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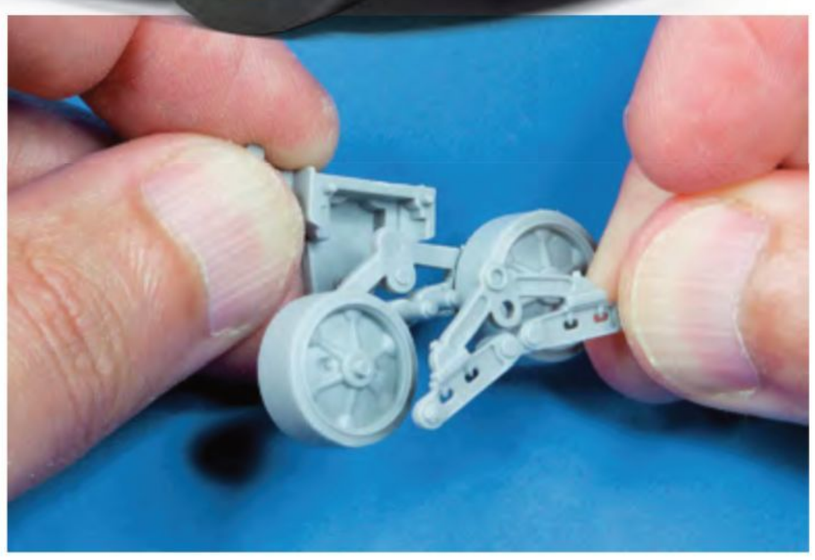
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Scale Modelling Road and Track presents nine build projects for all levels, from experienced car and bike modellers, to those considering entering this genre for the very first time. The build articles involve road-going supercars, Formula 1, Group C and vintage subjects from various manufacturers, with many techniques, hints and tips imparted by auto modelling specialists.

This 100-page special publication from the team behind *Airfix Model World* is unmissable for any car modeller, no matter what the skill level.

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JÄGER BOMB
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KANDY SHOPPE
The intricacies of reproducing 'candy' finishes are demonstrated in detail by Dr James Whalen, along with more general painting advice.

ONE-FIVE-EIGHT
Toni Canfora employs aftermarket and scratch-building techniques to breathe life into Smer's vintage 1/24 Alfa Romeo 158 Alfetta.

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Welcome to the re-printed *Scale Modelling – Step-by-Step*…whether you are a total novice, returning to the hobby after a long lay-off, or an experienced modeller.

I mention the latter because even old-hands can pick up bad or unproductive habits and forget the basics. While flexibility and experimentation form a large part of building scale models, there are some standards that are set in stone and many construction, painting and airbrushing methods are featured here. Primarily though, this instructional publication is aimed at beginners who, if they choose to stick with it, will have entered a fascinating and fun arena in which to develop their creativity. Modelling encompasses many disciplines, and for younger people it is perfect for developing manual dexterity and patience. For those interested in history, or who would like to be, the hobby presents a fantastic opportunity to explore research material… not just for inspiration, but also for achieving the best possible accuracy.

The content in *Step-by-Step* has been compiled by Swedish modeller Toni Canfora, who more experienced builders may recognise as a stalwart of the Nordic Edge modelling collective. This group has, over the years, developed an impressive array of skills and techniques and many emulate their style. Apart from being a highly skilled modeller and publisher, Toni has a knack for describing often complex processes in layman's terms making them easy to read and understand…and, above all, put into practice. I thank him formally for his efforts.

Those returning to modelling after a long break (teenage years, busy career, having kids, … circle the applicable!) will find the hobby has, in many ways, changed beyond all recognition. In the past two decades, new manufacturers have emerged to offer a massive variety of kits, decals, accessories and books. While old favourites, such as Airfix, have rejuvenated themselves and their products to keep up with the times - and our thirst for quality and detail. On these pages we endeavour to welcome lapsed modellers back to the fold and to help update their skills. Enjoy, and get building!



Chris Clifford,
Editor

Author: Toni Canfora
Editor: Chris Clifford
Assistant Editor: Stu Fone
Editor's Secretary: Melissa Smith
Designer: Tom Bagley
Chief Designer: Steve Donovan
Group Editor: Nigel Price
Production Manager: Janet Watkins
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In terms of variety, scale modelling is a hobby that can't be beaten.

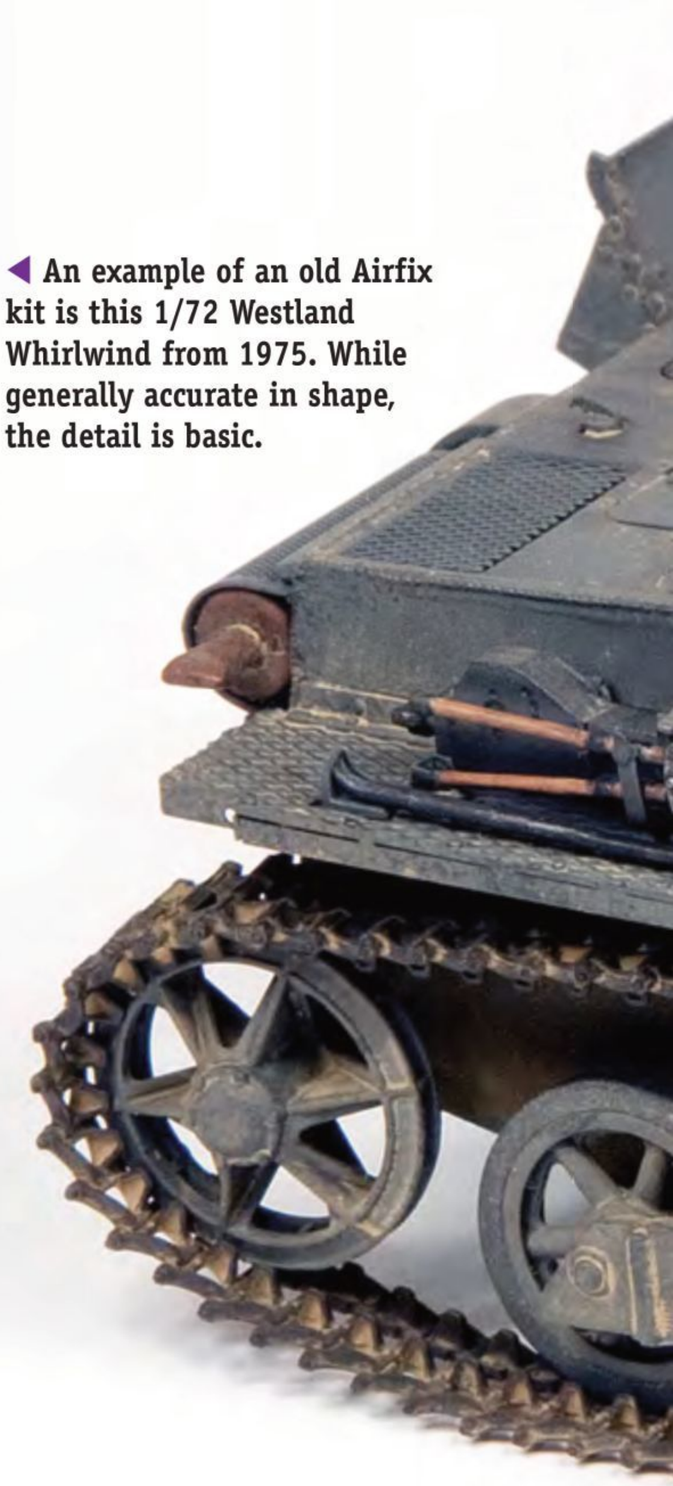
Besides the core subject matter of aircraft, armour, ships, space and cars, every sector offers a wealth of kits - and everything else needed for a truly rounded creative experience. But it hasn't always been this way. Back in the 1960s and 1970s many plastic kits were good for the period, but rather crude in comparison to today's products. Since then the hobby has experienced a revolution, not just in the sheer number of base kits, but also in the astounding selection of accessories produced by what's become known as the 'after-market'. Few real machines have avoided the focus of kit manufacturers, although their scale counterparts can vary in price and detail...even in these days of computer-aided design and high-tech moulding.



History

Kit quality has, generally, progressed exponentially in the past 20 years and now eclipses completely products made pre-1990 (even though at the time these were perceived as being worthy attempts). Early Airfix kits, while sometimes being accurate, bore raised panel lines, oversized rivets and very thick clear parts; the same could be said for models from Frog, Matchbox (whose kits were among the first to have engraved lines, but were decidedly trench-like), Heller and, in the USA, Revell, Monogram and Lindberg.

In what many perceive to be the golden age of modelling, the 1960s and 1970s were the formative years for notable brands. The most famous was, and still is, British



◀ **An example of an old Airfix kit is this 1/72 Westland Whirlwind from 1975. While generally accurate in shape, the detail is basic.**

This is Modelling!

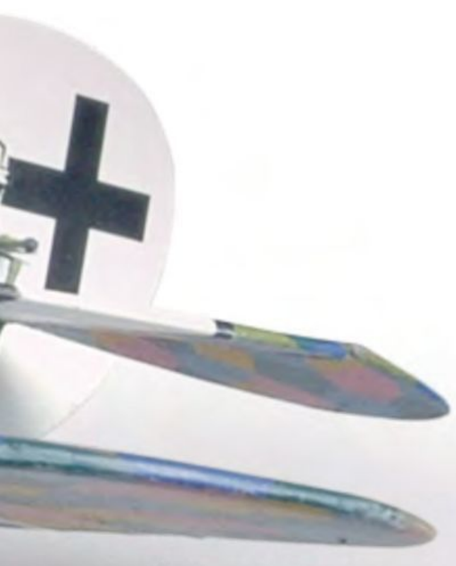
◤ **Wingnut Wings 1/32 Roland D.VIa**, by Steve Abbey

Dragon 1/35 PZ.BEF.WG.I Command Tank, by Toni Canfora





▶ **Another example of Airfix's bold new tooling is its Harrier GR7A/GR9A. Clever engineering is evident, and the kit sits on a par with (and in some areas actually betters) the Hasegawa/ Revell Harrier.**



▶ **Naval enthusiasts don't have just surface ships to build...there are also many submarines, such as ICM's 1/72 'Seehund' midget sub.**

icon Airfix which was often the first manufacturer to duplicate various war machines, cars and other subjects in scale form. Indeed, the hobby has for many years been known by the generic term 'Airfix Modelling' despite the existence of other brands. It's akin to Hoover being used as the term for any brand of vacuum cleaner!

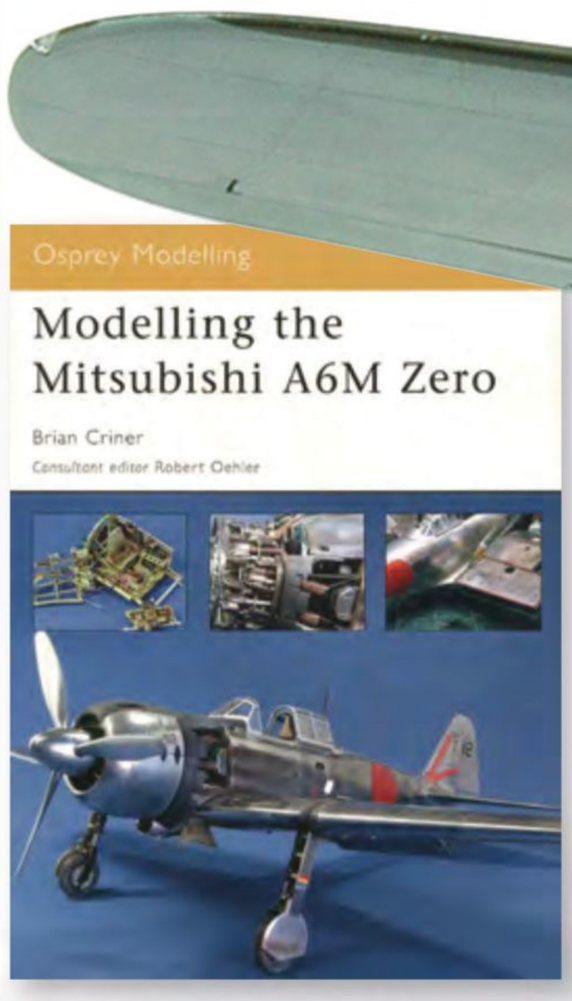
The fact that many of these early kits were fairly crude didn't seem to matter to younger modellers, whose only concern was to get a Spitfire or Tiger tank built and painted in a day...and back then modelling was THE pursuit for many children. Sadly, the attraction of computers and their associated games turned the heads of younger folk and the popularity of modelling waned. Of course there were just as many, if not more, older builders for whom detail and accuracy were the ultimate quest, so they set about adding their own embellishments, with scrap plastic, wire and other household materials. These days the over-30s still form the bedrock of modelling, but in recent years a near-disaster is helping to entice younger enthusiasts again. British stalwart Airfix was on its knees and bankruptcy was imminent, until the firm was bought by railway giant Hornby. The latter saw the potential for investment and clever marketing was employed...along with a drive for higher quality moulding and detail for Airfix kits in general. The results have been impressive, with inspiring packaging and publicity ▶







▲ **Hobby Boss is one of the more recent Asian brands. Its US Coastguard Jayhawk helicopter is just one of its products, from an impressive tally of aircraft, armour and naval subjects.**



◀ **Osprey Publishing is the friend of modellers worldwide, due to its vast selection of reference books. The company covers aircraft, armour, ships, figures and general military history.**

campaigns which seem to be capturing the attention of younger people who are interested in taking up the hobby.

Beyond Europe

Arguably the Far East has made a huge impact with brands such as Tamiya which, although it produces aircraft, is undoubtedly more famous for its excellent armour and car kits. Tamiya is a huge force in modelling but, in the eyes of many, has been superseded for military subjects by the Chinese firm Dragon. The latter offers a myriad of military kits (along with aircraft and ships), latterly created with 'slide-moulding' which means not just two halves to a mould, but the addition of a third section to produce treats such as hollow gun barrels and the like. Other noteworthy Asian brands include Hasegawa, Academy, Bronco, Kinetic, Hobby Boss, Meng and AFV Club, whose kits all exhibit superb moulded detail.

A surprising emergence has been kit and accessory manufacturers from the Czech Republic. This model-making hotbed, due to Cold War government encouragement of modelling as a wholesome pursuit, is home to the company Eduard. The company is the most famous name in photo-etched metal detail parts and, latterly, for very detailed 'multi-media' kits which contain plastic parts, along with resin and metal components for detailing. The Czech Republic is also home to equally impressive brands such as Special Hobby.

In essence, kits have changed from becoming little more than toys to highly detailed replicas, - but sometimes this comes at a price. Far East kits imported to the UK/Europe can be costly due to various factors…higher oil prices being just one. It's still possible to obtain cheaper kits, though, and in particular those in 1/72 scale.

◤ **MK35 Editions 1/35 1940s Tractor**, by Toni Canfora



Revell 1/32 Heinkel HE 111P-1, by Steve Abbey

Modellers building to a budget have obvious choices, which provide not just value for money but also pleasing detail. Many kit manufacturers offer cheaper and more expensive products in their ranges, and two major names leap out in terms of providing keen prices and high quality - Airfix and Revell. The former's re-invention by parent company Hornby has spawned greater detail than ever before, and kits such as the new 1/72 HP Victor, Westland Sea King and Me 262 have delighted legions of modellers. Recent standout 1/48 kits such as the Westland Walrus, P-51D and Sea Fury have also garnered high praise. On the continent and in the UK, Revell has long been recognised as providing quality kits at affordable prices… and the choice is varied. The Revell range offers a huge 1/72 Type VII German U-Boat and a highly detailed 1/24 London Routemaster bus…with a great many other subjects such as sports cars, aircraft and military vehicles. The company has also been a major player in the US for many years, albeit under different management. One other brand that budget-conscious modellers should consider is Italeri, which celebrated its 55th anniversary in 2017, offers a large range of aircraft, military, auto and some naval kits. While the detail may not always be top-notch on all its re-releases, newly tooled subjects such as its 1/32 F-35A Lightning II and Dassault Mirage III are a real treat.

Relative size

Plastic modelling has, almost always, been governed by scale. Those with little space favour 1/72 scale (one inch to six feet on the real thing) because the kits are generally smaller. In the US 1/48, or 'quarter scale' was king for many years. The larger scale and size means better and clearer detail but, recently, the even larger 1/32 scale has become popular. This is due in part to firms such as Chinese company Trumpeter, which has released a great many aircraft in 1/32 scale. In the same context, World War One aircraft have found new modelling fans after film director Peter Jackson set up his own kit company, Wingnut Wings, which produces exquisite 1/32 Great War flying machine kits at reasonable prices.

In the armour arena, 1/35 scale is still the most favoured and there is a massive array of subjects. In recent years smaller scale military models, in 1/72 and 1/76, have made a comeback, but 1/48 kits have also emerged. Ship modellers have, for the most part, had the most choice in 1/700 and 1/350 and the latter has seen some stunning products in recent years, from Hasegawa, Tamiya, Dragon and Flyhawk. But the outstanding detail does cost more.

A global community

The hobby's stature has grown with the advent of modelling clubs in many countries. These enable like-minded people to meet on a regular basis, share ideas, learn new skills and see each other's work in progress. Instrumental in furthering the aims and reputation of the hobby is the International Plastic Modellers' Society, which has branches worldwide and stages popular shows and exhibitions. There are also many independent clubs not affiliated to IPMS which offer good company and sound advice. Undoubtedly, though, the Internet is a primary



Aftermarket accessories now account for a blossoming sector of the industry. This 1/48 Russian rocket pod and loading trolley from Czech-based firm Eduard, is a fine example of modern resin casting.



Airfix 1/72 Mikoyan Gurevich MiG-15, by Alan Price

destination for bringing modellers together. Dedicated websites, such as Hyperscale, are a major growth area, offering previews and reviews, discussion forums and reference material. Anyone with a question to do with modelling, or a real machine, can find someone on the internet to provide the answer and this has resulted in an increase in forum 'posting'.

Fun on paper

While the internet has its uses and is a superlative resource, the traditional printed word still looms large and offers not just a dizzying array of magazines in many countries, but an even more staggering selection of reference books. There is little that has not already been investigated by enthusiasts, authors, historians and publishers. No matter what the aircraft, tank, car, ship or other machine, it's likely that there is a suitable reference tome which will aid the modeller to understand the subject. Among magazines, *Airfix Model World* was launched in 2010, but established itself quickly as Europe's top-selling publication, providing a mix of sound modelling advice and historical reference. It seeks to echo the classic *Airfix Magazine* of old, available in the 1960s and 1970s (then briefly again in the 1980s and 1990s), in that it covers many genres such as aircraft, military and space, but with a fresh and modern approach. More established titles include *Scale Aircraft Modelling*, *Model Airplane International* and *Military Modelling*.

The choice of current books is legion, too, with Osprey Publishing being a prolific producer of reference material such as its 100-plus Aircraft of the Aces series, type-specific/generic instructional modelling titles on various aircraft and armour and books which educate on the tactics and intricacies of warfare through the ages.

The Future

With the jaw-dropping array of products available in modelling today, it's difficult to see how things can improve. Plastic kit quality is almost as good as it can get without resorting to more expensive resin and mixed-media alternatives. Where betterment lies is arguably in the realm of subject matter despite the massive choice currently at hand. Oddly, there are still aircraft and other machines which do not have good representation in a given scale, although rendition by a kit manufacturer does often rest with demand and 'saleability'. Wait long enough though and it is likely one's Holy Grail will eventually appear.

For now, there is a seemingly endless supply of kits, accessories, decals and books with which to busy ourselves - and the list grows longer each week. Few hobbies offer as much opportunity so, if you are a beginner, don't feel overwhelmed by the choice… simply decide what's appealing and go for it.

▼ A high parts count, multi-media content and staggering detail…all facets of a Dragon armour kit. The company is among the market leaders in terms of 1/35 scale military subjects.



Scale Modelling MOSQUITO



The Mosquito was one of the most famous and capable aircraft of World War Two. This 100-page special from the team behind *Airfix Model World* magazine celebrates that fact with five full model builds, type histories, kit/decal/accessory listings and exclusive scale drawings. Learn about the real Mosquito, and receive great instruction and advice on assembly, scratch-building, detailing and more.

History features are provided by the renowned authors Dana Bell, Malcolm V Lowe and Terry Higgins, and all are accompanied by superb period images and colour profiles. The five in-depth Mosquito build projects are:

AIRFIX 1/24 FB.VI COASTAL COMMAND

TAMIYA 1/32 FB.VI SEAC

HASEGAWA 1/72 FB.XVIII 'TSETSE'

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Choosing the Right Tools

This chapter will serve as a guide to the selection of basic tools and equipment that are, if not necessary, at least of great help when constructing a plastic model. As with most artistic hobbies, tools play an important role and can have a great impact on the end result. It's worth noting that expensive doesn't always mean better, even if price and quality go hand-in-hand, but fortunately the basic tools shown here are not a major investment. And it is not necessary to start off with a big toolbox either… one can add the preferred equipment over time.

Sourcing the tools

There are a few items that are absolutely necessary even for the most basic modelling tasks, and without which the work will prove to be much more difficult, not to mention dangerous. Using non-purpose tools (especially sharp knives) is not recommended, and in general children should not handle sharp tools without parental guidance.

Hobby shops usually carry all the tools needed to get started and in most cases the staff are qualified to guide the client through the selection to make the choices easier. They are often modellers themselves and get daily customer feedback on the items they sell. Model shows are also a good source of products.

Many tools, however, can just as easily be found in a hardware store, or even in women's make-up stores and chemists, and are generally much cheaper when compared to modelling-specific items. One should keep in mind, though, that branded products are properly manufactured for modelling purposes.

▼ **Hobby knives are available in many styles and with a large selection of blades. Cheaper starter sets or all-in-one kits can be found in hardware shops, if a major brand is too expensive or unavailable.**





Here's a good example of a budget hobby knife starter set, with different handles and blades.

KNIVES

The most important and versatile tool is the hobby knife. They come in many different sizes and shapes and, with a great selection of blades and handles. The knife, or scalpel, is the most used modelling tool and should be selected with care, as many construction hours will be spent with them in hand.

The typical hobby knife has a metal shaft and interchangeable blades, and the most famous brands are X-ACTO and Swann-Morton (the latter being used by surgeons worldwide). It is of course a matter of taste if one prefers a plastic or metal shaft, but the latter provides safety in that it won't bend under pressure, risking the blade sliding and breaking.

On most knives the blades are easily switched and many various sizes and shapes are available, and again it's up to one's taste which to use. Often, different tasks will demand various blade shapes. Some modellers prefer to always have a very sharp blade and change theirs often, while others seem to like the blade better once the really sharp edge is worn down and has less bite. In fact, in can be a good idea to have both at hand as the blunter blade can be useful when cleaning up troublesome mould seams on very delicate parts, where a fresh blade could ruin desirable detail.

Many office stores now sell paper-cutting scalpels, usually with a plastic shaft, and these can be used as hobby knives as well. Carpet knives can also be employed for modelling purposes. Keep in mind, though, that these less-refined knives are made for cutting sharp edges, not carving and shaping and therefore have less 'feel' in the hand, being less comfortable.



The classic X-ACTO or Excel model, with a round metal handle. This is a good, sturdy knife.

▼ A paper scalpel found in office stores can be used as a hobby knife, but lacks stability for tougher work.



▼ The three most important blade types are the straight, curved and flat, or chisel edge.



DRILLS

Hobby drills are hard to come by and have to be sourced from hobby shops, well-stocked craft shops or hardware stores. The reason for this is the very small bit diameter has little use for other than fine crafts. These drills are very delicate and easily broken so their life expectancy is short. Still, they will prove very useful for drilling out exhaust pipes, gun barrels and for making small holes when necessary, when the tip of a hobby knife will simply not suffice. Due to their small diameter, a special purpose pin-vice will have to be used and these are normally sold together with the drill bits.



A typical hobby drill set, with bits as small as 0.3mm in diameter.

CLAMPS

Plastic clamps have limited use but are nonetheless a tool that can come in handy, especially when using slow-drying glues or when cementing large pieces. Wing or fuselage halves are examples, when the pieces need to dry straight and under pressure to avoid gaps. The use of masking tape will be dealt with in the painting chapter, but it is worth stating here what a great aid it is when holding parts together during dry-fitting and while glue sets.



Self-closing clamps help to hold larger pieces together during dry-fitting and gluing.

SAW BLADES

For basic construction, the modelling saw is perhaps not the most important tool in the box, but for more advanced building, such as cutting loose an aircraft's rudder or opening a hatch, they will prove to be essential. As with hobby drills, this tool can be considered a speciality item and will be hard to find other than in hobby shops. The blades generally come with a variety of teeth, the finest are as thin as razor blades, with extremely delicate teeth for minimal damage of the plastic and fine cutting control.



Tools for part removal, cutting, sawing and scribing.

CUTTERS

Sharp cutters will make modelling both easier and safer, and are very useful when the knife isn't strong enough. For instance, when removing parts from a thick runner the knife blade could break, and since the runner has to be pressed against a surface there is great risk of damaging the parts. Removing components with cutters is by far the quickest way, too. Cutters are also best for cutting metal wire, even though the cutting faces can get easily damaged; it's wise to have a special tool just for metal.



▲ A modelling saw for cutting plastic. This has a multitude of uses, no matter what the model.



▲ A regular pair of scissors is always useful when cutting out decals or lengths of masking tape.



▲ For finer sawing, such as cutting out rudders, flaps or aileron surfaces, a special-purpose saw with a very fine blade is the best choice.



▲ Plastic scribers are great for cleaning up panel lines in putty, but also for re-scribing and freshly scribing new panel line detail.



Dedicated cutters are extremely useful for removing parts from the runner, cutting metal wire and working photo-etched metal details.



Here are various examples of cement that can be employed for different parts of a model.

GLUE/CEMENT

Much has happened since the early days when modelling glue was slow to dry, toxic and left nasty stains...or even worse, long threads. Today the market offers very thin liquid cement, slightly thicker contact glue, fast-drying and super-strong cyanoacrylate (Superglue and others), and incredibly tough two-part epoxy to mention a few. It is really up to the modeller which one to use, but they do have different purposes. Thin liquid glue, such as Tamiya Extra Thin Cement or Humbrol Liquid Poly, is perfect for very delicate parts as very little of the fluid is needed and it is applied with a fine brush. The cement doesn't really glue the pieces, but rather melts the plastic to promote a bond. The only downside with this type of glue is that once the plastic has melted, the part will be ruined if the bond is cracked.

Other common glues are Humbrol's Poly Cement and Revell's Contacta, which also rely on the melting process but are applied through a very fine metal tube. These cements work well with small and delicate parts, and are also suitable for slightly bigger areas such as gluing wings and tailplanes to the fuselage.

For small parts that need to dry instantly in place, cyanoacrylate is the perfect choice, as a minimum amount of cement is needed and it dries in seconds. A great advantage with Superglue and other 'cyano' adhesives is that they also work with metal parts. A well-known brand is ZAP, and its product Zap-A-Gap, which comes in several viscosities. As the name suggets, the cement also works well as a gap-filler. Cyanoacrylate (CA) is toxic though, and should not be inhaled...contact with skin must also be avoided (it was designed to bond skin, after all). Always make sure the working area is well ventilated.

Epoxy cement gives super-strong bonds, and dries slower than CA. This type of adhesive generally comes with two gels, which are mixed together before application. The most famous brand is Araldite, and while there is a slow-setting variety, the Rapid version sets in five minutes. Epoxy cement is useful for larger models with heavy parts, or when combining different materials.

▼ Humbrol and Revell cement offerings are of good quality, and easy to use.



▼ Two-component epoxy creates super-strong bonds and can set within five to ten minutes.



CUTTING MAT

It is not necessary to purchase a special purpose cutting mat, but they do offer more than just protection of the working area. Apart from having a surface that is designed to absorb the sharp edges of knives and saw blades, they usually have a printed scale ruler and a square web pattern. These are very useful when cutting parts to a 90 or 45 degree angle, when an item needs to be measured and when parts need to be properly aligned when glued.

TWEEZERS

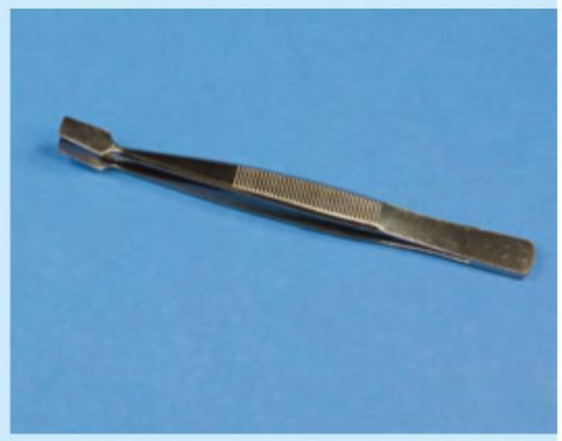
Modelling involves handling delicate parts and, to make things more complicated, they usually fit in hard-to-reach places (clumsy hands and thick fingers don't help matters). To remedy this there are various forms of tweezers to choose from. The typical version is straight-armed and closes when squeezed; these can be found in make-up stores, chemists and hobby shops.

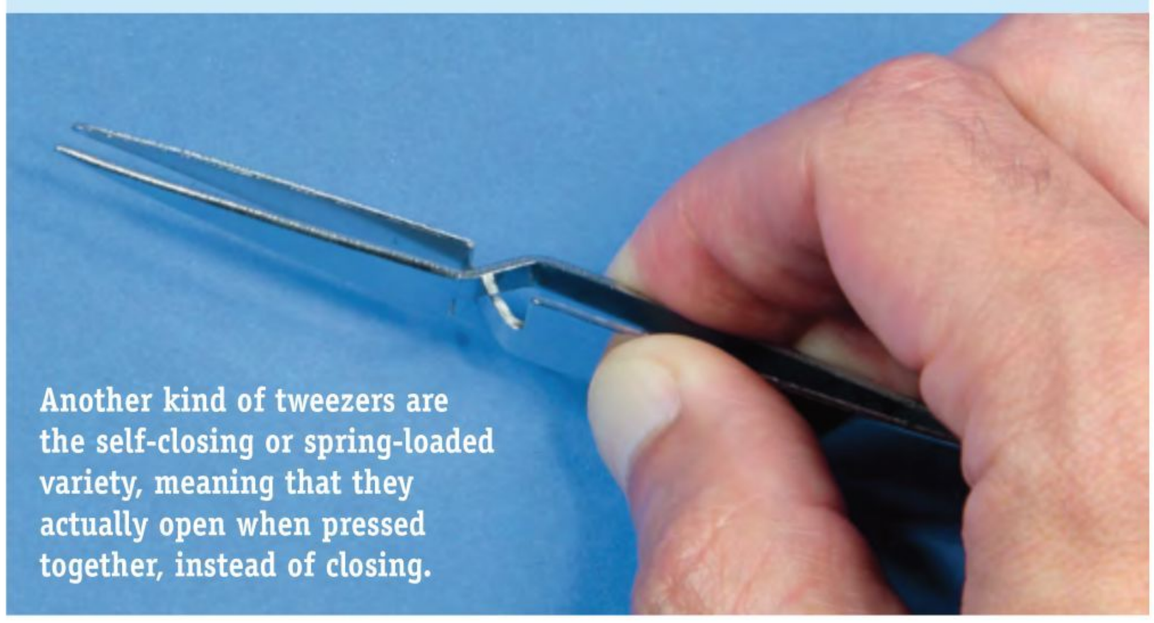
It is essential to keep the tweezers in good shape and they should be replaced as soon as they don't close properly. Tweezers with larger flat tips are useful when handling decals.

▼ Tweezers with a bent tip are suitable for reaching inside narrow spaces, such as a cockpit or turret.



▼ These 'duck-billed' tweezers are perfect for applying decals and small sub-assemblies.





Another kind of tweezers are the self-closing or spring-loaded variety, meaning that they actually open when pressed together, instead of closing.



Pliers are vital when working with metal parts.



▲ An overview of sanding mediums: sanding sticks are perhaps the most essential items and can be found in any make-up store or chemist.



▲ Sanding sticks can be bought in different grades, for versatility.



▲ A selection of diamond files... note the different profiles; each has its own use.

SANDING TOOLS

Next to the hobby knife, sanding tools are the most important items in the toolbox. Whether it is a simple piece of abrasive paper, such as Wet & Dry, or state-of-the-art diamond files, they are absolutely necessary and have a great field of use. Basic cleaning up of parts, sanding filled areas on a model and shaping parts are the most common uses.

Sanding sticks, which are essentially nail files, are perhaps the most useful. They come in many grades from very coarse to extremely smooth, for a polished finish. Sanding sticks give the modeller good grip and control of the sanding motion, and compared to using sand paper it is also less tiring... something to consider when cleaning up 20 road wheels on a tank chassis.

Sandpaper is easy to come by and is very cheap. One advantage is that sand paper can be bent and shaped to reach corners that are hard to reach with files. It is also the perfect choice for sanding large, flat surfaces such as the inside of fuselage halves, before gluing them together. Diamond and plain metal files are great for sanding rough surfaces and for sanding components to a certain shape. They are available in many profiles and usually come in packages of four to eight pieces, including round, half-round, square and flat, which are perhaps the most useful shapes.

A Scotch-Brite pad or rough household sponge is another cheap all-round item found in any supermarket. It is great for cleaning up metal and round plastic parts, by rubbing the item between the fingers with the cloth.



A selection of putty products, which can be found in most good craft and hobby shops.

PUTTIES/FILLERS

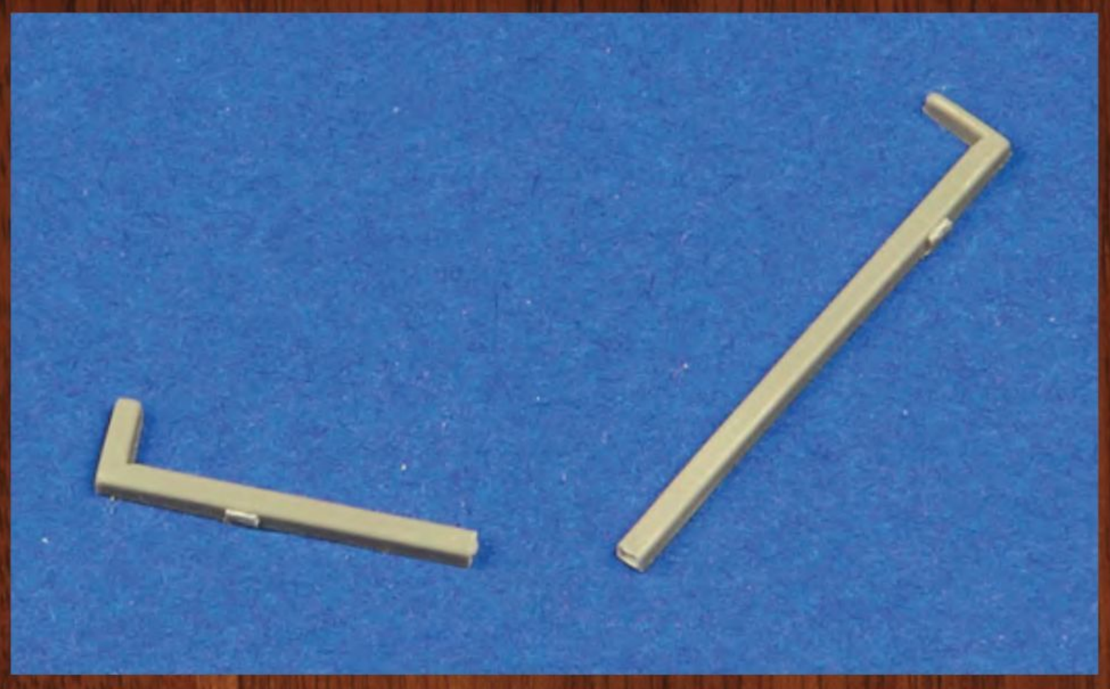
Although the quality of kits today is generally very high, very few offer total perfection. Some may come near but not many models are completed without the use of filler or putty, if a perfect result is the goal. Filler is used to fill and conceal a gap or a seam that was not visible on the actual vehicle, aircraft, car etc. The common filler is usually grey and fast drying, such as Tamiya Putty Basic Type. It is easily applied with the tip of a hobby knife, a piece of plastic or a special purpose putty tool. This type of filler is suitable for shallow gaps or filling small seams and can be thinned with liquid cement. For larger gaps or areas difficult to sand, two-component filler is often more suitable. Milliput is a common brand that offers putty in different grains, with Superfine White being the smoothest. This putty is water-soluble which means it can be smoothed into tiny gaps with the aid of a finger and a drop of water, to create perfect filler that needs little or no sanding. Milliput also dries slowly, which is of benefit when working on large areas, but it can be force-dried in an airing cupboard or similar warm area.



▲ Tamiya's Basic Putty is a common product, similar to those offered by Squadron, Humbrol, Revell and Italeri.

▼ Masking tape is useful for holding large parts in place when gluing, besides its obvious use as a masking medium when painting and airbrushing.





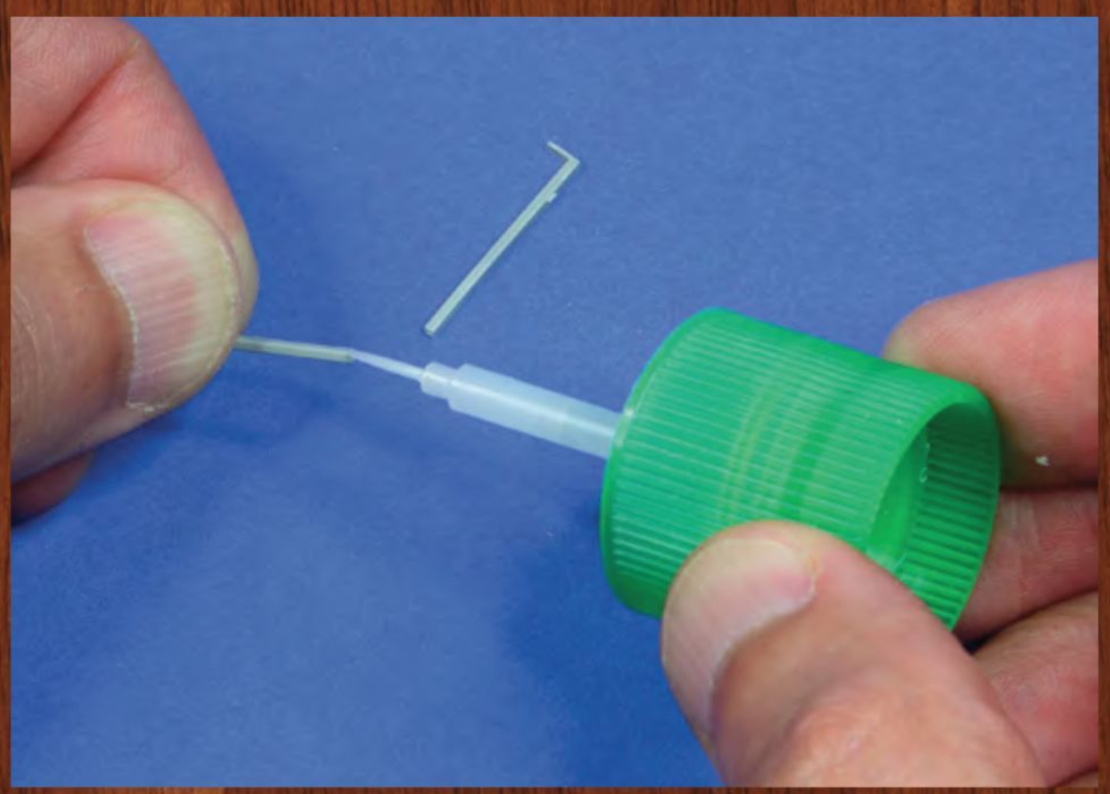
▲ When cleaning up delicate parts such as these, they can easily be broken.

Don't Panic!

Every modeller experiences part breakage but it doesn't mean that the kit in question has to be shunned. The repair or re-creation of kit components can be very simple, as shown here...

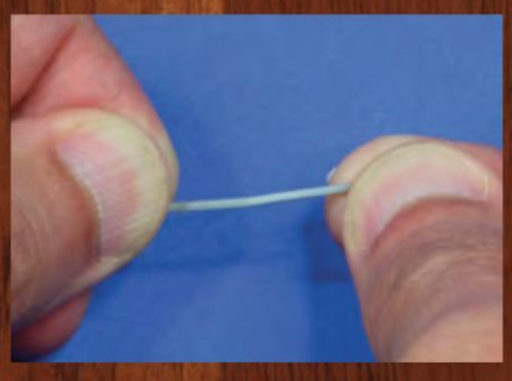


▲ This is a typical fragile kit part...a thin beam.

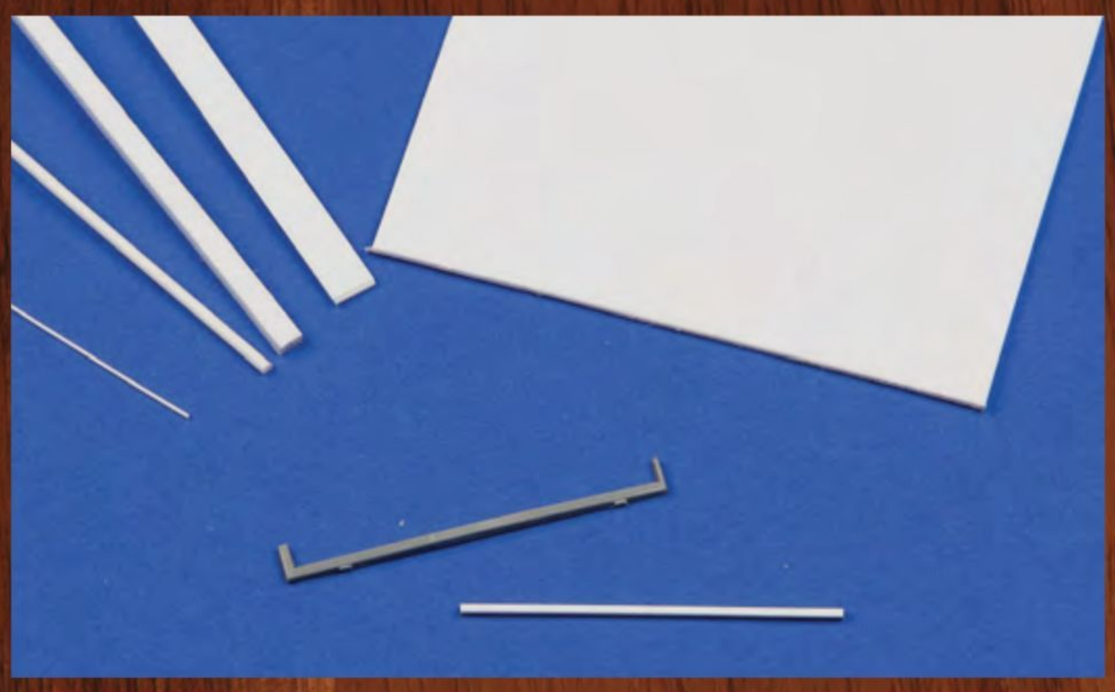


▲ If the break is clean, a small amount of liquid cement can be applied...

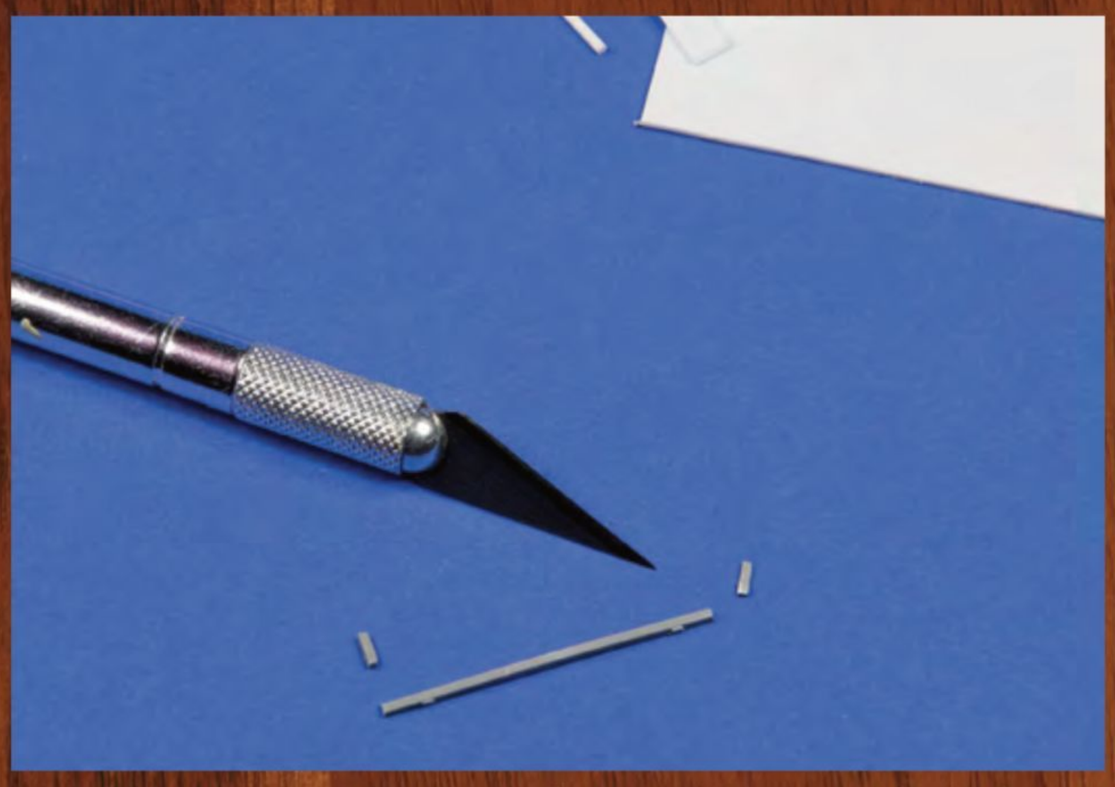
▼ ...then the parts are gently pressed together and held firmly for a minute then left to dry.



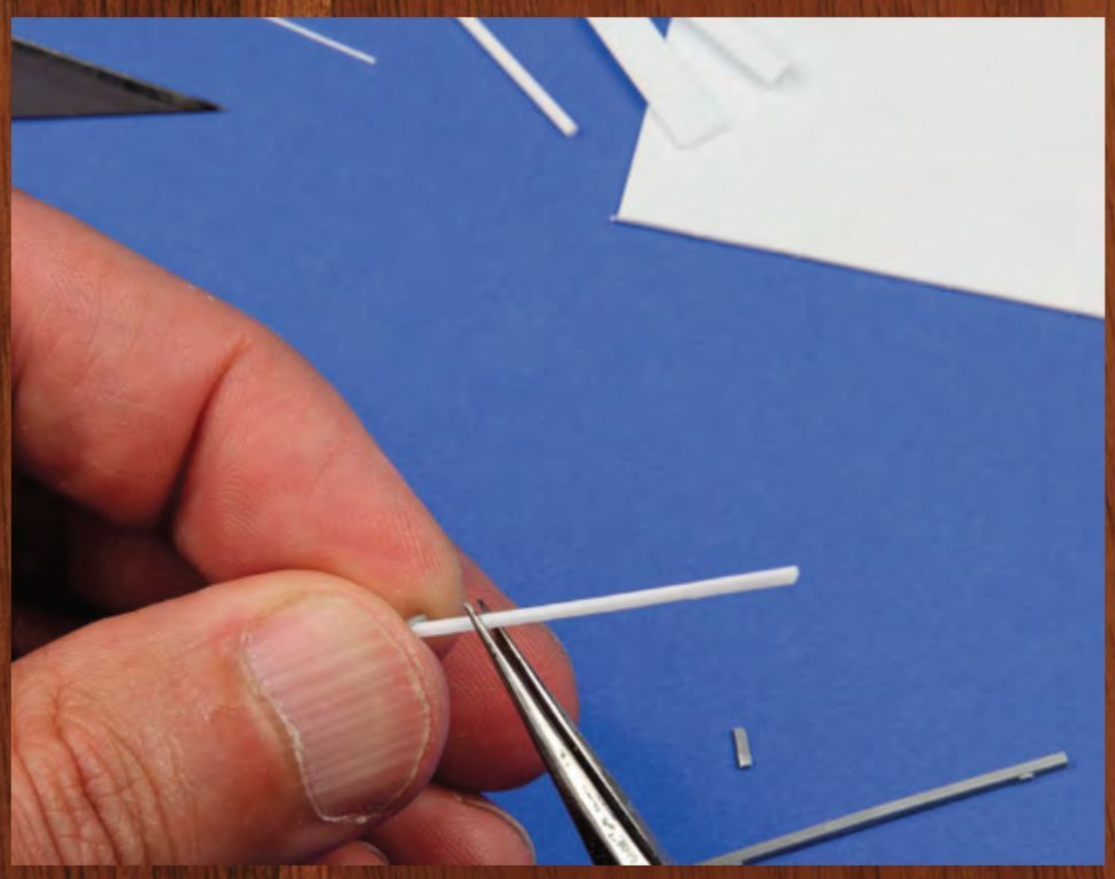




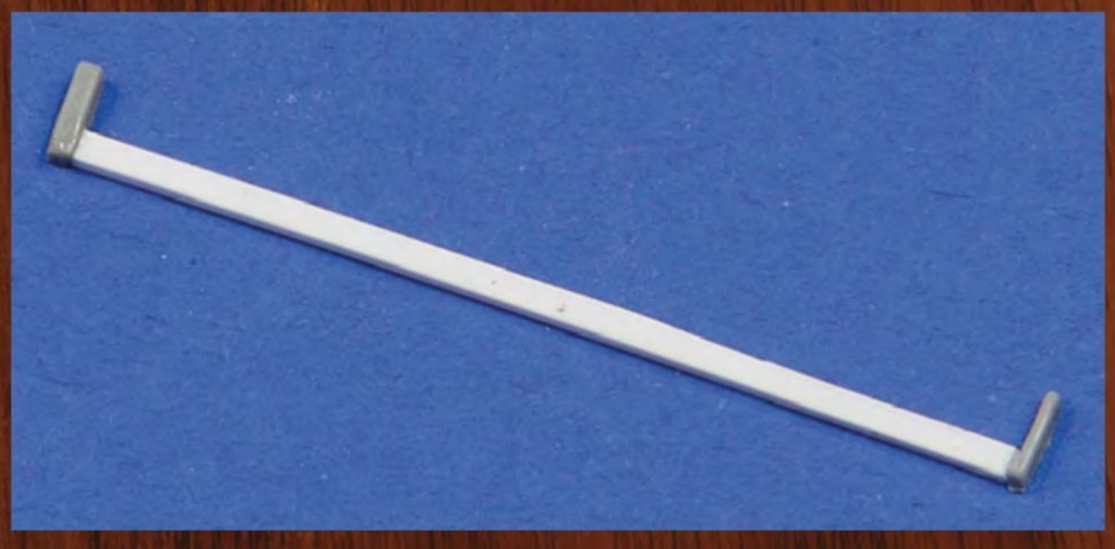
▲ If a kit part is damaged severely, it may be necessary to replace certain parts of it. Here, a suitable piece of plastic strip has been selected.



▲ The kit part end uprights are cut off neatly with a sharp hobby knife.



▲▼ Plastic strip items are then simply glued to the ends of the original kit part.



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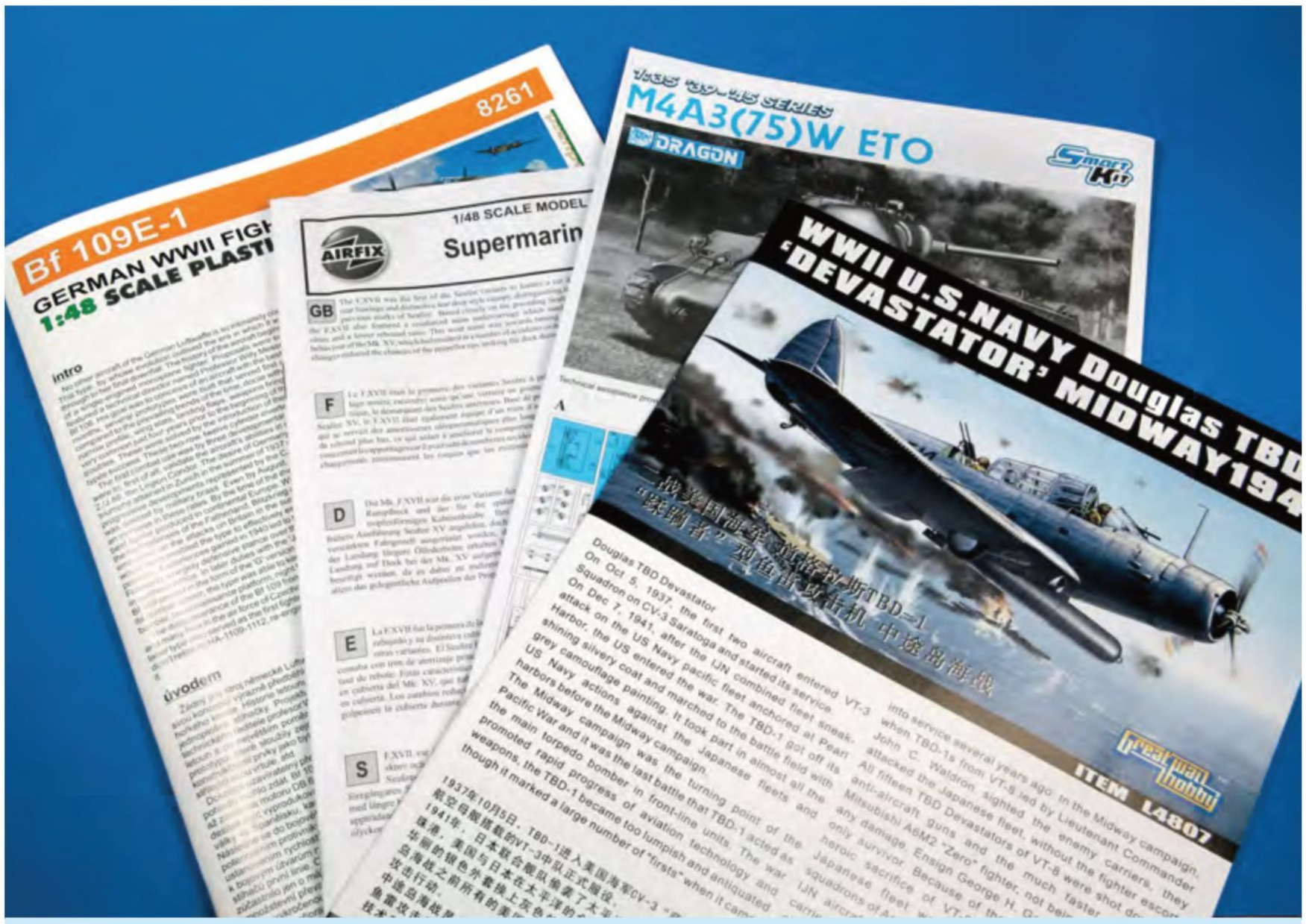
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Construction and Painting guides

Without assembly instructions, any kit would prove to be a near impossible challenge, even for the most experienced modeller. The kit instructions not only tell the modeller what goes where, but they also provide a building sequence that is well considered and, in many cases, the most logical way to proceed.

Instruction manuals come in many forms, from rather simple black and white line drawings, to colour-printed and computer-generated 3D-graphics. And it's not necessarily the latter that is the most helpful or clear. It is also important to keep in mind that kit manufacturers have different approaches, on parts break-down and how to visualise the assembly process in the instructions. For this reason it's very important to carefully study the instructions before beginning assembly and committing glue to plastic. This will not only help to understand the assembly sequences, but also to help comprehend the various symbols and letters used on the sheet. Usually, a kit will have the parts on frames, or runners, named A,B,C and so on, and then numbered from one and ascending. Learning the specific numbering system for a kit helps to speed up and ease the building process, which in a kit with hundreds of parts would otherwise be difficult.



▲ **Instruction sheets can be simple black and white drawings, exclusively full colour or a mix of both.**

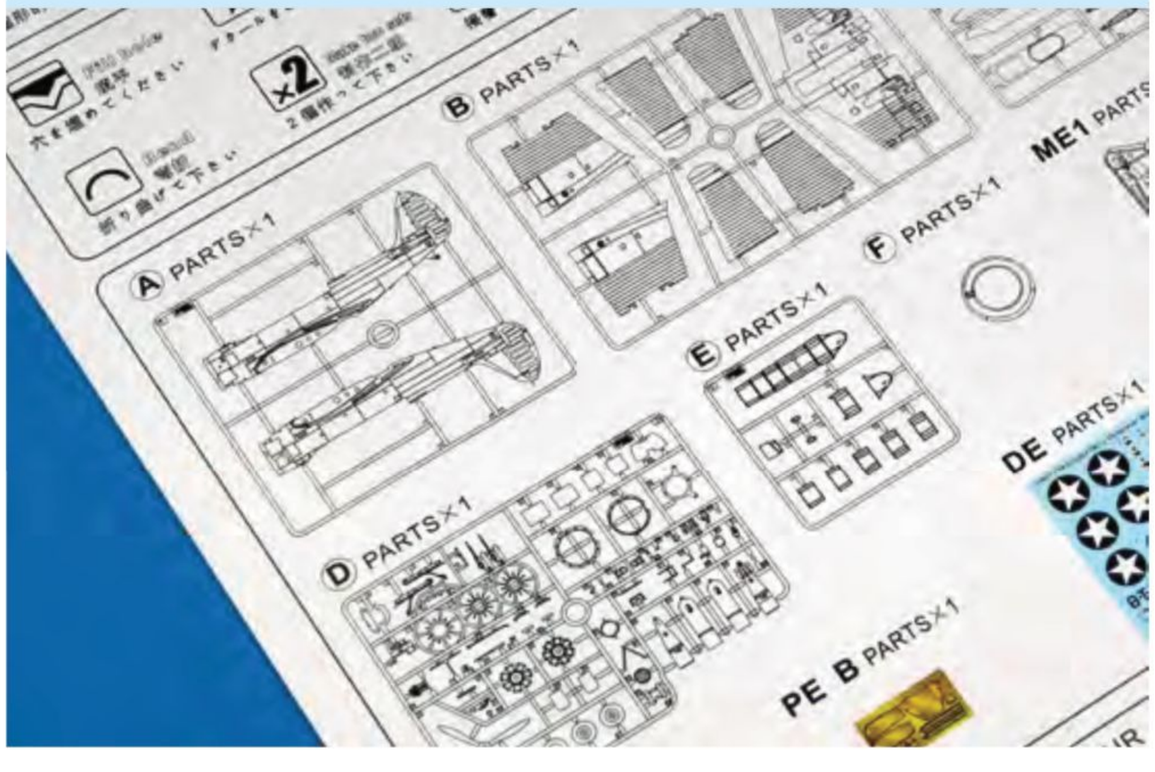
Command markings

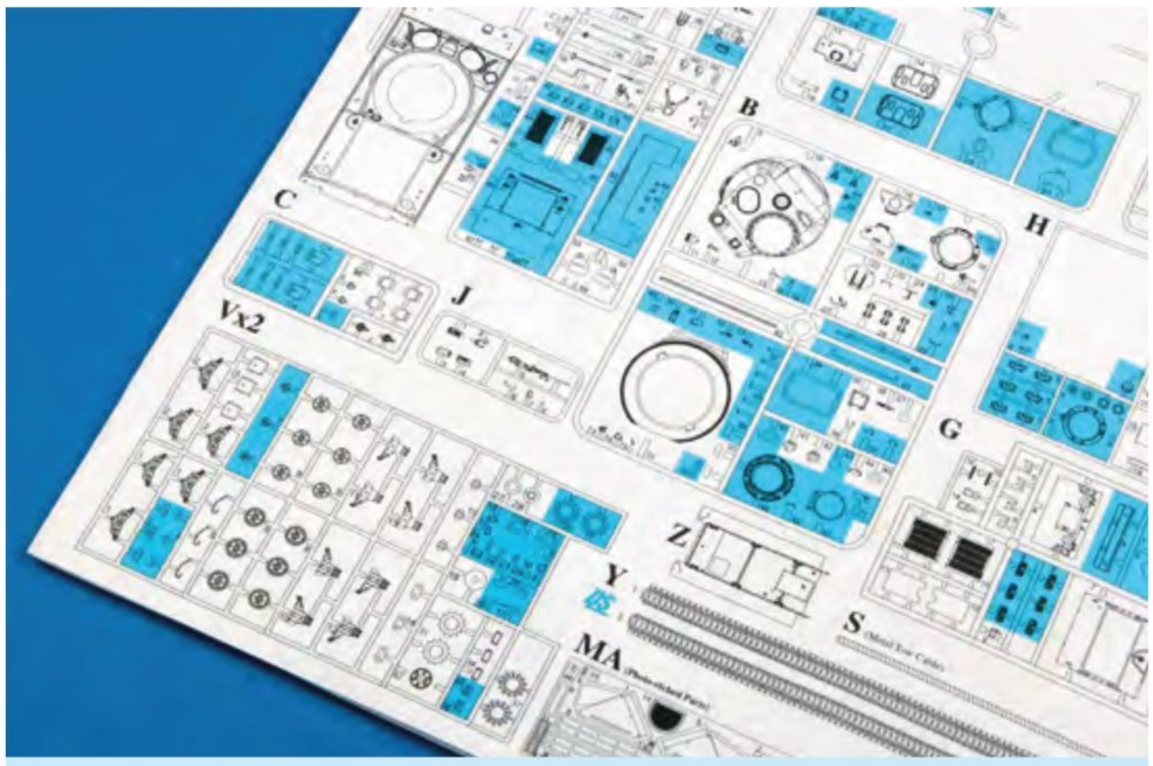
Instruction manuals also commonly use symbols to show the modeller where a specific action is to be taken. For instance, where it's necessary to drill a hole, assemble without glue, choose between optional parts etc. Study of these symbols is vital and ignoring them can cause unexpected problems during construction. It's not uncommon that kits also include parts that are not intended to be used, which may come as a surprise. The explanation is, however, quite simple. Many kits are released in different versions of, for instance, an aircraft, and to cut costs their respective parts are moulded on the same runners. Subsequently, certain components that are specific for one version may not be applicable to others.

Build sequences

The construction sequence of most kits is similar regardless of manufacturer, even if their complexity can vary depending on the scale and level of detail. A good rule of thumb is to choose a kit which requires a suitable skill level. Too complicated a kit can easily affect one's

▼ **Kit parts runners are usually labelled A, B, C and so on for easier recognition. Layout illustrations of the runners and their components are often included on the instructions.**





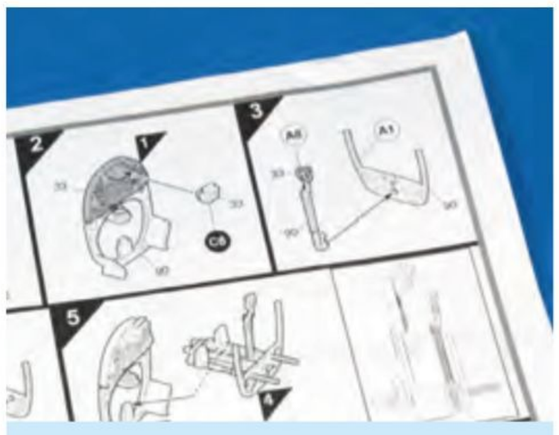
▲ Kit parts not be used are usually highlighted, in this case with blue. These can always be consigned to a spares box for use on other builds, or they can simply be used for practice and honing one's skills.

FURTHER HELP

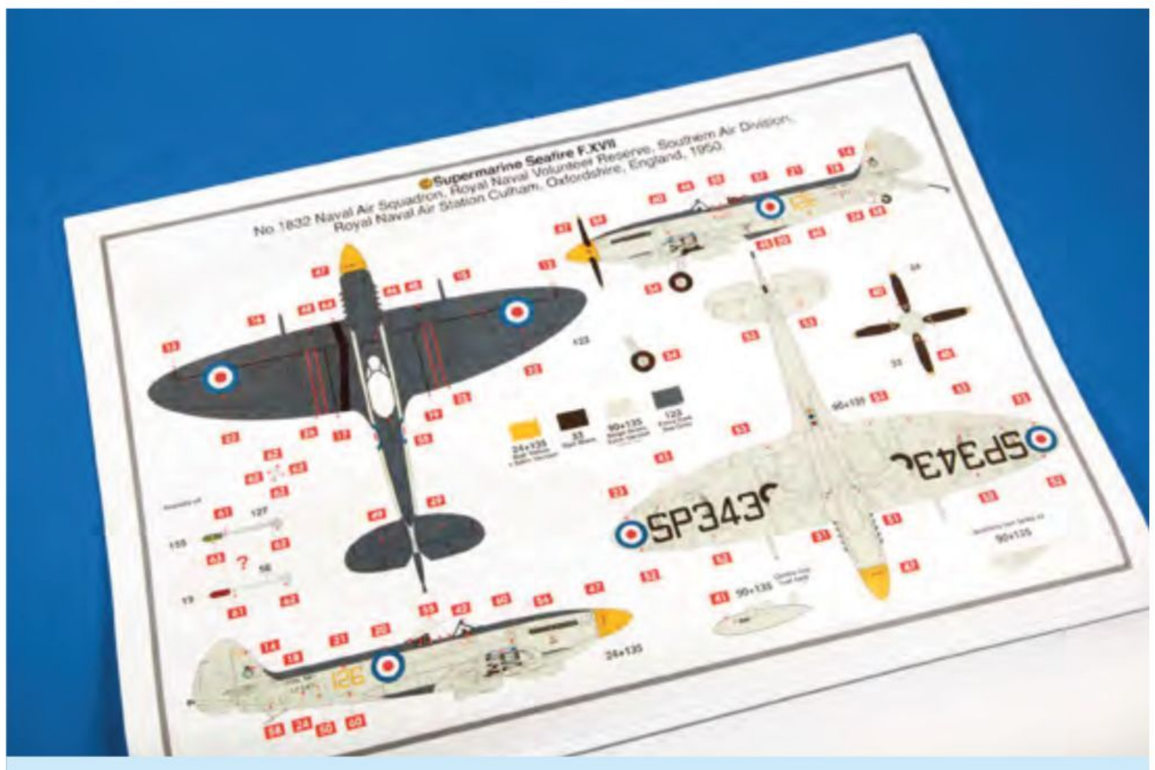
Even if most instructions provide necessary guidance for the assembly, they are seldom flawless and this is sometimes the case with the kit itself. Modelling magazines are of great use in terms of reference and inspiration, while the Internet is also a great resource, where many modellers are happy to share their projects and often post pictures of on-going builds. Kit reviews are easily found too, and these help to highlight difficult sections in the assembly process of a certain model, and how to solve any issues.



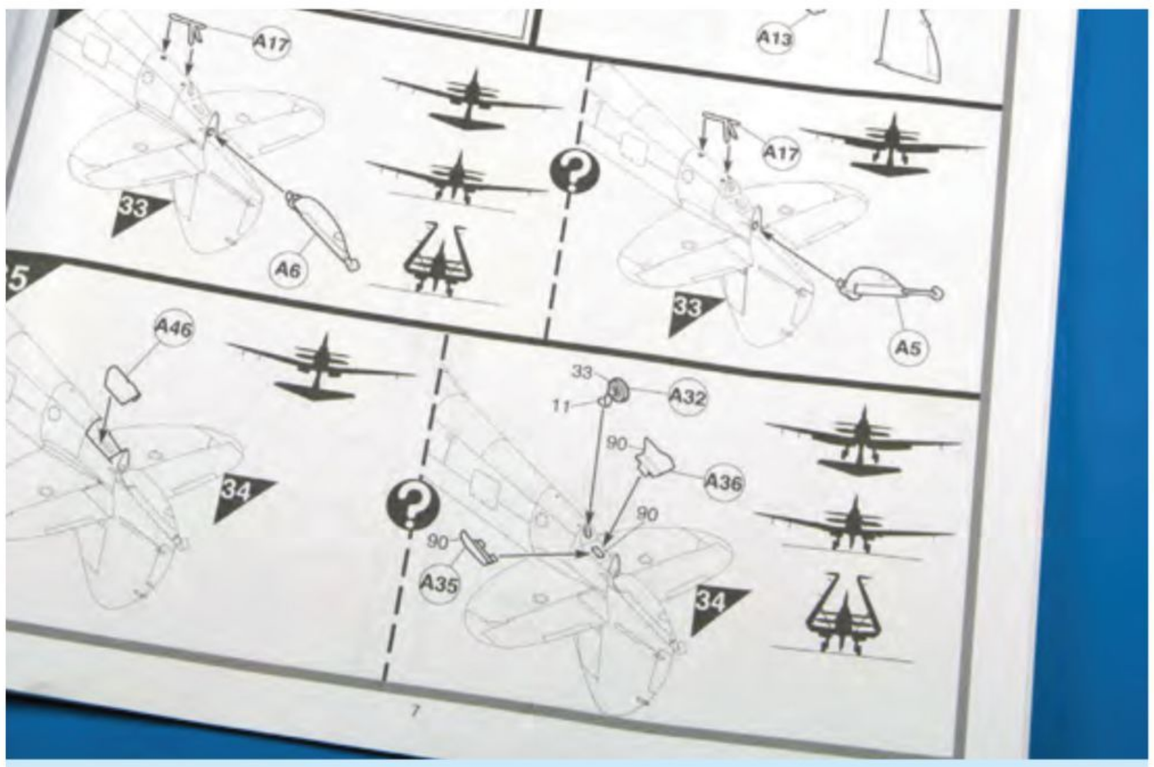
▲ Careful study of the instruction sheet's various symbols is vital for accuracy and avoiding mistakes.



▲ With good instruction sheets, the build sequence is numbered and easy to follow.



▲ A decal guide is also usually provided with the painting instructions. Placement is mostly achieved by way of corresponding numbers on the decal sheet itself.



▲ It is very common for kits to have optional parts. Here, the choices are highlighted with a question mark symbol.

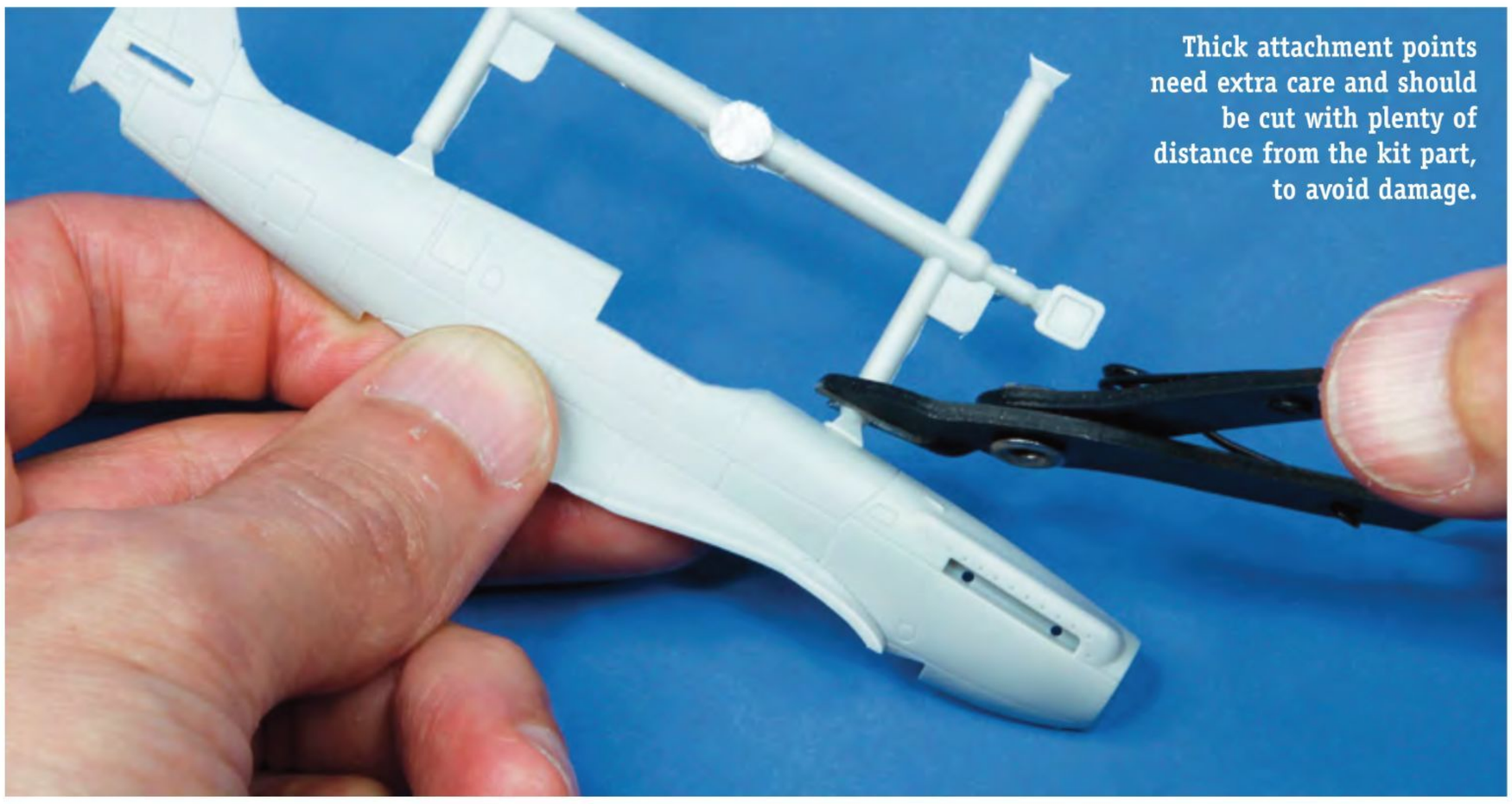


▲ A colour and decal placement guide is also usually included within the instructions. These should be studied carefully before any painting begins.

enthusiasm and confidence, and test one's patience to the limit. Aircraft kits are generally constructed with the cockpit as a starting point, followed by assembly of the fuselage halves, wings, landing gear and external parts such as fuel tanks and weaponry. With a few kits built, the modeller will soon find ways to jump between these sections which, in the end, can save time. Military kits, especially tanks, also follow a typical build sequence which usually begins with the chassis and lower hull. This is usually followed by the upper hull and turret then finally, on-vehicle tools and equipment. Some builds are very complex and the instruction sheet may contain more than 40 stages, or sections. To keep track of what has been dealt with, it can be a good idea to simply use a regular pen to mark the completed steps with, for instance, an X.

Colour suggestions

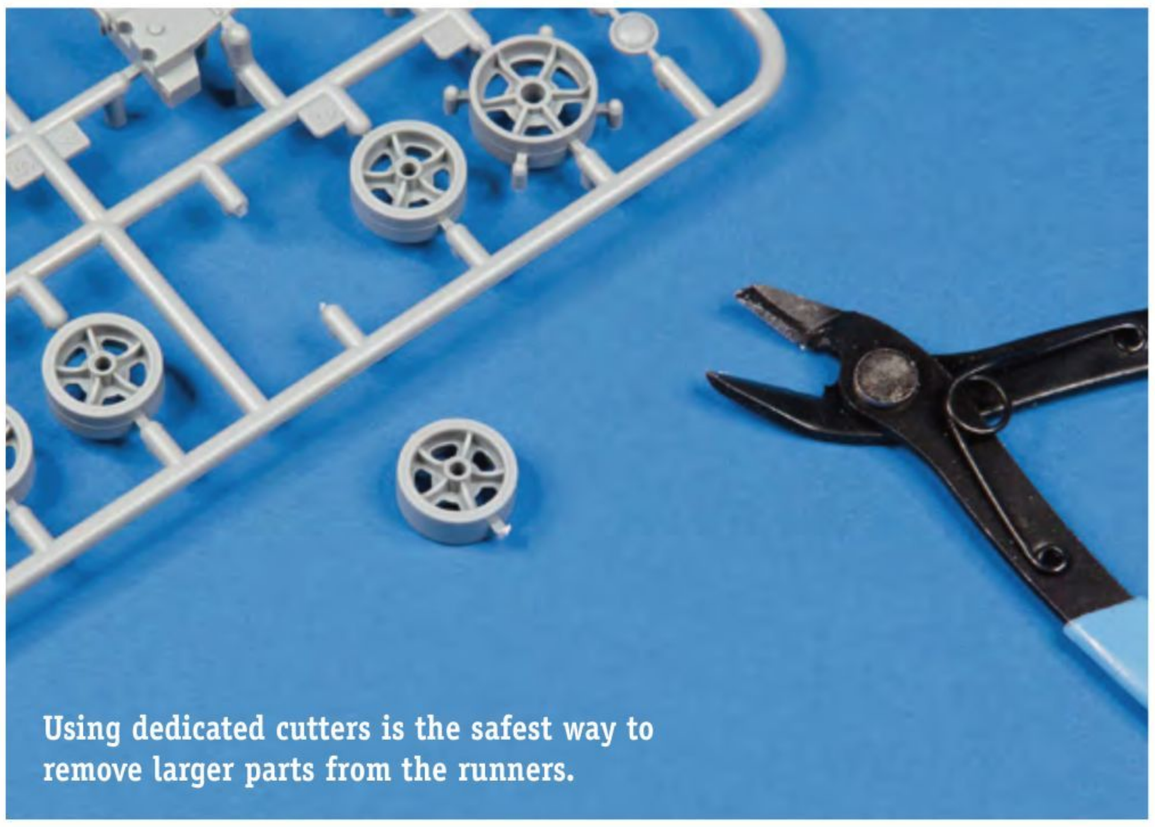
The instruction manual also serves as a painting guide. All necessary colours are listed and it will be explained where to apply each colour, and if painting is to be carried out before the assembly is finished. This could, for instance, be in a cockpit before the fuselage halves are glued together which would make the cockpit inaccessible. The colour guide often also provides several colour brand suggestions, to make it easier to find the suitable colour…even if one specific brand is not available at the local shop. Most kits come with several painting options, so the instructions should be studied carefully in order to achieve the correct result. The same goes for the decals, which are normally supplied on a separate sheet. Painting and the application of decals will be covered in depth in a later chapter.



Thick attachment points need extra care and should be cut with plenty of distance from the kit part, to avoid damage.

Working with the plastic

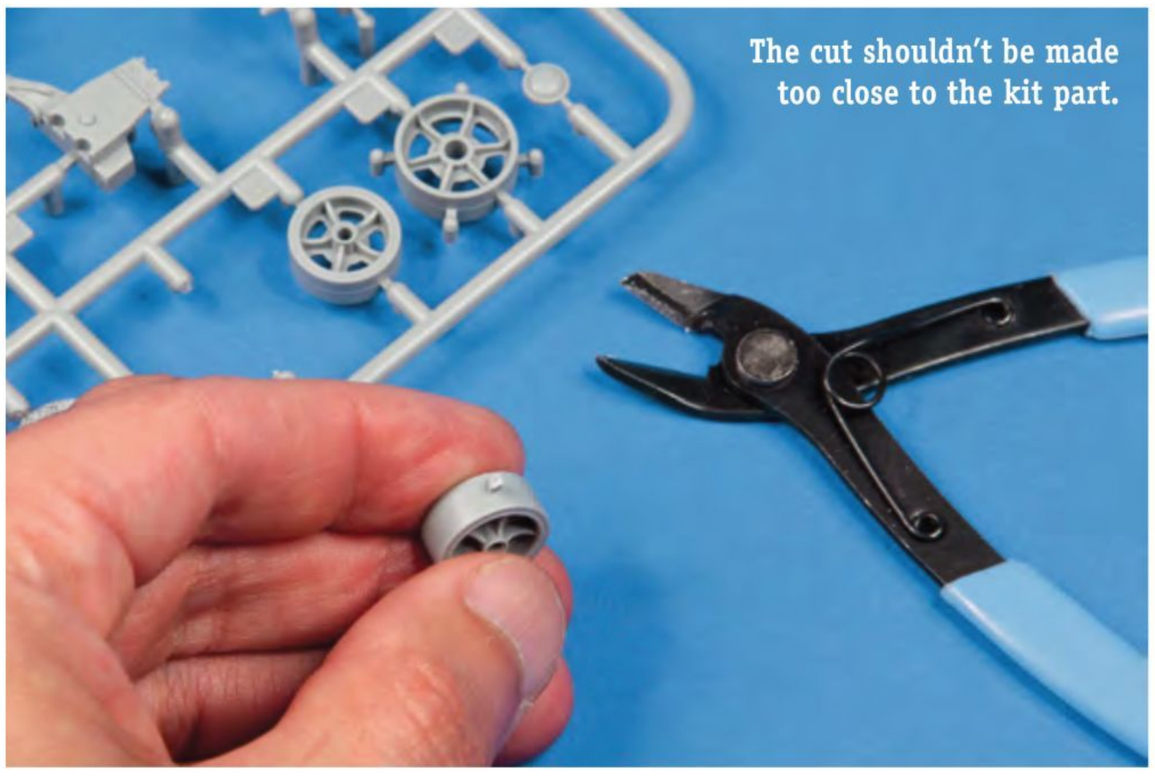
Plastic model kits have developed and changed a great deal in the past decade. The level of detail, casting quality, engineering ingenuity and fit have all generally improved; today's modellers can consider themselves lucky to have all this quality and variety from which to choose. Despite this, though, a model kit doesn't fall together by itself and modelling skills are still necessary. But good quality kits do not mean that they are flawless…few products can be considered perfect. Furthermore, some vehicles, ships, or aircraft subjects are still only available in older kit form, with some moulds being well over 20, 30 or even 40 years old…and this means extra work in order to ensure the best results.



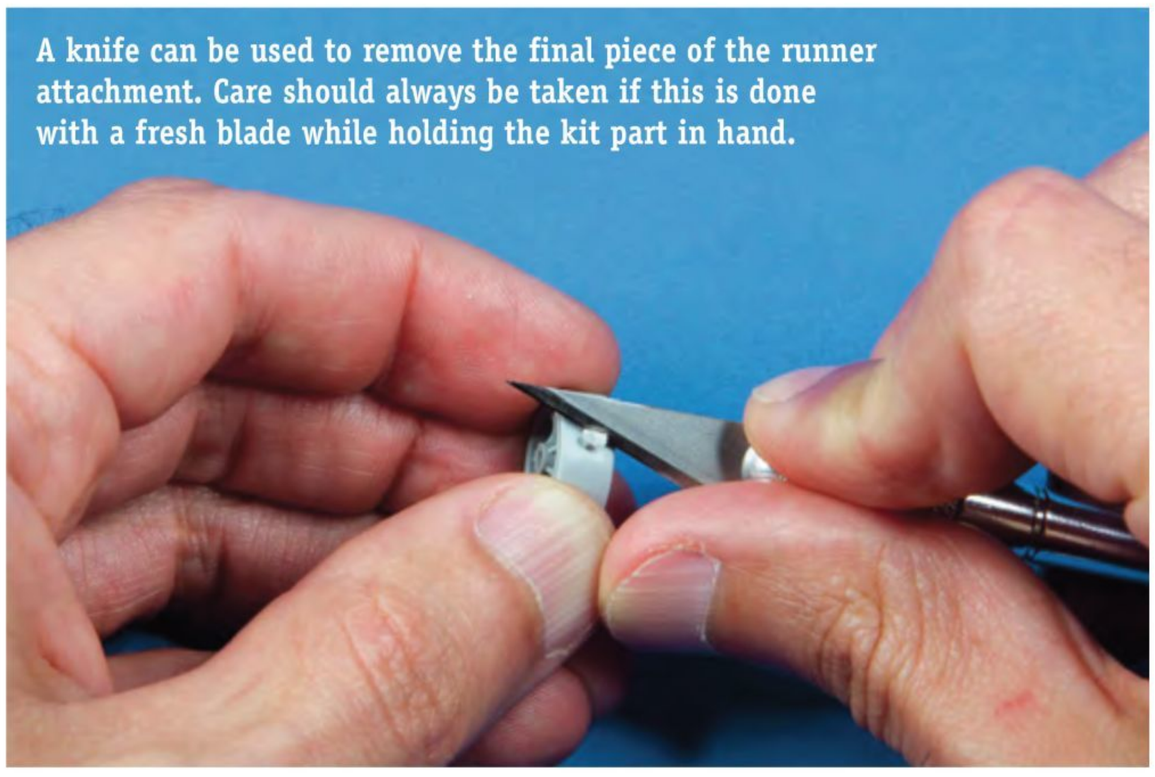
Using dedicated cutters is the safest way to remove larger parts from the runners.

Removing parts from the runner

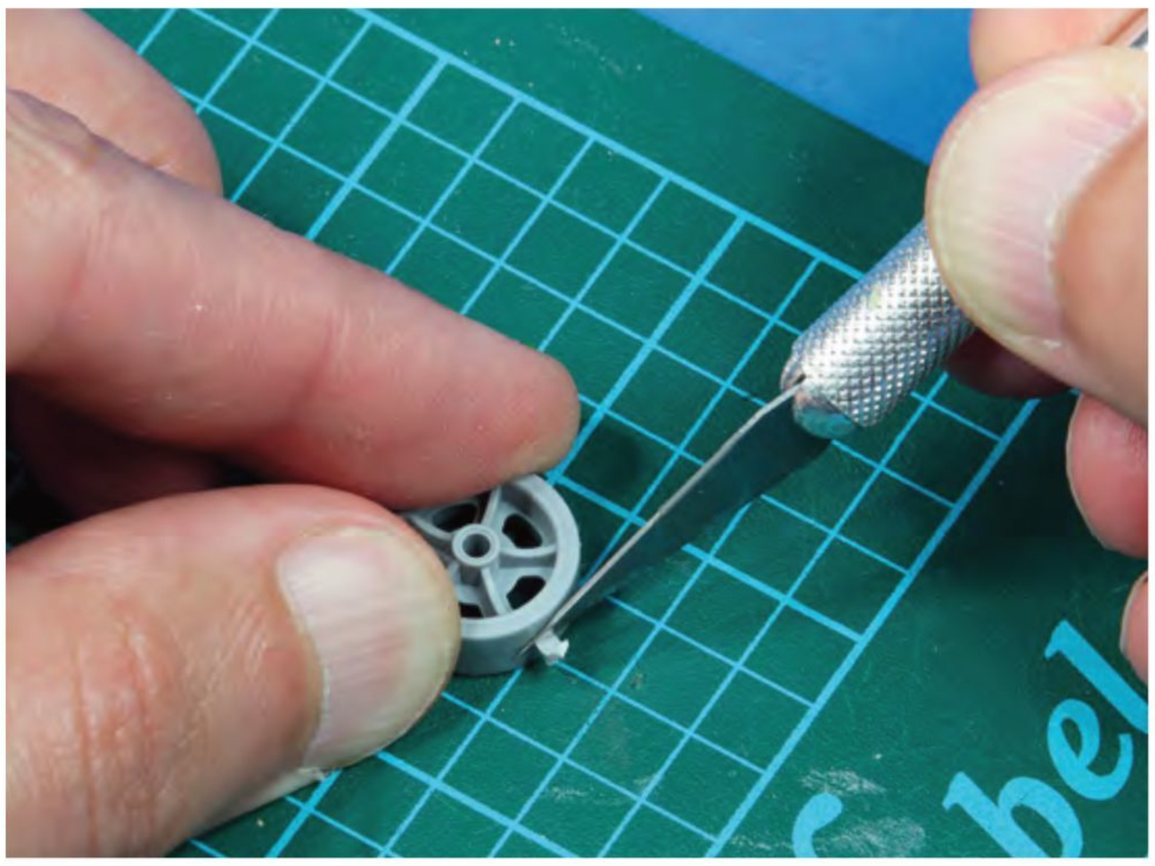
The foundation for any beautifully executed model is proper preparation and good housekeeping. Sloppy or quick work will not only make assembly more difficult, but it will also leave visible traces on the finished model and render it less realistic, or simply what it is…a piece of plastic. The kit parts come on runners (incorrectly, but almost universally known as sprues), and obviously they need to be removed in order to be assembled with other kit components. This may sound straightforward, but much care should be taken when doing this to avoid damaging the part. Cutters are mostly the best choice, but for smaller parts it can be more suitable to use a sharp hobby knife or razor saw. When using cutters, the most important thing is not to cut too closely to the part as its connecting section can easily distort during this process, which can result in ugly marks on the kit part itself. So, it's better to cut well back from the part



The cut shouldn't be made too close to the kit part.

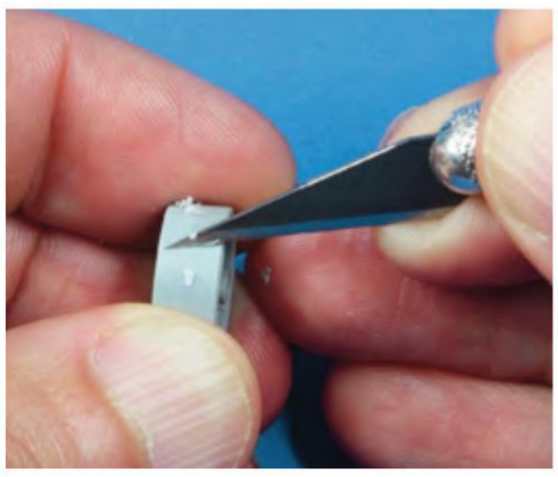


A knife can be used to remove the final piece of the runner attachment. Care should always be taken if this is done with a fresh blade while holding the kit part in hand.

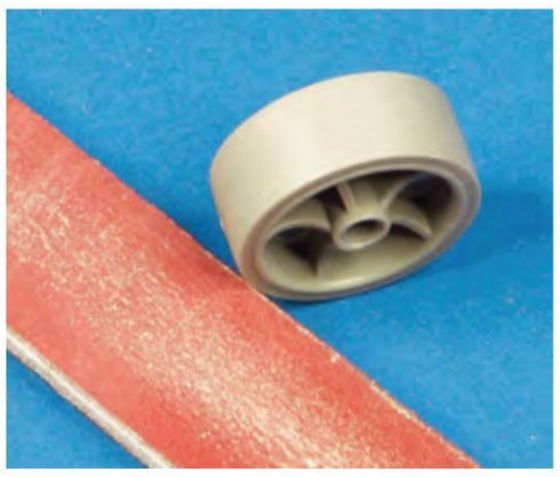


▲ A much safer way of neatening is to use a dedicated cutting matt.

▼ The seam can now be scraped with a hobby knife blade.



▼ Careful sanding will remove the last of the seam and attachment stub.



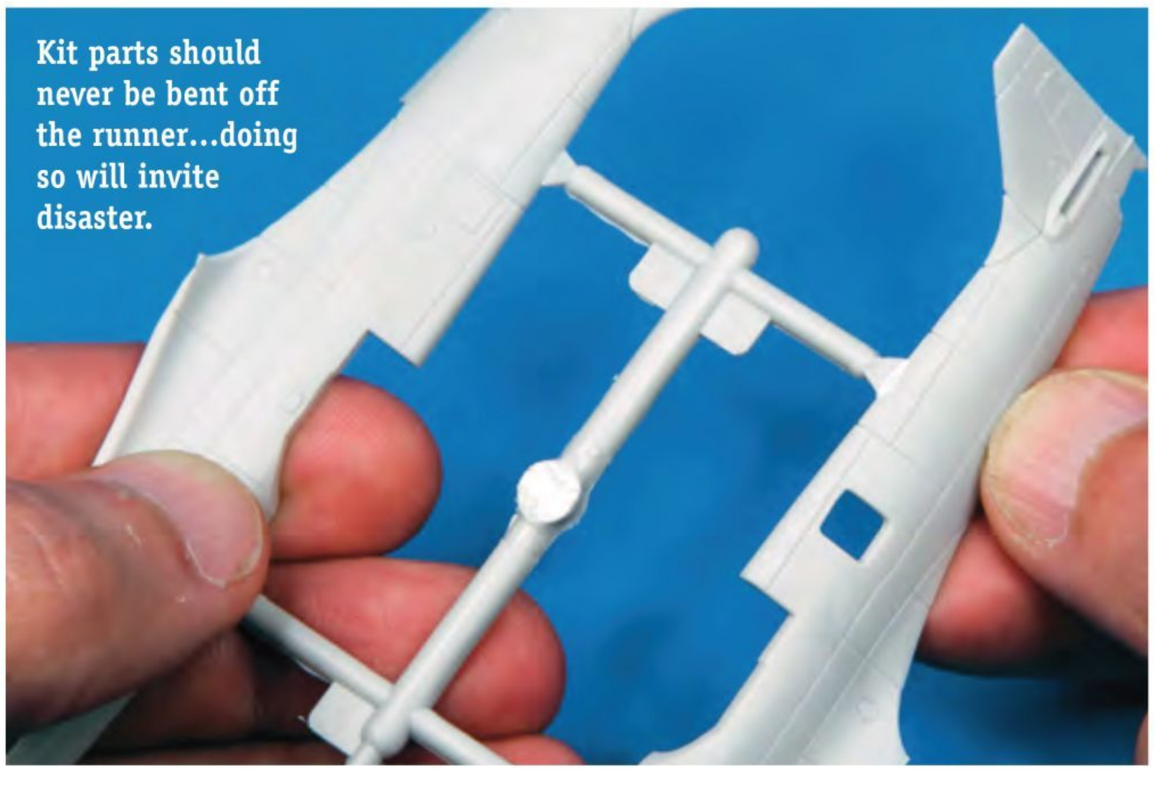
and remove any excess plastic with a knife and/or file. Kit components should not, under any circumstances, be bent off the runner with one's fingers.

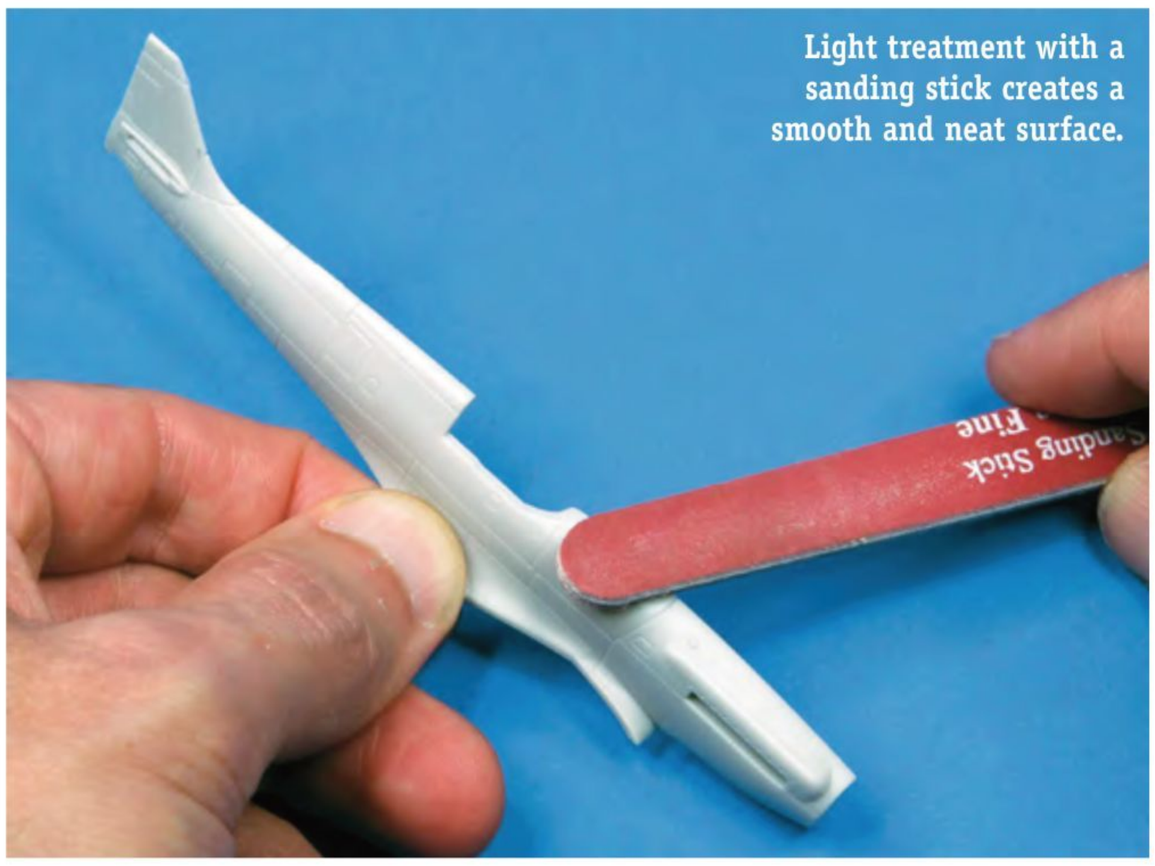
Ejector pin marks

Almost all kits will be covered in some areas by small circular marks on the surface, mainly on the inside. These are called ejector pin marks and are the result of the kit being forced from the mould by pins. Since the moulding takes place under high pressure, the pins hit the plastic with much force in order to ensure its release. Pin marks must be removed if they are placed in an area which will be visible after assembly. Shallow ejector pin marks can be eradicated by scraping the surrounding area carefully with a curved hobby knife blade, followed by sanding with abrasive paper over the entire area. Deeper marks need to be treated with filler/putty and then sanded.

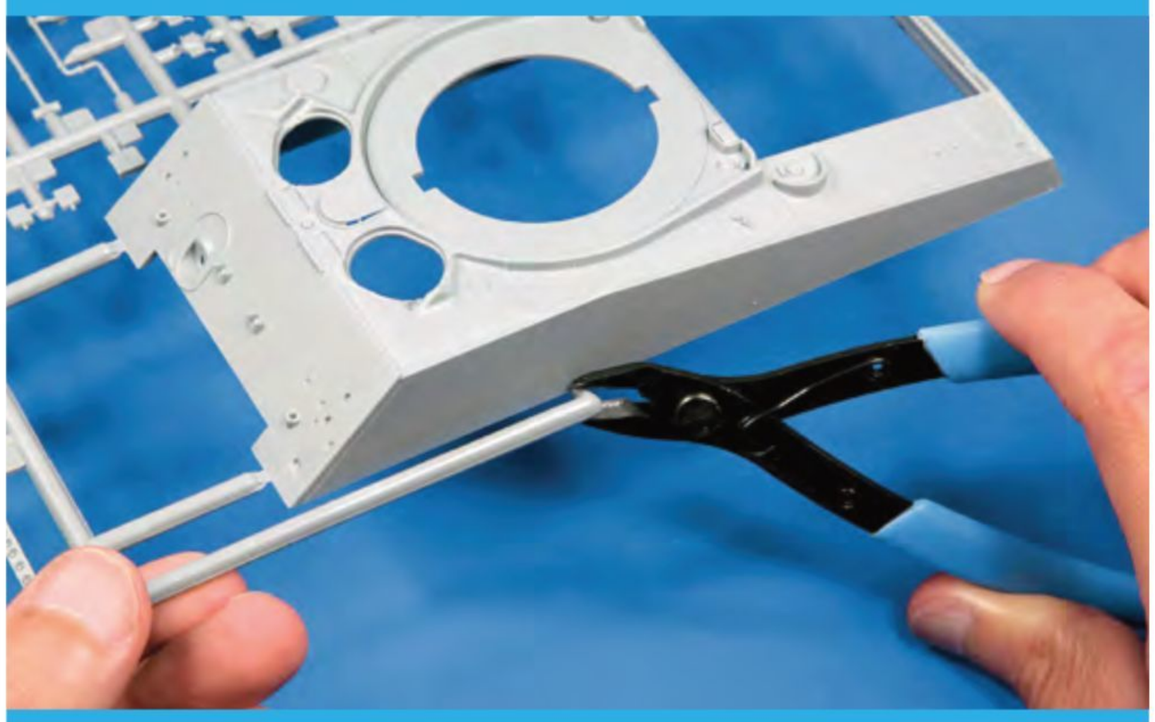
Flash and mould seams

Most kit parts have a mould seam which can be anything

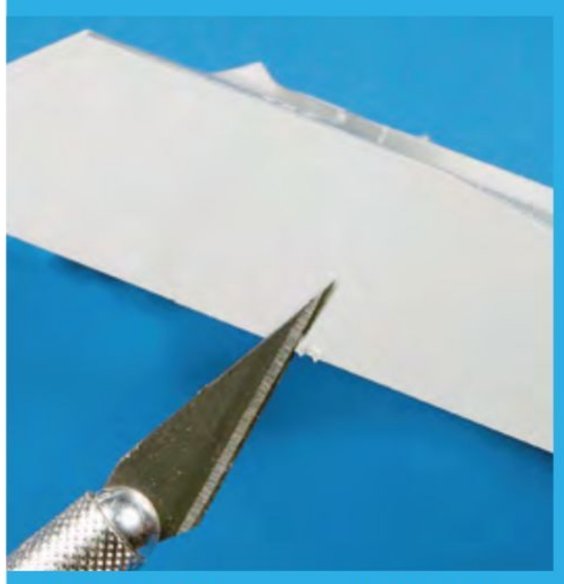




LARGER COMPONENTS



▲ The kit part is first removed from the runner with dedicated cutters.



▲ Most of the excess plastic is then pared away with a sharp blade.



▲ A flat metal (diamond) file removes the final traces.





Clear parts are fragile and easily scratched, so should be kept in their plastic bag as much as possible. If they don't come in a bag, give them their own.

CLEAR PLASTIC

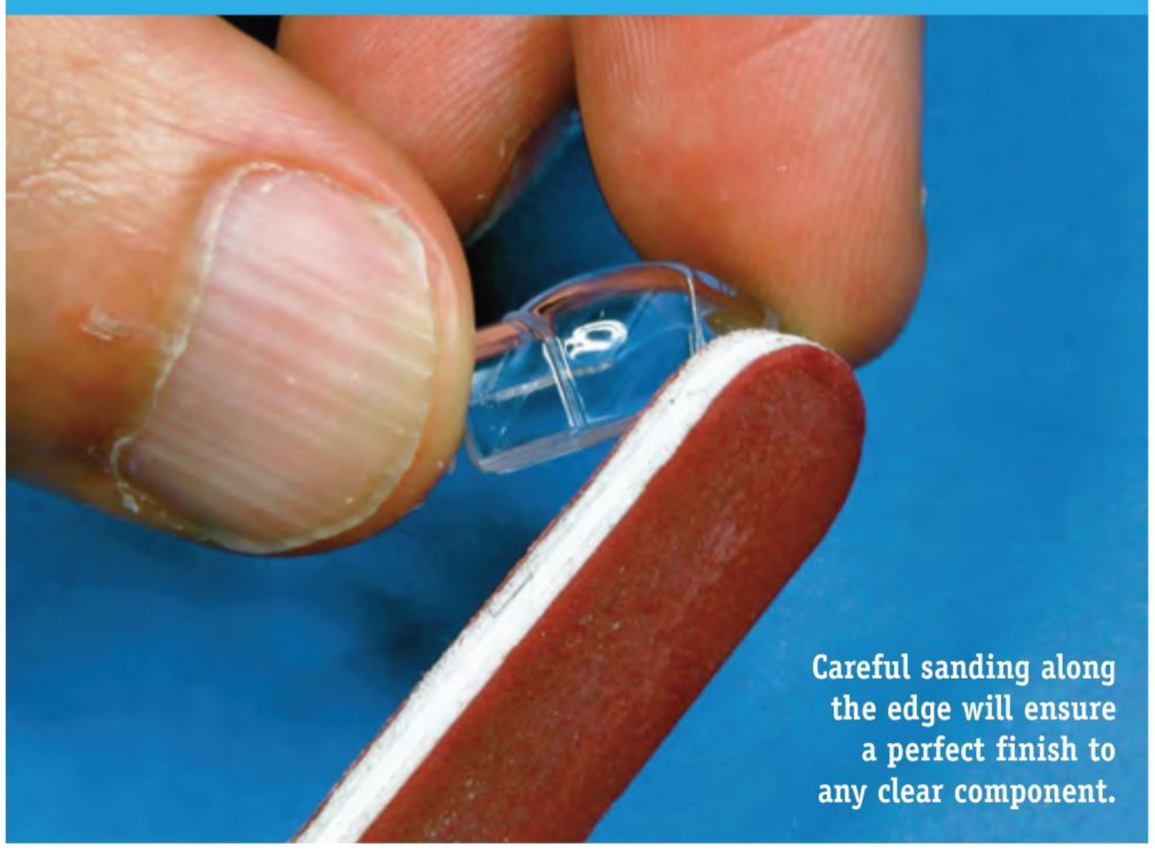
Many kits have a few, or in some cases, several parts moulded in clear plastic. This is usually for the windows of a car, the canopy of an aircraft or lamps for a tank. Clear plastic is more fragile and brittle than that used for regular kit parts and should be handled very carefully. First of all, a gentle approach needs to be taken when removing the parts from the runner. When doing this, cutting not too close to the kit part is the best solution, while holding the runner steadily against a cutting mat, followed by sanding carefully. Clear parts can be scratched easily and should be kept in a separate plastic bag until they are actually required in the build process. If scratches need to be removed, this can be done with very fine abrasive paper and a polishing cloth, and if necessary also a polishing paste. More on this method will be imparted later on.



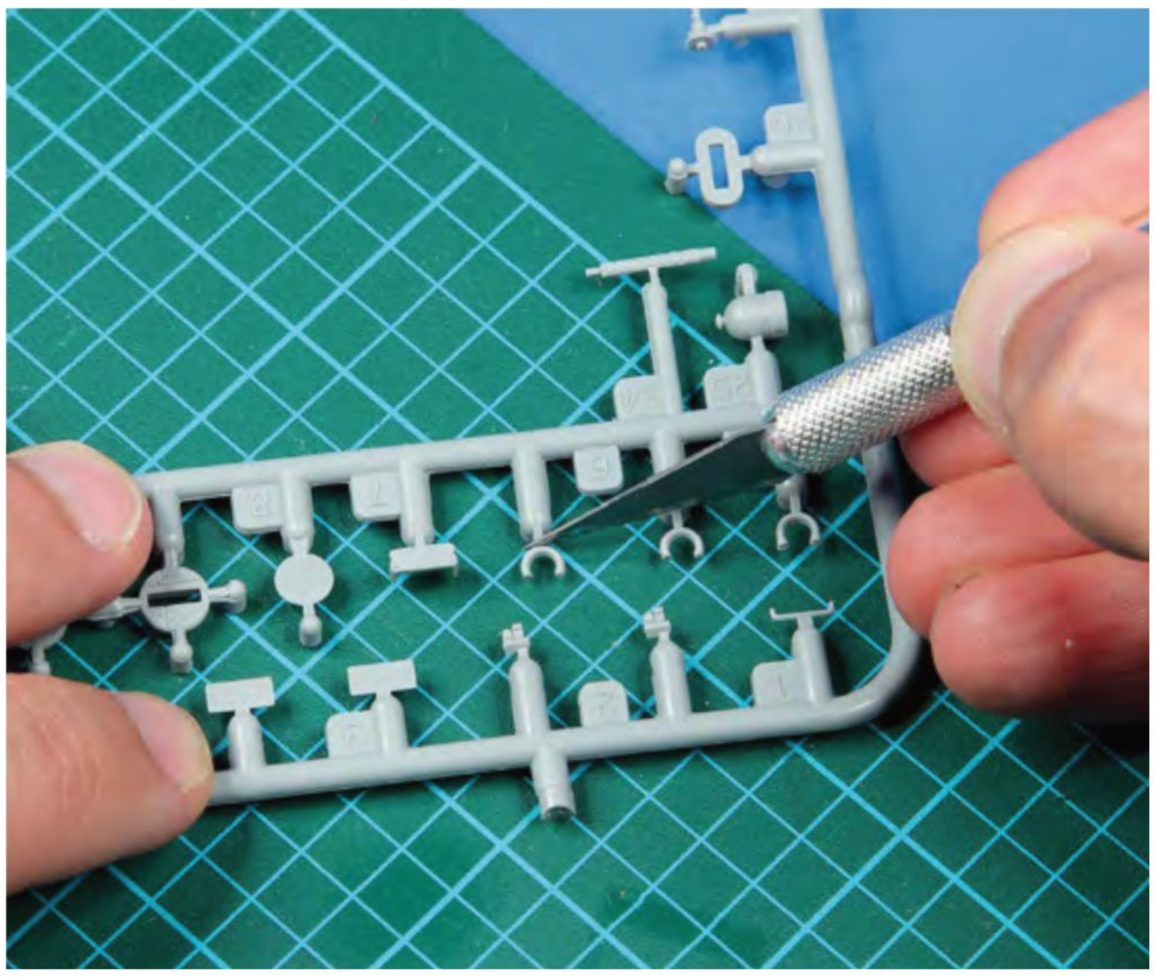
▲ With transparencies, the cut should be made far from the actual part to avoid cracking.



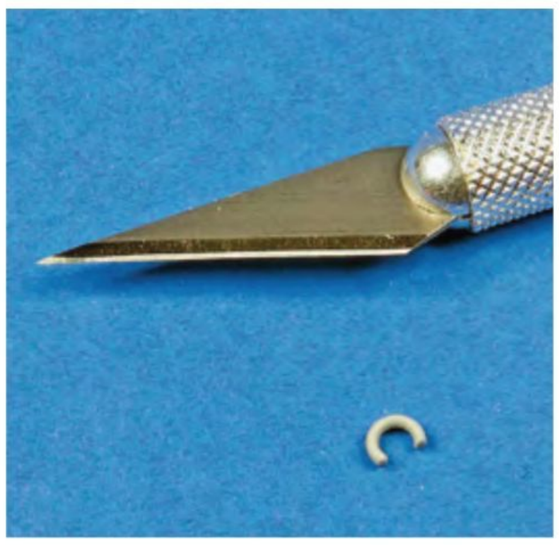
▲ The rest of the plastic stub can be removed with a sharp blade, close to the kit part.



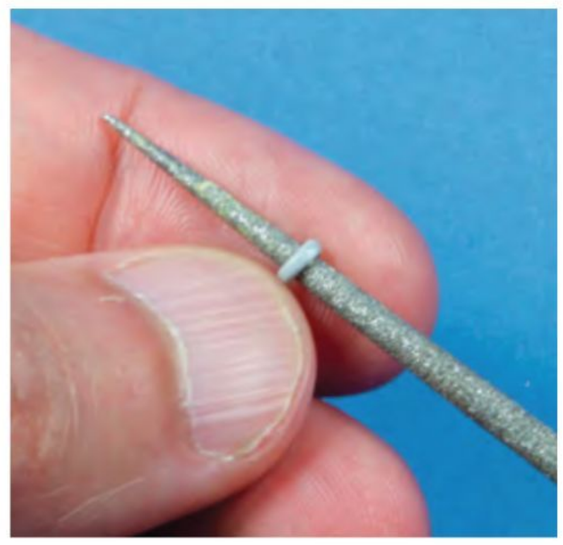
Careful sanding along the edge will ensure a perfect finish to any clear component.



▲ Smaller pieces are best removed with a sharp blade, but left unchecked they can have a tendency to go flying off. One can use a portion of folded masking tape to secure the part during removal.



▲ A close cut leaves very little trace of the attachment plastic.



▲ The inside of a curved object is easily cleaned up with a round file.

from barely visible to highly prominent, depending on the quality of the moulding. Older styrene can also show traces of leakage around individual parts, and this is commonly known as 'flash', which looks like a thin plastic film (this can affect modern kits too). Flash can be removed carefully with a knife, while mould seams can be eradicated with various tools, much depending on the modeller's preferences. The most common method is to use a hobby knife or sanding stick, or both. When using a knife, the blade is simply scraped along the seam at 90 degrees to it; the seam should then simply flake or spiral off, and the amount of pressure on the blade will determine how much. When using a sanding stick or abrasive paper, it's important to choose the proper grade. Too smooth will have little effect, while too coarse could result in damage to the kit part…or remove too much plastic.

Bent and circular parts

For small curved or looped surfaces, such as a vehicle towing hook or the inside of a tube, a round or half-round file can be useful, as it can follow the shape of the kit part, whereas a knife would easily damage it and a sanding tool simply wouldn't reach. Outer surfaces of tubular components, such as gun barrels, always need attention as it's desirable for them to properly maintain their circular shape. Sanding or scraping the seam on its own may cause the barrel to assume an oval, rather than round shape. A solution to this is to use abrasive paper or a Scotch-Brite scouring pad. The chosen sanding medium is simply wrapped around the barrel, and then held between the fingers while the barrel is rotated. This creates an even effect on the surface, to avoid distortion and promote a properly circular shape.

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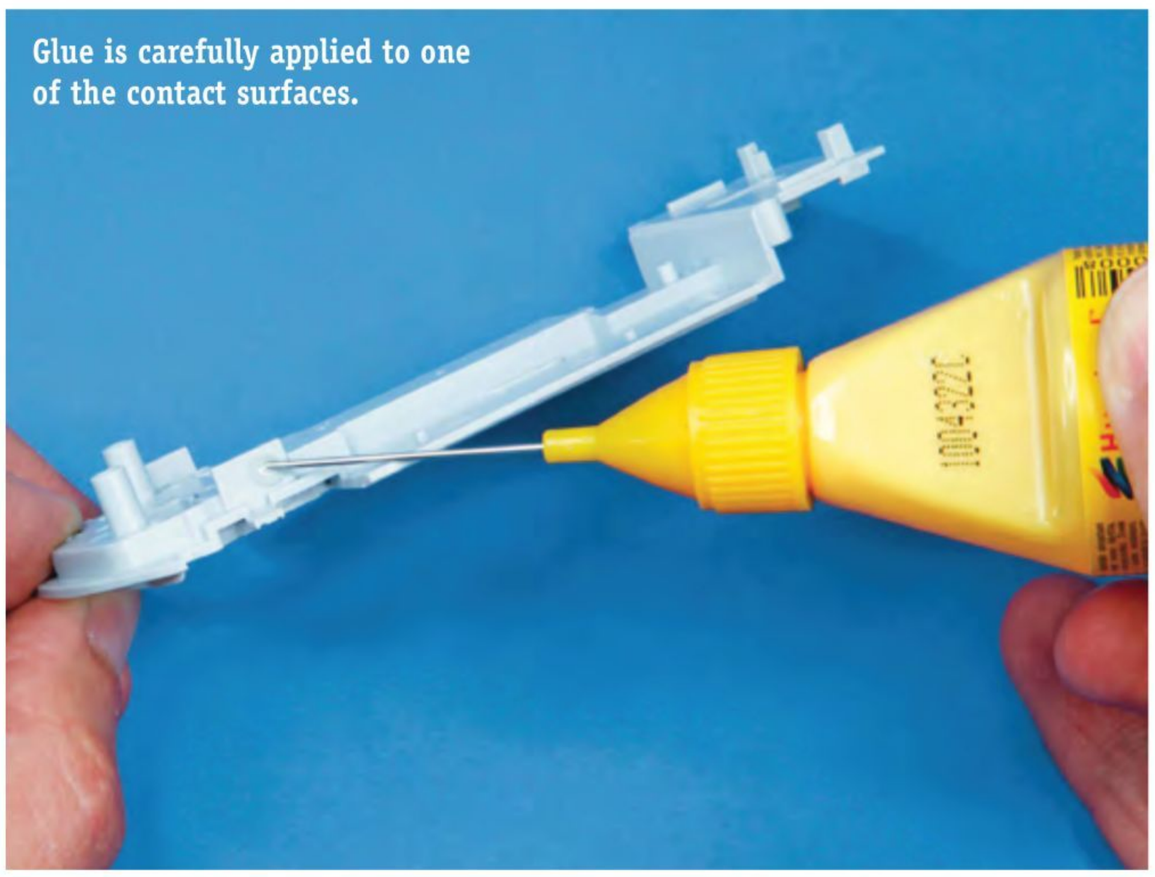
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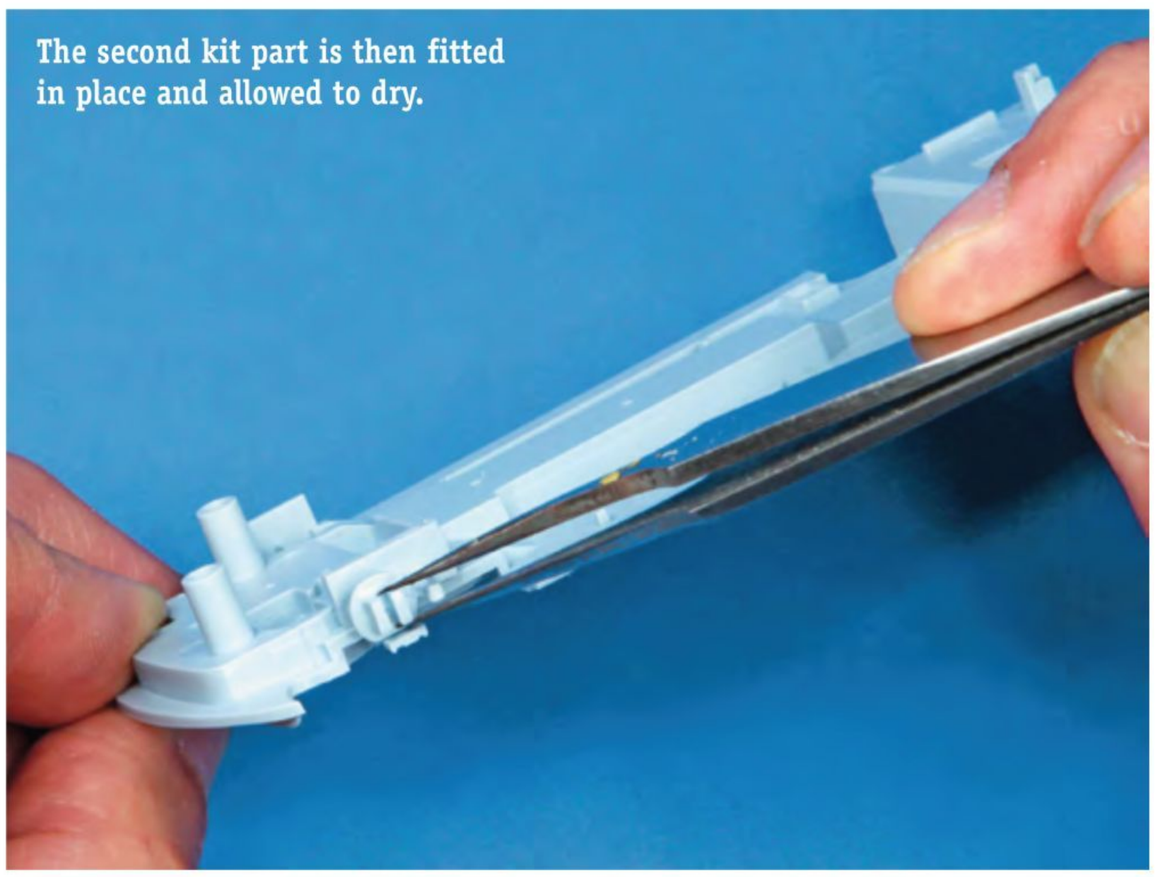
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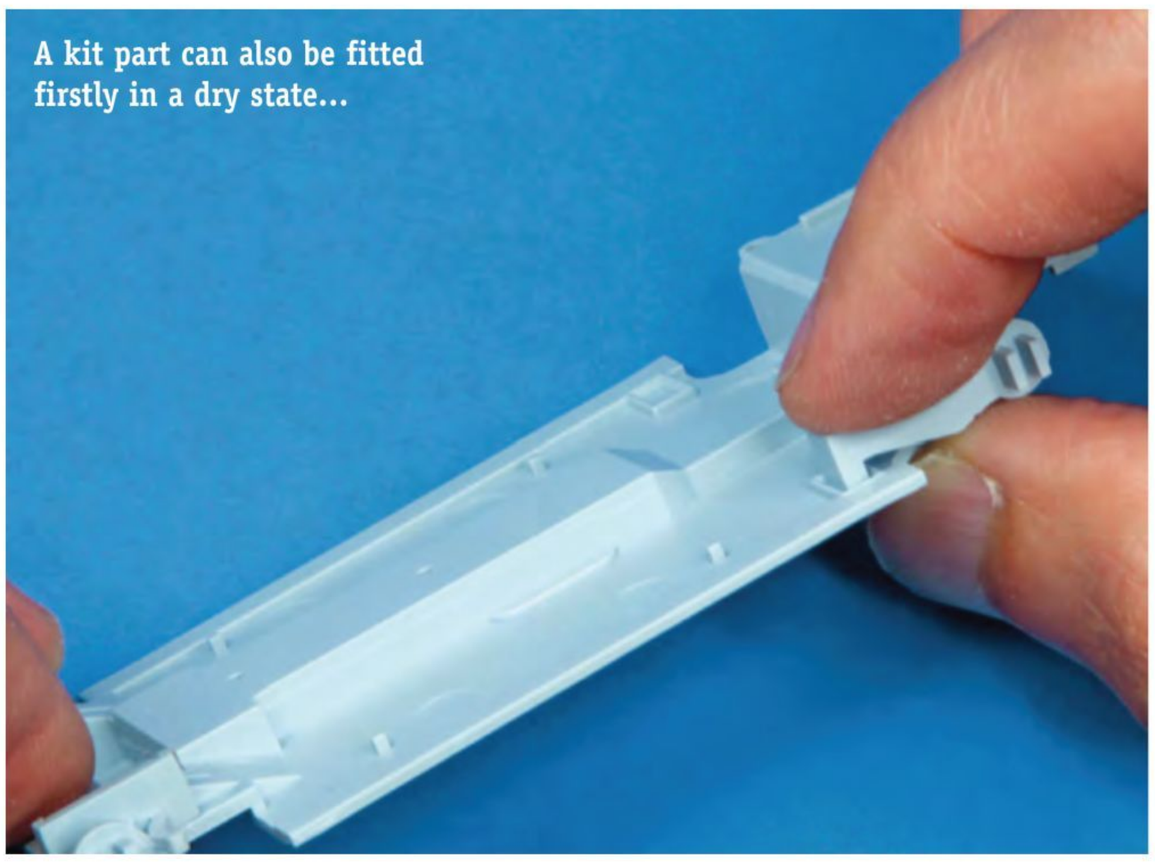


Glue is carefully applied to one of the contact surfaces.

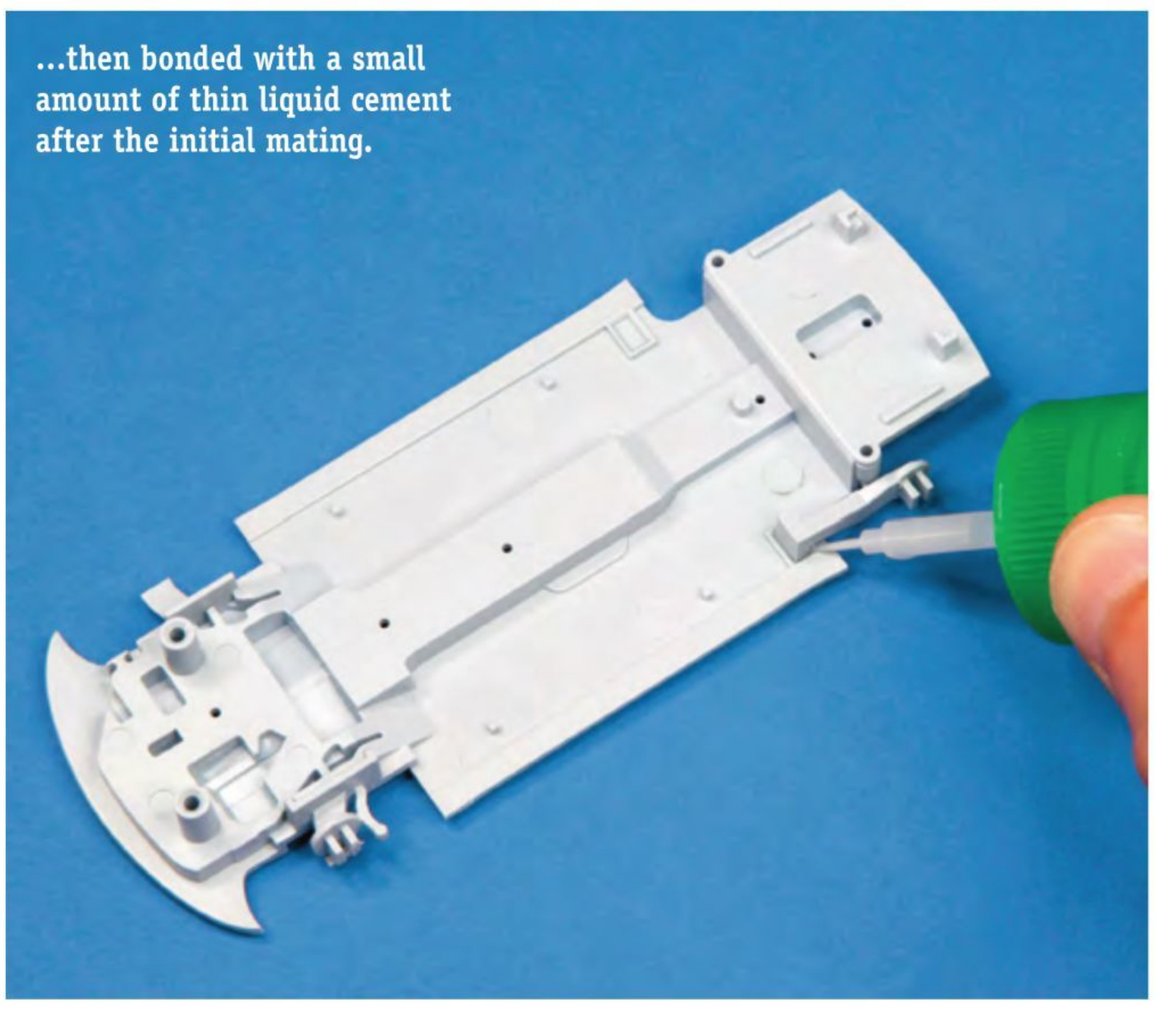


The second kit part is then fitted in place and allowed to dry.

Making a Start...



A kit part can also be fitted firstly in a dry state...



...then bonded with a small amount of thin liquid cement after the initial mating.

The assembly of a plastic kit can run from straightforward to very complicated. Many variables can affect the process; kit quality, the instructions and, most importantly, the modeller's preparatory work and skill. With a thorough study of the product and good part preparation the odds for success only increase.

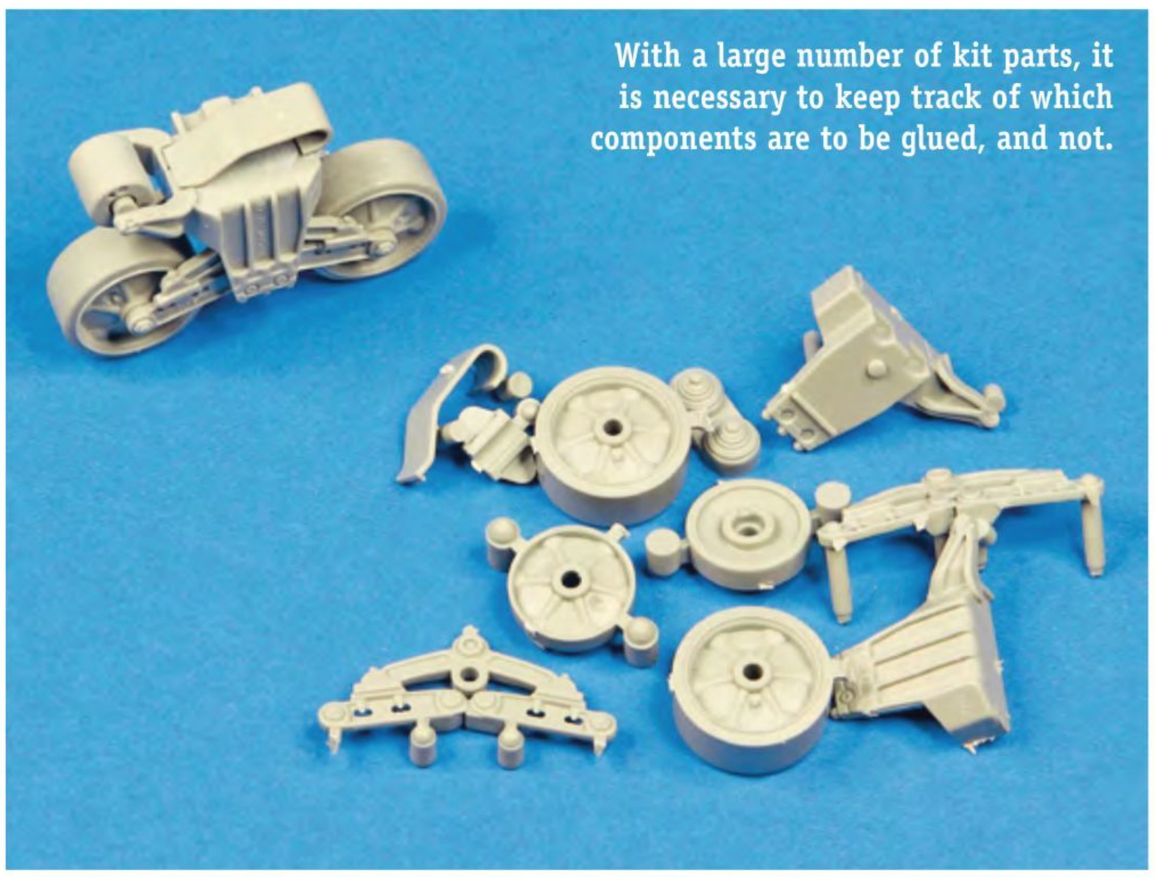
Dry-fitting

After the parts in any given stage are neatened, it's time for assembly to begin. The first rule is to always dry-fit the components before committing

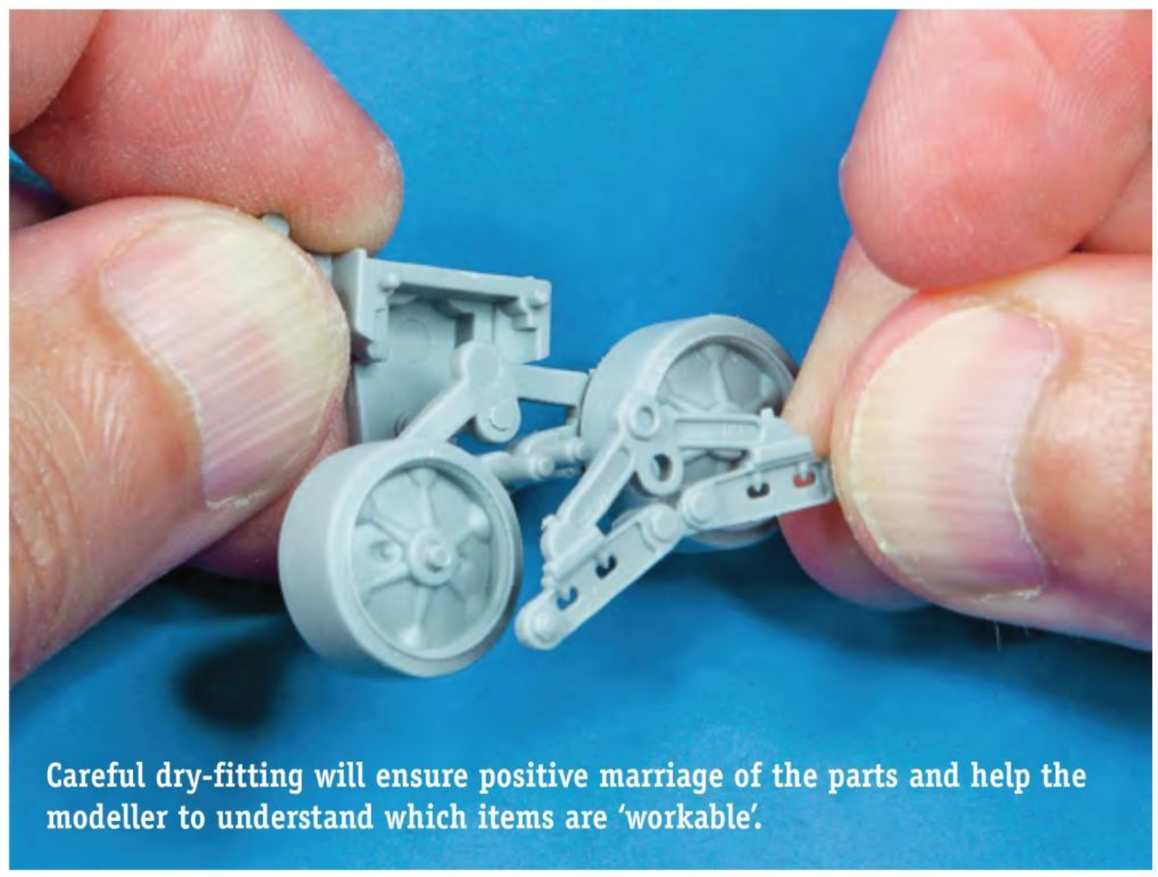
APPLYING GLUE

When the parts are dry-fitted and all seems in order, it's time to apply the glue. This can be done in a different order, depending on which type of glue is used. The most common way is to apply a small amount of adhesive to one of the kit parts, and then simply press the other against it. Then, the kit parts are held together for a few seconds or until they bond. Another method when using very thin liquid cement is to first press the kit parts together, then apply the cement with a fine brush and let it run along the join line, which in effect creates a 'welded' seam. This method bonds the parts strongly as the plastic is actually melting where the glue is applied. For larger areas, such as fuselage halves, both techniques can be combined. For instance, on the inside of the fuselage's contact surfaces, thicker glue can be applied. When the halves are pressed together, the thin cement can be run along the fuselage seam, to ensure a tight bond. In some cases it may be necessary to use tape, clamps or rubber bands during the curing of the glue, to guarantee a tight fit.

Care should be taken while studying the kit instructions, as not all kit parts are supposed to be glued. For instance, it is very common for the wheels on a car or tank to be assembled in running order. In these cases they are usually secured by other parts - gluing around these should be carried out with great care and precision to ensure that the wheels actually turn instead of being fixed solid. The main reason for keeping wheels in running condition is not to make them 'playable', but to ease their painting at a later stage.



With a large number of kit parts, it is necessary to keep track of which components are to be glued, and not.



Careful dry-fitting will ensure positive marriage of the parts and help the modeller to understand which items are 'workable'.

a drop of glue; regardless of the modeller's cleaning-up efforts, it's not uncommon that a kit part doesn't fit properly, and this is better discovered before any glue is applied. In many cases the plastic needs to be thinned slightly, a hole widened or perhaps the kit instructions do not depict the kit part properly… which can cause confusion. So, even the seemingly simplest assembly should always be test-fitted.



TOP TIP

Thin liquid cement is ideal for sealing thin seams such as those on fuselage halves.

Cleaning up

Gluing often leaves traces around the kit parts. These marks need to be removed, or they will ultimately be visible underneath successive coats of paint. Patience is vital here; firstly, the assembly join must dry properly so that the parts don't fall apart when handled. Secondly, a semi-dry surface can be soft and is therefore fragile, and should be allowed to dry before being treated. Excess glue is most easily removed with very fine abrasive paper, with the tip of a hobby knife blade or a combination of both. Carefully sand the area around the kit part, or repeatedly scrape the blade in a 90 degree angle against the surface until the glue peels off.

Replacing parts

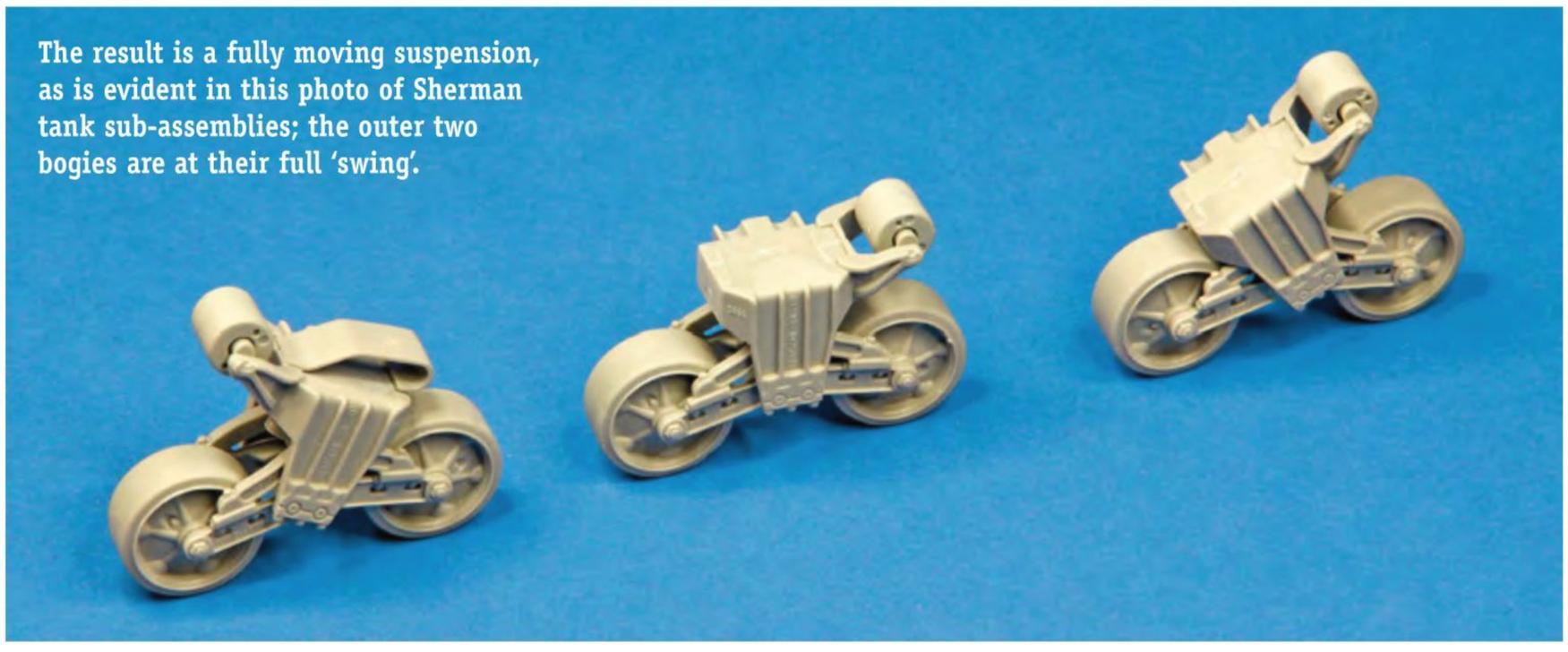
Plastic is a fragile medium and kit parts are quite easily damaged or broken if not handled with care, but even when they are, accidents can, and do happen. The most common problem is when a part simply snaps off, due to excess pressure from tools or general handling. Luckily, because of its sometimes delicate nature, the plastic often leaves a clean cut which makes it possible to mate the broken parts like two pieces of a puzzle. A small amount of glue is applied to the broken surface, and the parts are pressed together. Fine sanding will cover the blemish, but in some cases a small amount of filler can be required.

If a part is damaged severely, it will need to be replaced. Many experienced modellers have spares boxes with hundreds of parts left over from previous modelling projects, but if the broken part is unique then it becomes hard to replace in this way. Some manufacturers offer their parts runners separately but it's often a complicated procedure to obtain these (and at a cost), especially if the kit is manufactured half-way around the world. One can also contact the kit importer, but sourcing replacement parts through on-line modelling forums is another route and people are surprisingly helpful when it comes to these matters.

The last option is to make a scratch-built part. This can be rather easy, or very complicated depending on the shape of the component. For instance, a piece of railing, or straight support arm for a landing gear can be replaced with commercial plastic rod/tube, or a piece of metal tubing from suppliers such as Albion Alloys. A broken or missing landing gear, on the other hand, would require a far more complicated operation and advanced scratch-building skills.

CORRECTING ERRORS

No matter how thoroughly the assembly instructions are studied, or how well the parts are prepared, errors occur even for the most experienced modellers. The most important thing in such situations is not to panic or react too quickly. The most common mistake is to glue a kit part in the wrong place, or at the wrong angle…and the remedy for this is to carefully remove it and re-glue it. If the glue is not yet dry, a slight wiggle can loosen it and it can quickly be re-positioned. A touch of thin liquid cement can actually help dissolve the glue join in this case. If the part has already dried in the wrong position, some 'surgery' may be required. With a sharp tip of a hobby knife, the glue seam can be carefully cut or opened, but not likely without slight damage to the kit part. As a consequence, the component will probably need to be repaired or replaced.



The result is a fully moving suspension, as is evident in this photo of Sherman tank sub-assemblies; the outer two bogies are at their full 'swing'.

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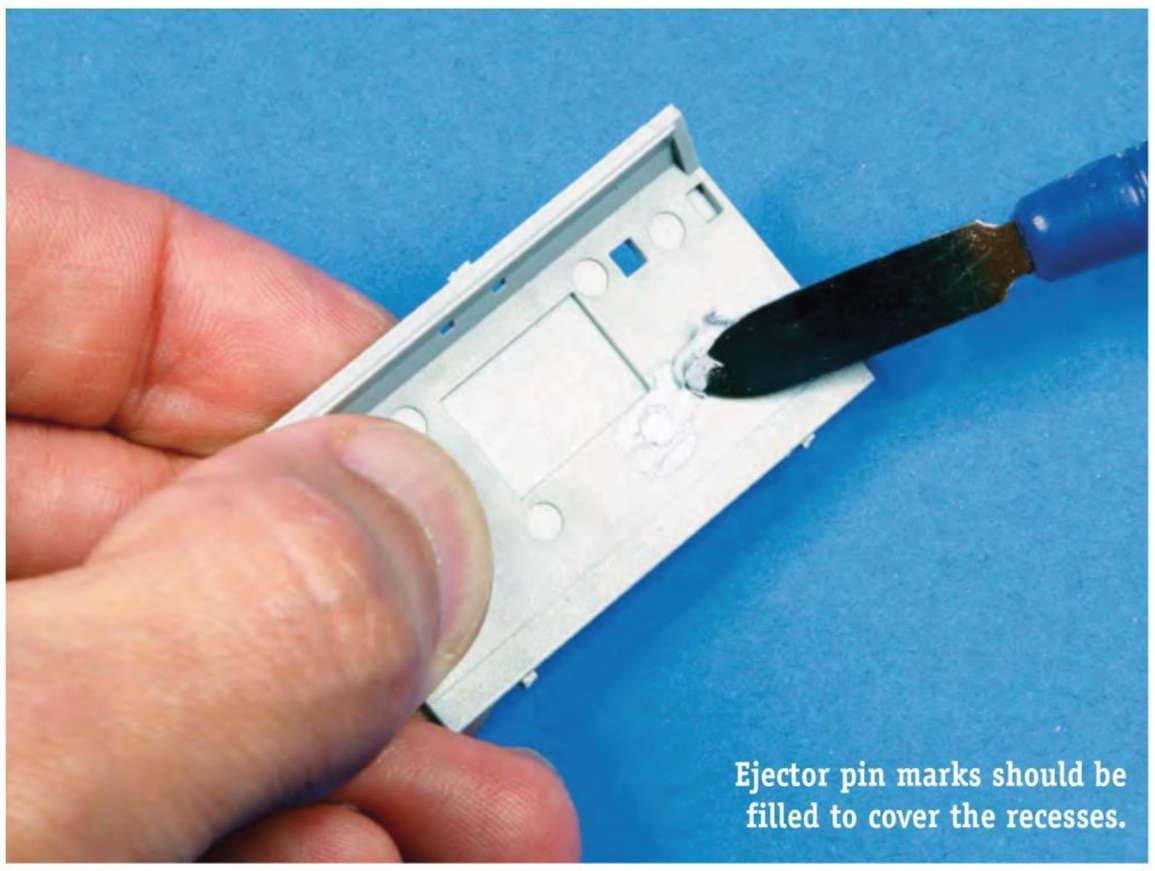
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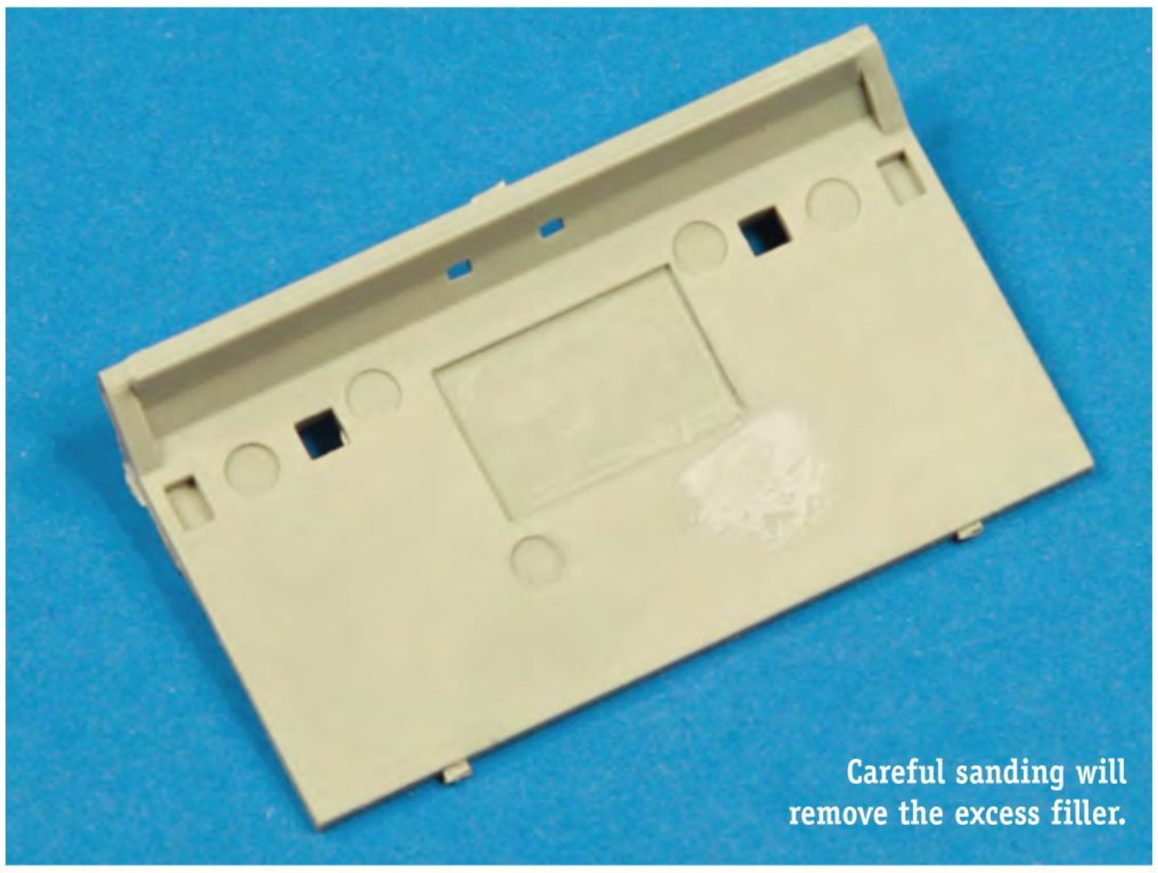
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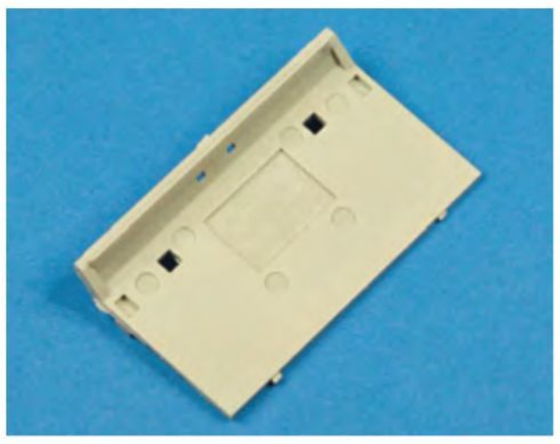
Ejector pin marks should be filled to cover the recesses.



Careful sanding will remove the excess filler.

A Fine Finish

When looking at a beautifully produced model, which exhibits smooth surfaces and an impeccable coat of paint, it's hard to imagine all the work involved before achieving that finish. Although painting is a very important part of the final result, again, proper and careful preparation cannot be overrated. The good quality kits of today usually piece together rather easily, but inevitably many models will suffer from minor gaps and seams that need to be fixed, or they will otherwise show up during and after painting.



▲ On this part the circular ejector pin marks are clearly visible.

Deciding on the effort

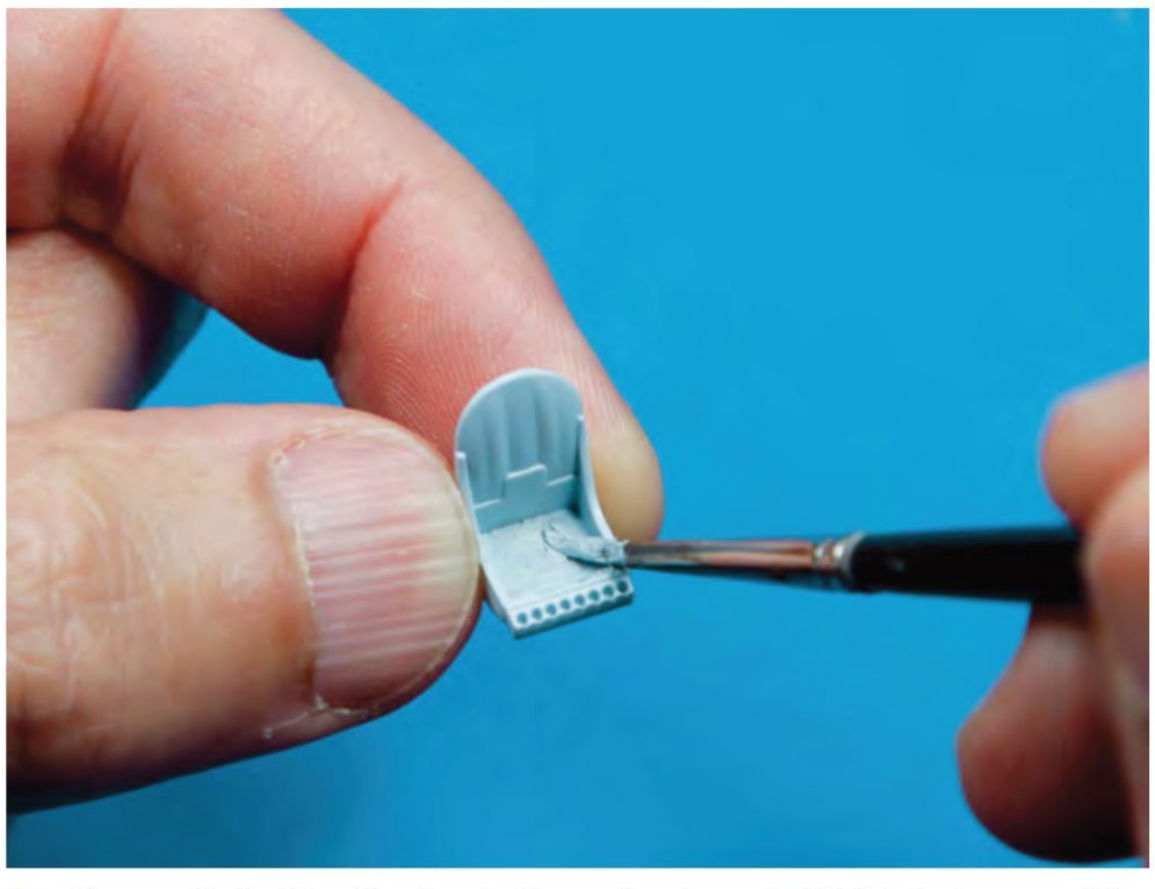
When kit parts are glued together they often leave a seam or a gap. This is most apparent where two flat surfaces meet each other, as with fuselage halves and tyres that are moulded in two parts. In some cases the seam is supposed to be there, as on the real thing, but sometimes it has to be removed if the original item is smooth. Regardless of the size of the seam or gap they must be treated accordingly. It is certainly convenient if a seam can be removed by just sanding, and this is often the case if the fit of the parts is good and liquid cement has been used. The opposite of this would be kit parts that fit poorly and leave a clear gap. In the end, it's up to the modeller to decide how much effort to expend, and what is necessary in order to achieve the desired result. A good way to determine how much sanding and/or filling is needed is to take a broad felt marker pen and apply a streak over the seam…then sand it. Sanding will remove the ink and immediately reveal the remaining imperfections.



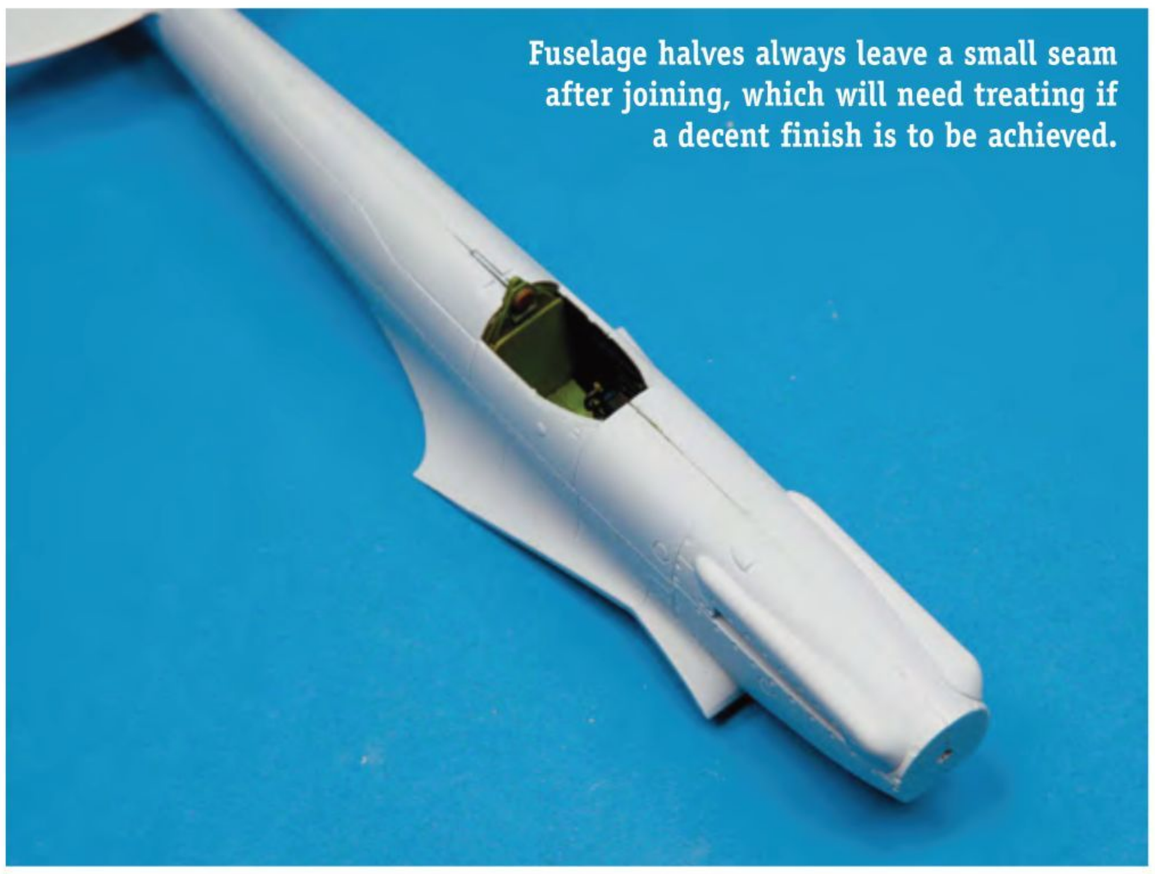
▲ Some pin marks can be hard to reach, such as on the base of this aircraft seat.



▲ For neat filling, epoxy putty is firstly thinned with liquid cement…



▲ …then applied with a fine brush. No sanding is needed if this is done carefully.



Fuselage halves always leave a small seam after joining, which will need treating if a decent finish is to be achieved.



A wide felt marker pen is used to mark the seam.

LARGER GAPS

Some kits suffer from really poor fit in places, or for other reasons are prone to large gaps. For example, advanced modellers often convert models into other versions and sometimes mix parts from several other kits (often known as kit-bashing), which often produces fit problems. Filling these gaps with putty would be a difficult and fragile solution, as putty can be prone to cracking when applied in thick layers.

A solution to this is to fill the gap with commercially available plastic card or strip. Styrene sheet is sold in well-appointed hobby shops and comes in many sizes and shapes - and can easily be used to fill large holes and gaps...or in more advanced cases, new panels or plates can be cut from it. A suitable piece is simply cut and glued into the gap as tightly as possible. The area is then sanded smooth and if necessary, a small amount of putty can be added on top of the plastic insert.



▲ A fine sanding stick removes the top coat of the marker colour.

Fixing minor seams

In the easy cases, small glue seams can be removed with careful surgery along the seam. A gentle scrape with the blade of a hobby knife may suffice to create a smooth join between parts. In other cases this needs to be followed by very careful sanding to even out the surface further or remove traces of knife strokes. As mentioned earlier, the same procedure can be used when removing shallow ejector pin marks.



TOP TIP

Thin liquid cement is ideal for sealing thin seams such as those on fuselage halves.

Filling gaps

When assembling a model, even those of top quality, there will almost certainly be a few minor gaps that need filling and/or sanding. On aircraft it's commonly where the wings meet the fuselage, or around air intakes. On tanks it's not unusual for gaps to appear on hull plates or turret halves when assembled. These gaps can be filled with various types of modelling filler or water-based putty. Most modellers use epoxy putty, which dries quickly and is easy to sand. The putty can be applied with a special tool, hobby knife blade, or even a thin piece of plastic.

Putty can shrink slightly when drying, so enough must be applied to compensate for that. Once the putty is dry, it has to be sanded so it's level with the kit part, leaving just the filling in the gap. Medium-grade abrasive paper or sanding sticks will quickly remove most of the excess filler, but care must be taken not to damage too much of the surrounding plastic which may have panel lines or rivet detail.

The next step is to use finer grades of abrasive and gently re-visit the area, to even out the surface further. When the area looks ready, a super-fine grade 'wet and dry' paper can be used (with water) to achieve a polished surface as smooth as the original plastic.

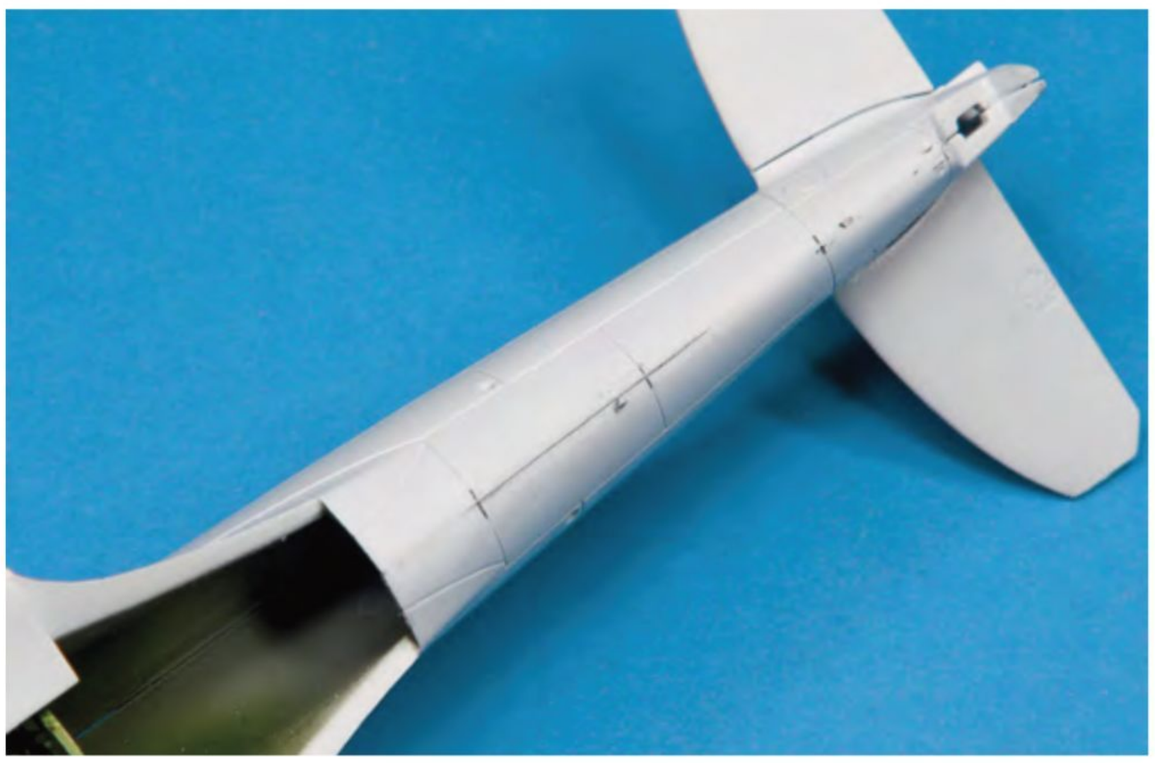
However, it's not uncommon that another thin layer of putty needs to be applied as small spots are easily missed, or because the putty from the first layer may have shrunk more than expected.

Some areas can be hard to reach using a specific tool, or may be surrounded by fine surface detail easily ruined when



▲ The remaining black ink from the marker reveals that the surface is not smooth...if it were, the ink would be completely gone after sanding.

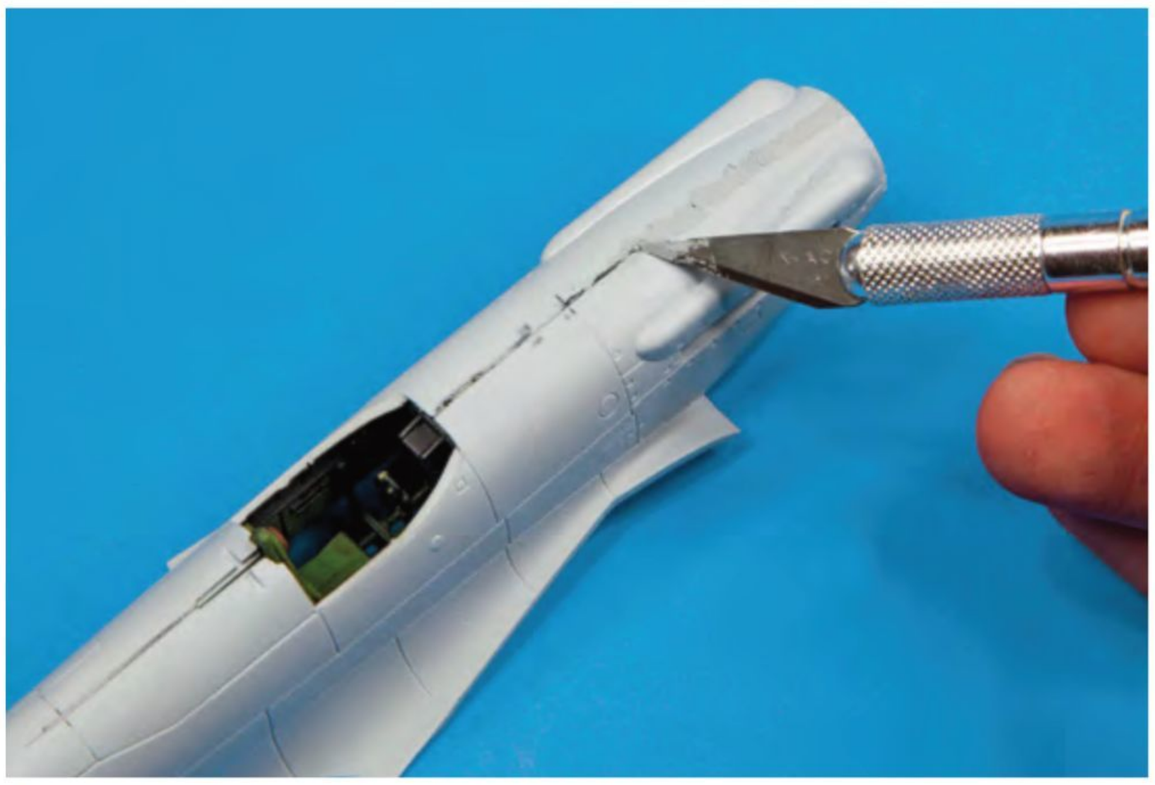
02 FILLING GAPS



▲ After further sanding, much of the black ink has been removed. Panels one and three are almost smooth, while panel two still displays an uneven surface.



▲ After another session with a sanding stick there is still a significant amount of black left, which means this area must be filled with putty.



▲ A thin layer of putty is applied with a hobby knife, but a screwdriver or clay-working tool would work just as well.



▲ Sanding with fine grade abrasive paper will remove the putty and create a smooth finish.

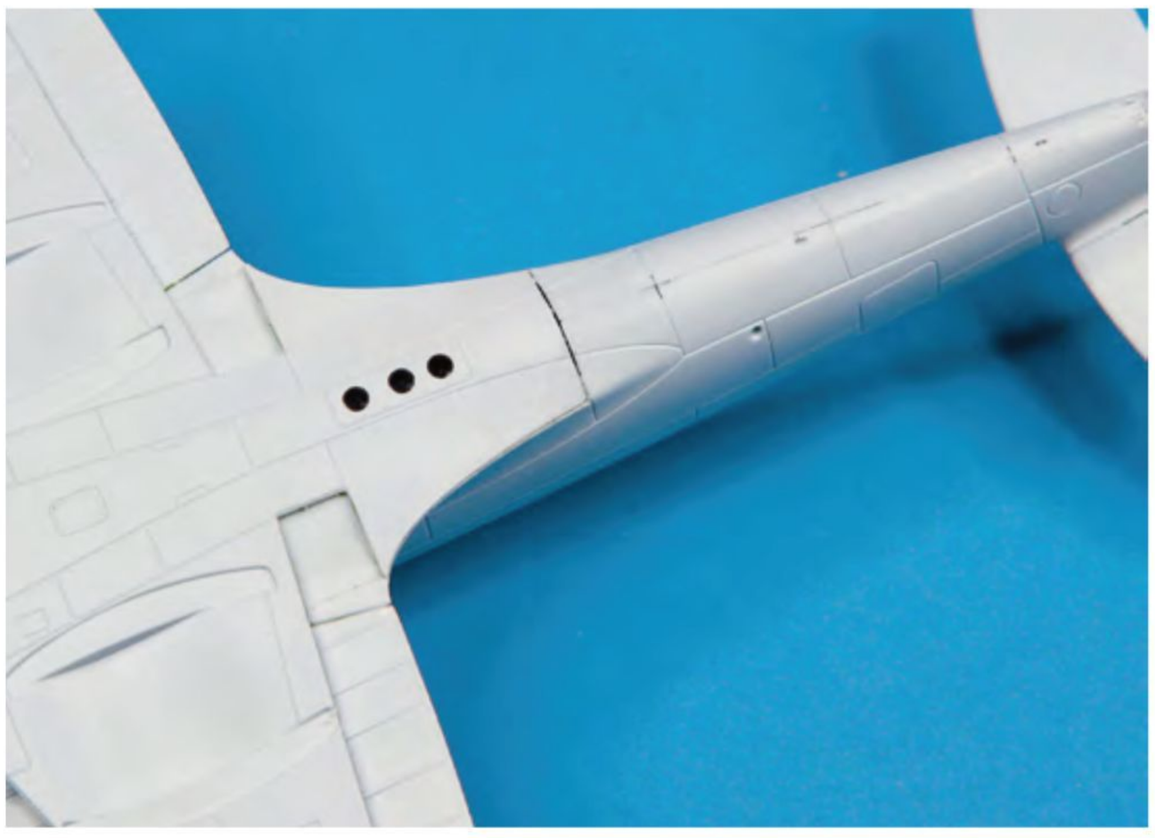
sanded. This can be the case near a wing root for instance. Here, water-based putty can be the perfect solution. A thread-thin line can be rolled from the putty and carefully inserted into the small gap. Then, with a wet fingertip, the putty is smoothed into the gap and the excess can be removed with a cloth or wet paper towel. If this operation is carried out with caution, no sanding will be necessary.

Final Check

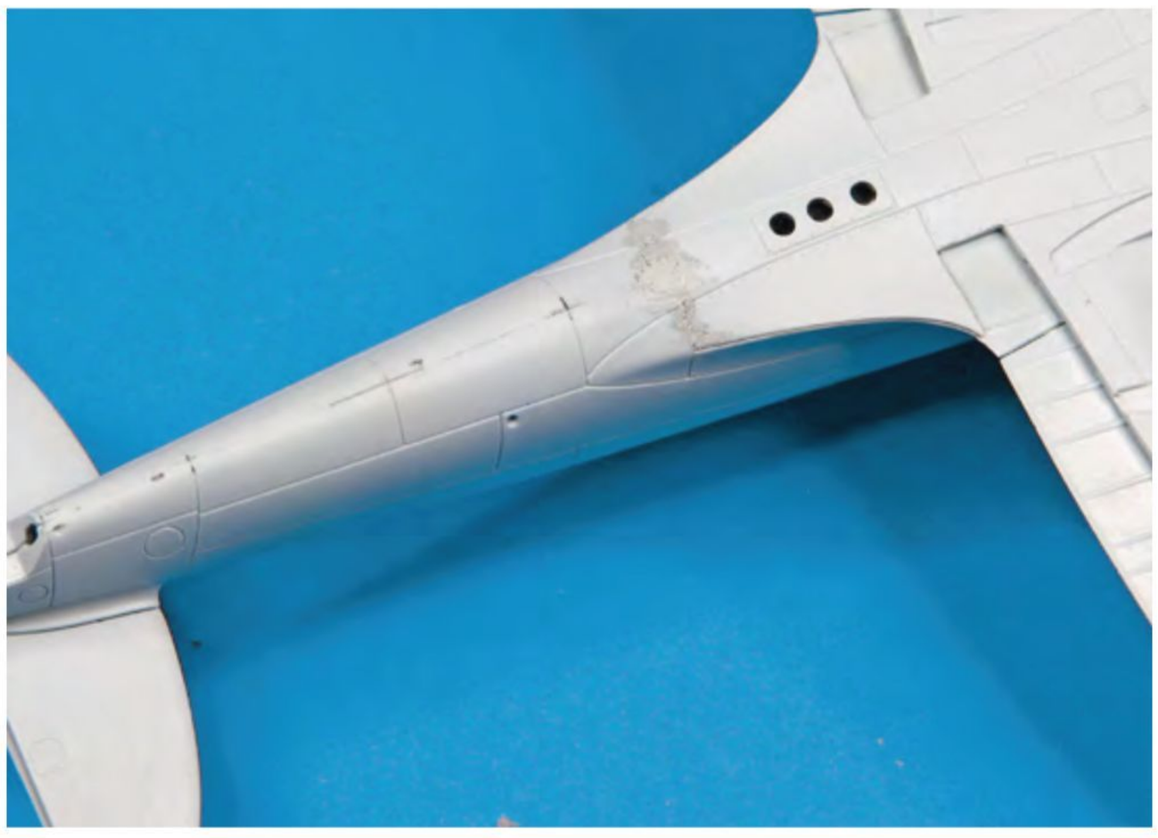
When the filling and sanding is done, there should be a smooth surface ready for painting. However, it's sometimes hard to see if a surface is entirely smooth, especially as the treated area often shows different colours from the plastic, sanding dust and putty. A final check is best carried out by washing away the dust and cleaning the surface, and to apply a very thin layer of grey or white paint which usually reveals any imperfections…more on this in the painting chapter.



▲ A black marker pen has also been used to reveal the seam on the leading edge of this Airfix Seafire kit.



▲ The join between the fuselage and the wings can often be tricky…the gap is evident in this photo.



▲ Filler is inserted into the gap, left to dry properly then sanded smooth.

Kit assembly instructions will advise the modeller to work in a certain order, from A to Z or one to whatever number; these instructions are mostly well considered as far as construction is concerned. However, it does not always take the most efficient painting process into consideration. Although each part is usually assigned with a code for which colour it should receive, it would create many problems to assemble and paint everything according to the building sequence shown on the instructions. With a few models under one's belt, one will soon discover that, for instance, the propeller and spinner is best left off until the closing stages of the assembly…when both have been painted separately, as has the main bulk of the aircraft. Tank modellers will also find that the underside and inner workings of a tank turret are hard to reach if already attached to the hull.



Airfix's 1/32 Mini Cooper shown in sub-assemblies, ready for painting.

A Modular Approach

Working in sub-assemblies

The answer to the problems just discussed is to assemble the model according to the instructions, but to hold off from final assembly. Instead, sub-assemblies are created. These are made up from a number of kit parts, built to ultimately join together. By doing so, both test-fitting and painting will be considerably easier.

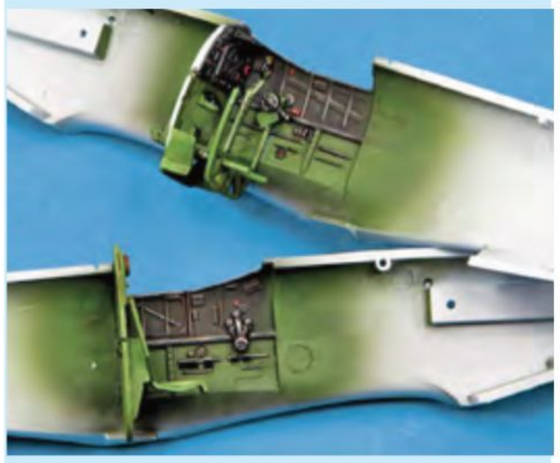
Typical examples of sub-assemblies are the cockpit of an aircraft, the turret of a tank, or the interior, engine or chassis of a car. They can also be smaller parts such as the undercarriage on an aircraft, or the running gear of a tank…but they all have one purpose and that is to make the final assembly and painting easier.

When to apply paint?

Some sub-assemblies need to be painted before they are attached to other parts of the model. A car interior would be impossible to reach if the car body was already on top of it. The same goes for a cockpit, which is hard to paint when glued to a fuselage half, and virtually impossible to paint properly if the fuselage halves are already glued together. The wheels of a car are another example, of parts that are hard to reach if they are already assembled with the main model. A golden rule is to leave all sub-assemblies for the exterior until last, while all the interior parts should be painted and assembled first. In reality this would mean the following, using a car as an example; chassis and interior are assembled and painted as one unit. The car body, without its windows is also painted separately. Wheels and final details such as windscreen wipers and headlights are all left until the final assembly, and painted before being glued into position. This sequence will make painting much easier and allow test-fitting of the separate sub-assemblies so that possible fit problems can be solved ahead of painting. For instance, a car body that exhibits poor mating with its floor pan needs to be adjusted before it is painted, because the paint coat would be ruined if filling and sanding was necessary.



▲ The painting of the interior would have been much more difficult if it had already been inserted between the fuselage halves.



▲ The painted parts are installed into the fuselage.

Final assembly

There is another obvious reason for not assembling all the final details of a model, and that is the subject's fragile nature. Small parts such as antennae, guns, rear view mirrors and such would easily fall off during handling of the model. It's worth taking a moment to consider in which order these finer details should be added. Basically, the final parts should be attached in size order, or where they are best reached. For instance, on the underside of an aircraft both weapons load and the landing gear need to be added, but the space here is usually very limited; the best solution would be to work from the inside out. This means starting with the centreline fuel tank or weapons and working outwards towards the wing tips. A modern jet aircraft can have four or five stations under each wing, so this is worth considering before gluing the payload into place.



Airfix's 1/48 Seafire Mk.XVII cockpit, in separate sections to ease the painting process.



▲ With the interior attached, the fuselage can be assembled and construction furthered.



▲ Styrene plastic card, or sheet, comes in many different thicknesses and is highly useful for converting and scratch-building work.



▲ Rods and strips are available in a great variety of shapes and profiles, which help when rendering extra detail on a model.

Improving the Product

No matter how great the model kit, there will always be room for extra detailing and improvement for those who wish to take their project further. What has come to be known as the 'aftermarket' industry offers a treasure trove of detailing sets, and while some modellers are perfectly happy just to finish a model by simply using what's in the box, or just to add a few minor details, others wouldn't dream of building a kit in this way and always buy the available extras. The joy is that one has this choice, based on desire and budget. Additional detailing doesn't have to be that complicated as there are many ways to improve a model, with moderate effort, using either home-made parts or those resin or metal items available commercially.

What to improve

During one's initial inspection of a kit, which might have perhaps hundreds of parts, it can be hard to identify which components may benefit from improvement or replacement. But when looking at finished models that have been subject to extra detailing, it's often easy to see the difference. With aircraft the most common improvement lies in the cockpit. Most desirable is the addition of seatbelts and detailed instrument panels, gun sights, canopy hinges and rear view mirrors. On the exterior it's common to replace the exhaust stacks, control surfaces, propeller blades, landing gear, antennae and gun barrels.

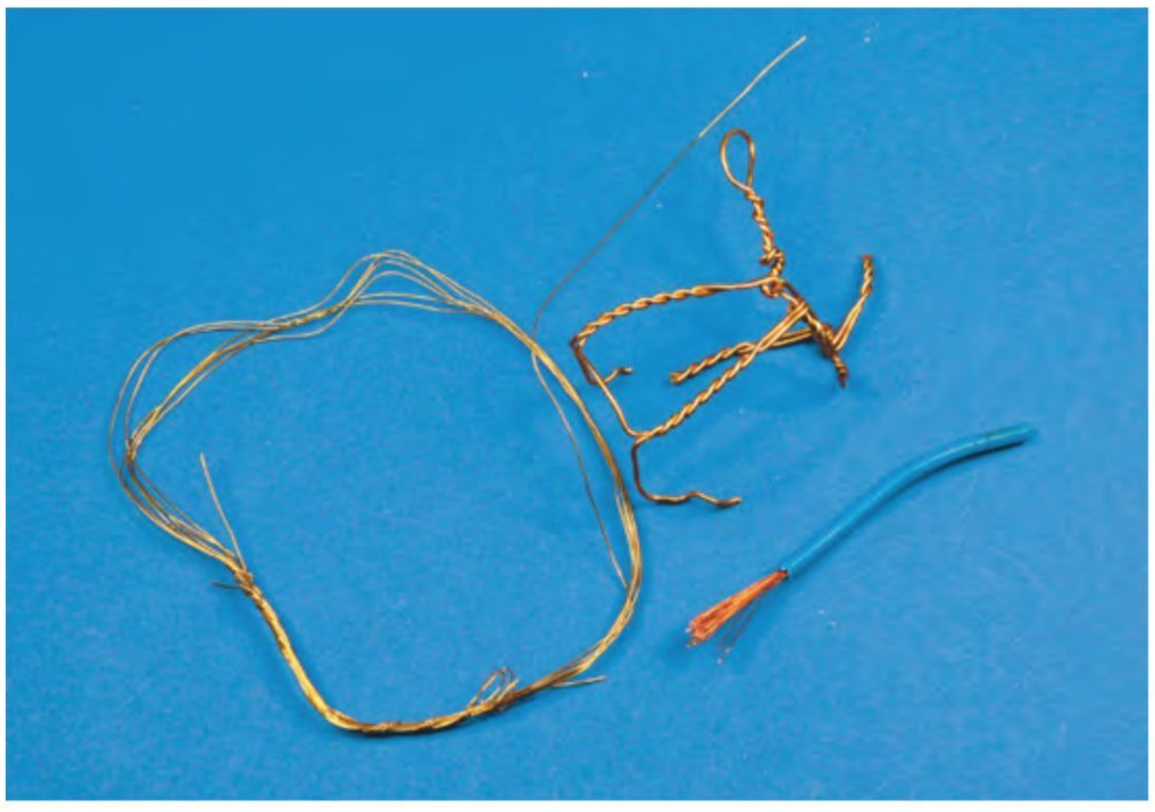
Tank modellers generally wish to replace tool holders, gun barrels, hinges, engine mesh covers, track guard fenders, towing cables and track links or wheels. A car builder will find many ways to customise a model by adding a fully detailed engine, new wheels, spoilers, chrome parts, exhaust pipes and extra lights.

'Scratch-built' additions

Although there is a huge market for accessories and the choices are legion, much can be done with a little imagination and the use of basic materials. These can often be found not only in hobby shops but in art and craft shops, DIY shops and even in supermarkets.

Plastic card and rod

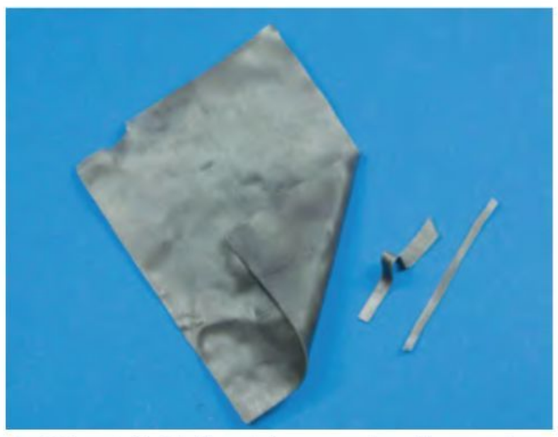
Perfect for creating interior embellishments such as instrument panels, and framework. It's easily cut with a scriber, knife or saw



▲ A number of materials can be sourced from every-day items. Shown here is copper wire in electric cabling (right), and copper-brass wire from champagne and wine bottles.



▲ Albion Alloys offers a comprehensive range of rods and tubing down to the smallest imaginable dimensions. The product quality is excellent.



▲ Metal foil, in this case lead, can be used for making straps, seatbelts and replicating other types of fabric.



▲ Lead wire is ideal for representing electrical wiring and brakes lines.

and can be glued by regular plastic cement. There are more than 100 different shapes and sizes, with varied thickness and profile, and in clear plastic which is useful when replacing transparencies such as head-up displays in aircraft cockpits. Major brands are Plastruct, Maquette and Evergreen.

Metal wire, rod and tubing

The perfect choice for replacing fragile plastic parts, simulating wiring, making crisp railing or to replicate coil springs. Fine tubing can replace gun barrels or pitot tubes on aircraft. Albion Alloys offers a superb selection of products.

Lead sheet foil and lead wire

Lead is a very soft material which is easy to shape, and holds onto that shape once set. This makes it ideal for simulating seatbelts, brake and hydraulic lines, and electrical wiring. Thin sheet foil can also replicate fabric such as a flag, a canvas cover, tie down flaps or 'remove before flight' streamers.

Brass wire and sheet

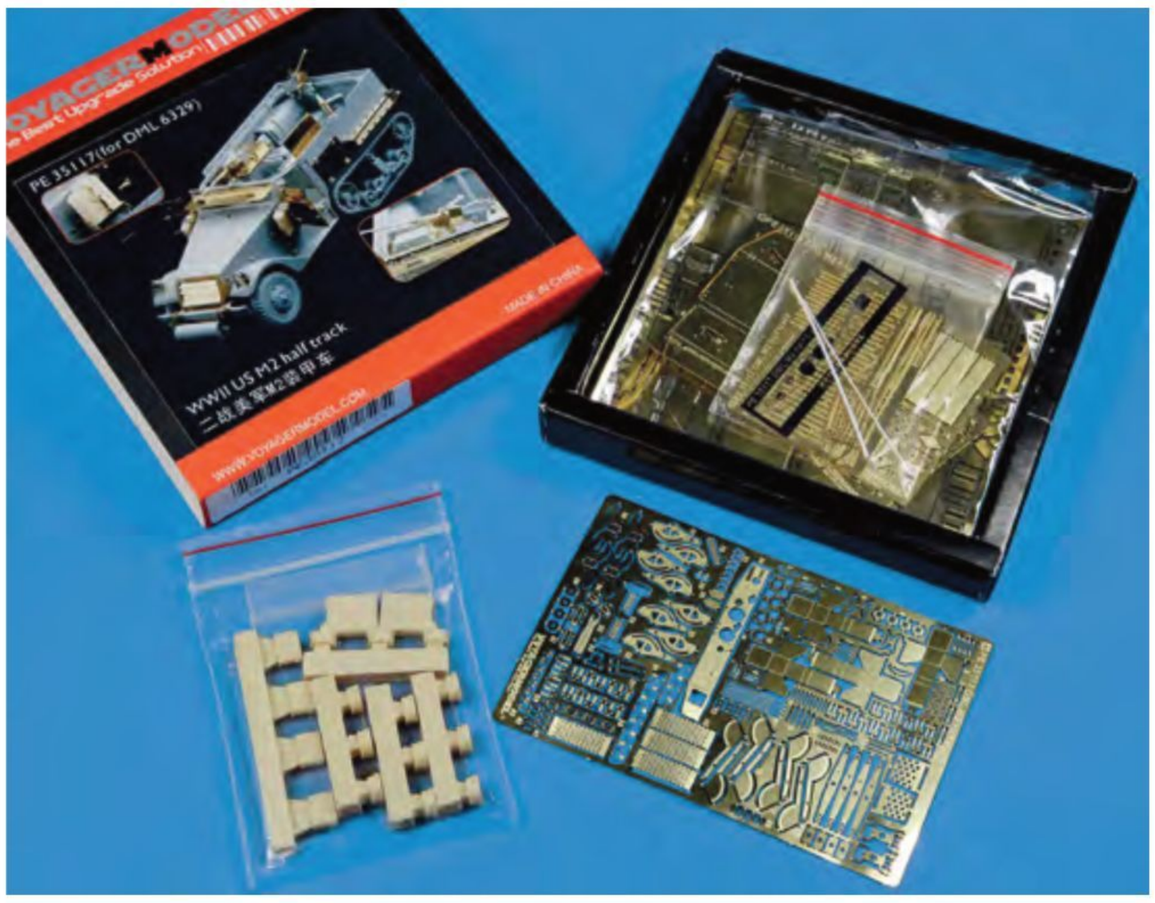
Advanced modelling can involve soldering and for that brass is a perfect material. Home-made fenders, fine railing and handles are just a few examples of what can be achieved with brass.



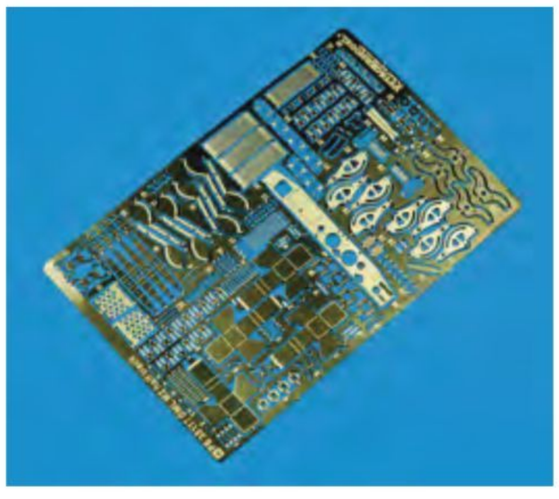
▲ Here's an overview of commercially-available accessories and updates for kits: resin sets, photo-etched metal, turned aluminium and brass details.

Photo-etched metal

Photo-etched (PE) details have been available to the modeller for the past 25 years or so. Basically, PE is thin brass (or other metal) sheet with relief detail which is used flat, or designed to be bent or rolled into a certain shape and is designed to replace or enhance the detail on a kit part; this offers a level of detail that is hard to achieve with plastic. A set of PE details is usually designed to fit a specific kit or type of aircraft, vehicle or ship, or the sets can contain just a specific part, for instance landing flaps for an aircraft. There are numerous manufacturers with some of the major brands being Eduard, Brengun and Voyager, but many also combine PE with other materials such as resin (known as mixed-media) and sell complete upgrade sets. A recent trend is that certain plastic kit manufacturers now include PE already in the kit, which is not just cheaper for the modeller but, in most cases, means good fit of parts. Generally, the metal



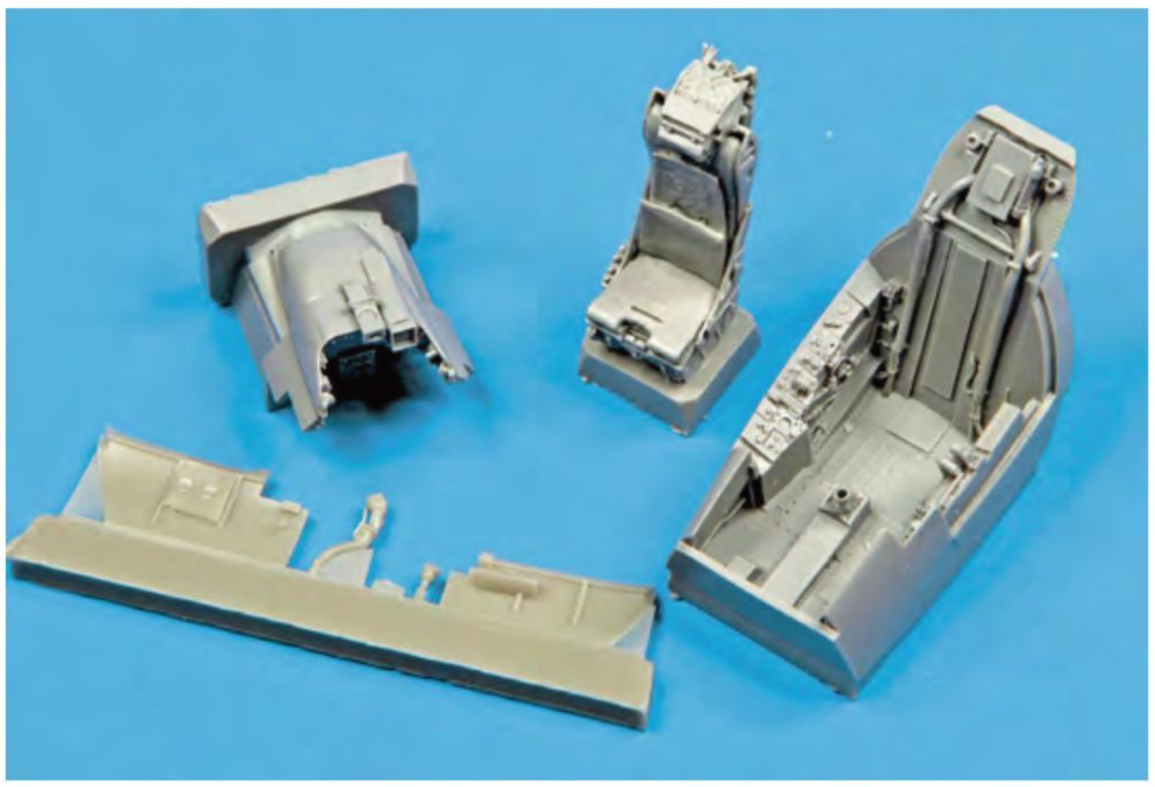
▲▼ An advanced update set for an armoured vehicle in 1/35 scale, which includes PE brass and resin components. The detail is stunning.



parts need to be painted, but more recent sets from the likes of Eduard are available as pre-coloured items, which certainly saves the modeller much time and almost always guarantees flawless results.

Resin

Resin is a hard, plastic-like material which is used for casting very crisp detail in relatively small series, compared to the volumes in which



▲ **A typical resin cockpit, in this case for a 1/48 BAE Lightning fighter aircraft; the crisp detail is hard to achieve with other materials, such as styrene plastic.**



▲ **Resin updates for armoured vehicles, in this case replacement wheels and an engine set for a Panzer IV tank.**

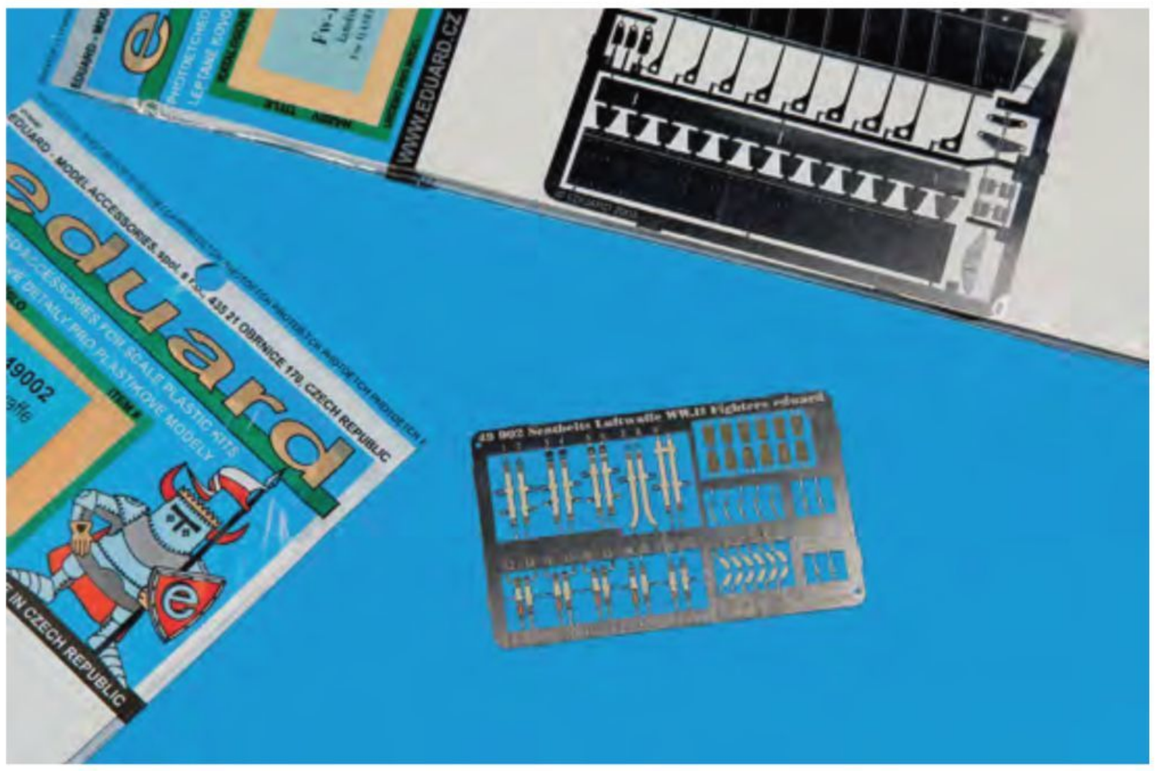
mass-produced plastic kits are manufactured. Thanks to its consistency, resin can be poured into very complex rubber moulds and achieve results that would be unreachable with injection-moulded plastic, which is the main material for kit parts. This means the manufacturer can offer an unparalleled level of detail, cast in one block. Entire cockpit tubs can be cast with all switches and panels, an ejection seat with seat belt detail, or a wheel well full of wiring. For armour modellers there is a huge market, which offers kit conversions, wheel replacements, special purpose gear and much more.

Resin is, however, a fragile material when cast thinly and can easily break when handled incorrectly; great care needs to be taken when removing the components from their casting plugs. Generally the parts need little preparation apart from cleaning up of seams or 'flash', and slight sanding. There are many brands offering resin sets and the Czech Republic is the home of some of the best, such as Aires, Quickboost, CMK and Eduard to mention a few.

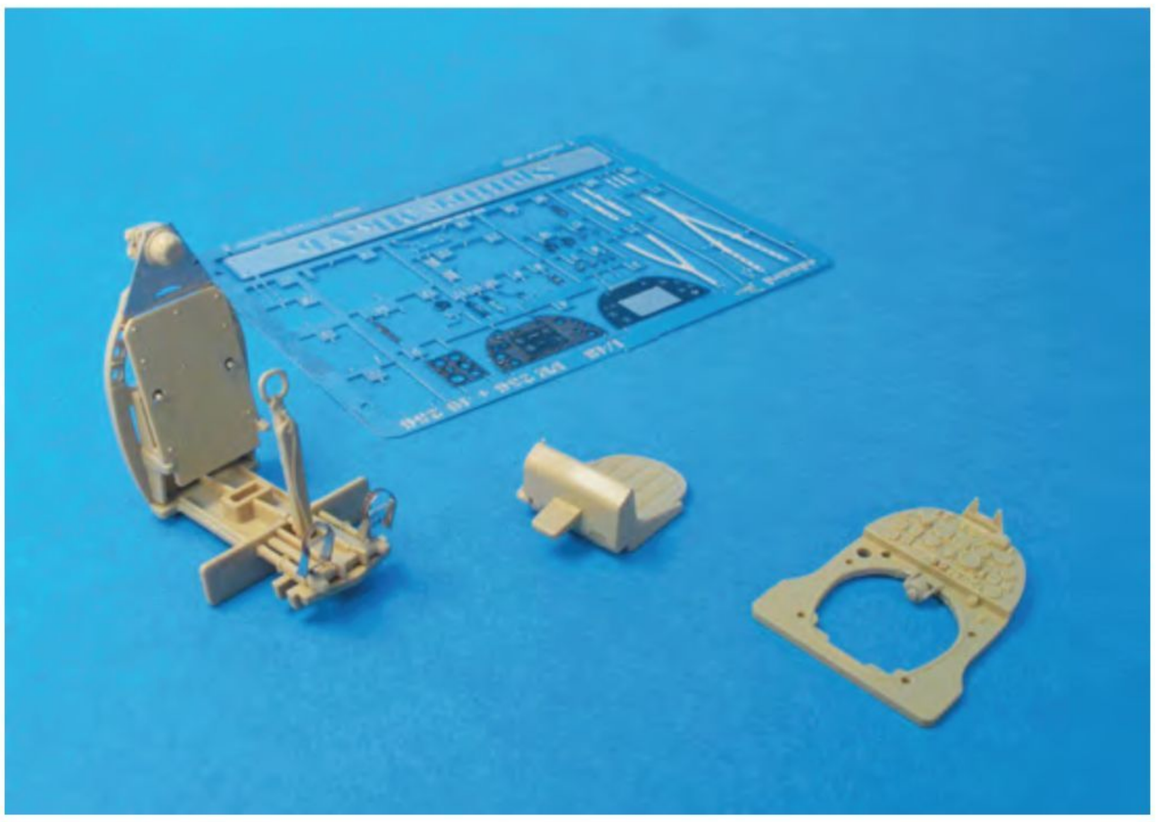
As the plastic kits get better and better, the need for resin replacements is perhaps not as common as before, and some shapes are difficult to cast because of the warping often experienced when casting large pieces of resin. Still, the level of detail is unquestionable.

Metal parts

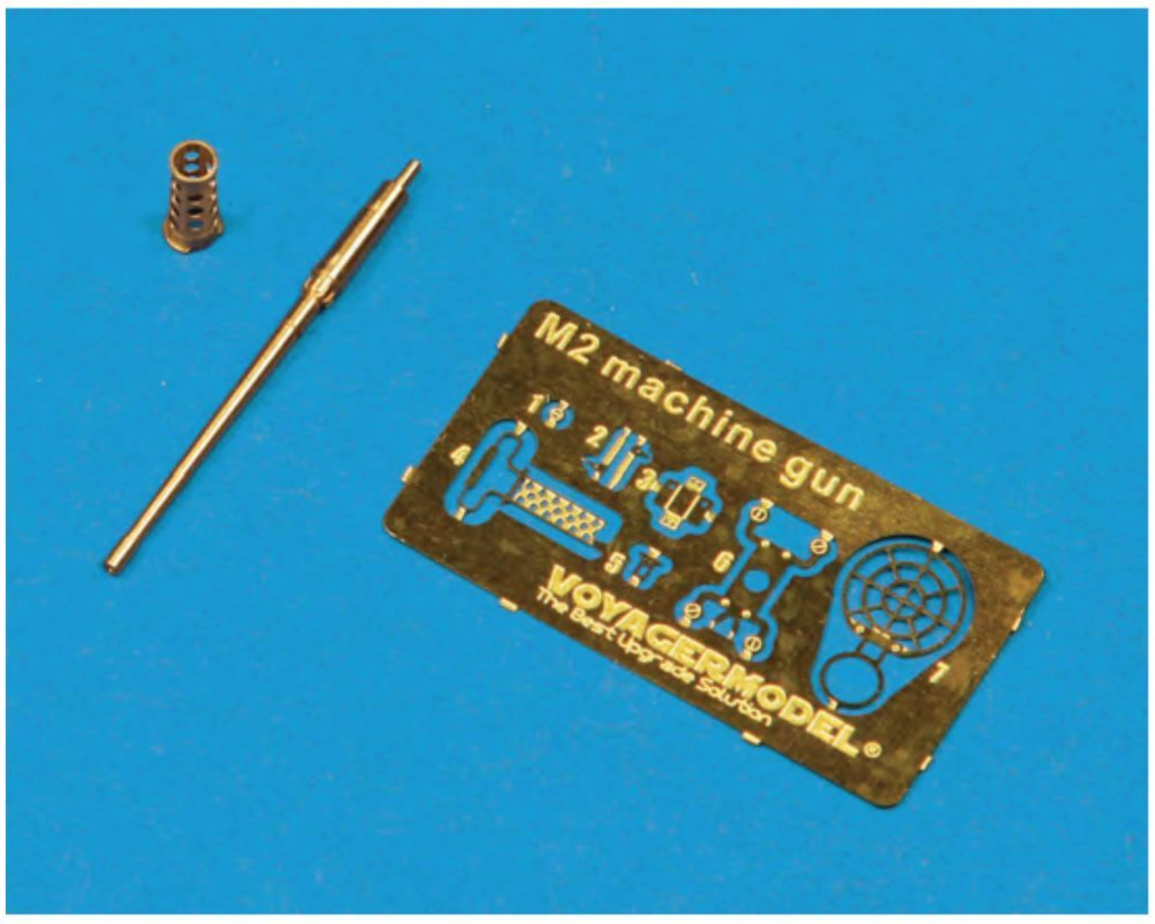
Some parts are better suited to be manufactured in metal, such as aluminium, brass or white metal and there are brands that specialise in this, most of them



▲ **Among the most common updates for aircraft are seatbelts, here seen in 1/48 scale, and in this case pre-painted. Landing flaps in 1/32 scale are also shown.**



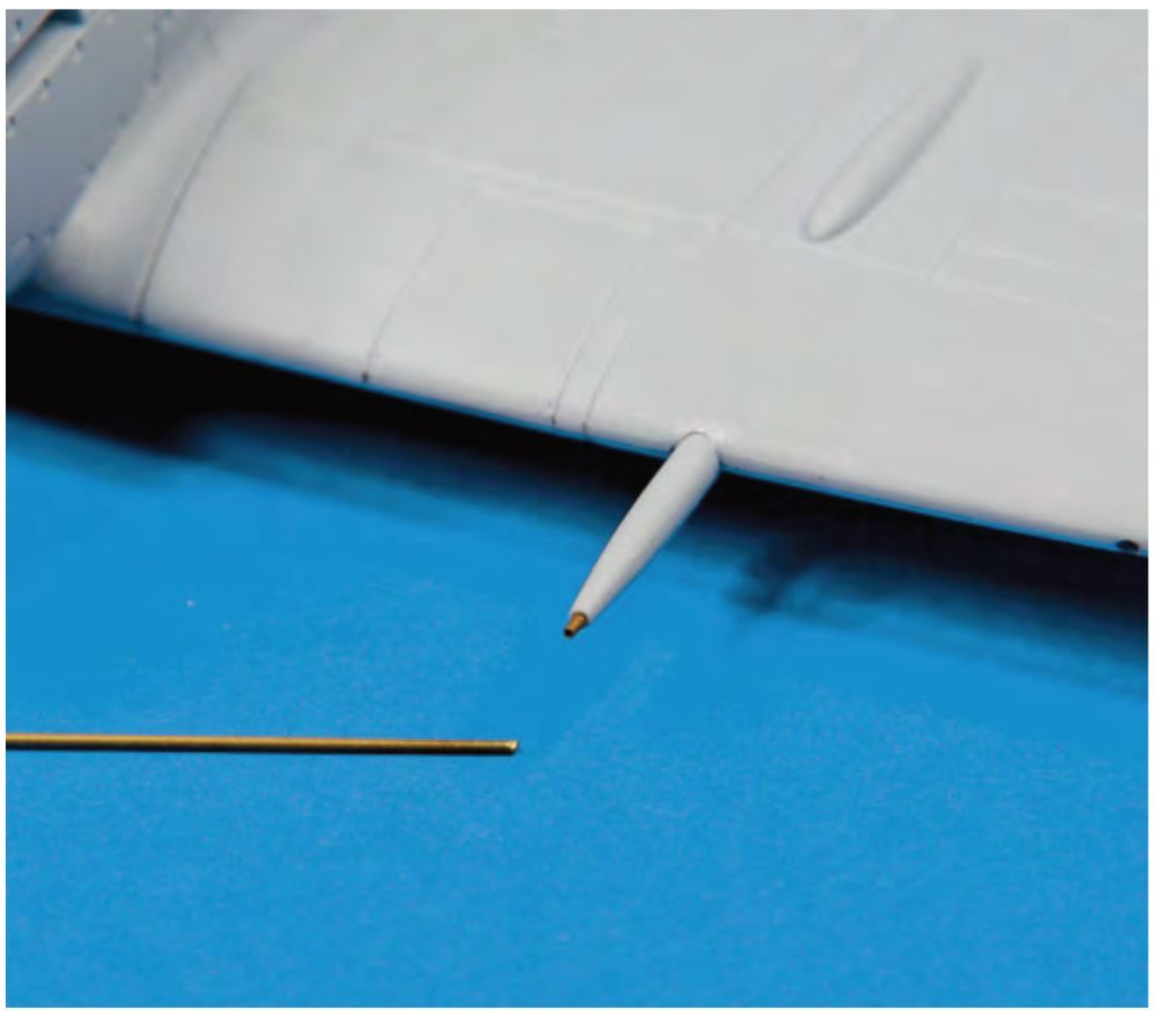
▲▼ **In detailing this cockpit, the instrument panel, oxygen hose and seatbelts were all added from photo-etched metal, or scratch-building materials such as soft lead wire coiled around a central strand.**



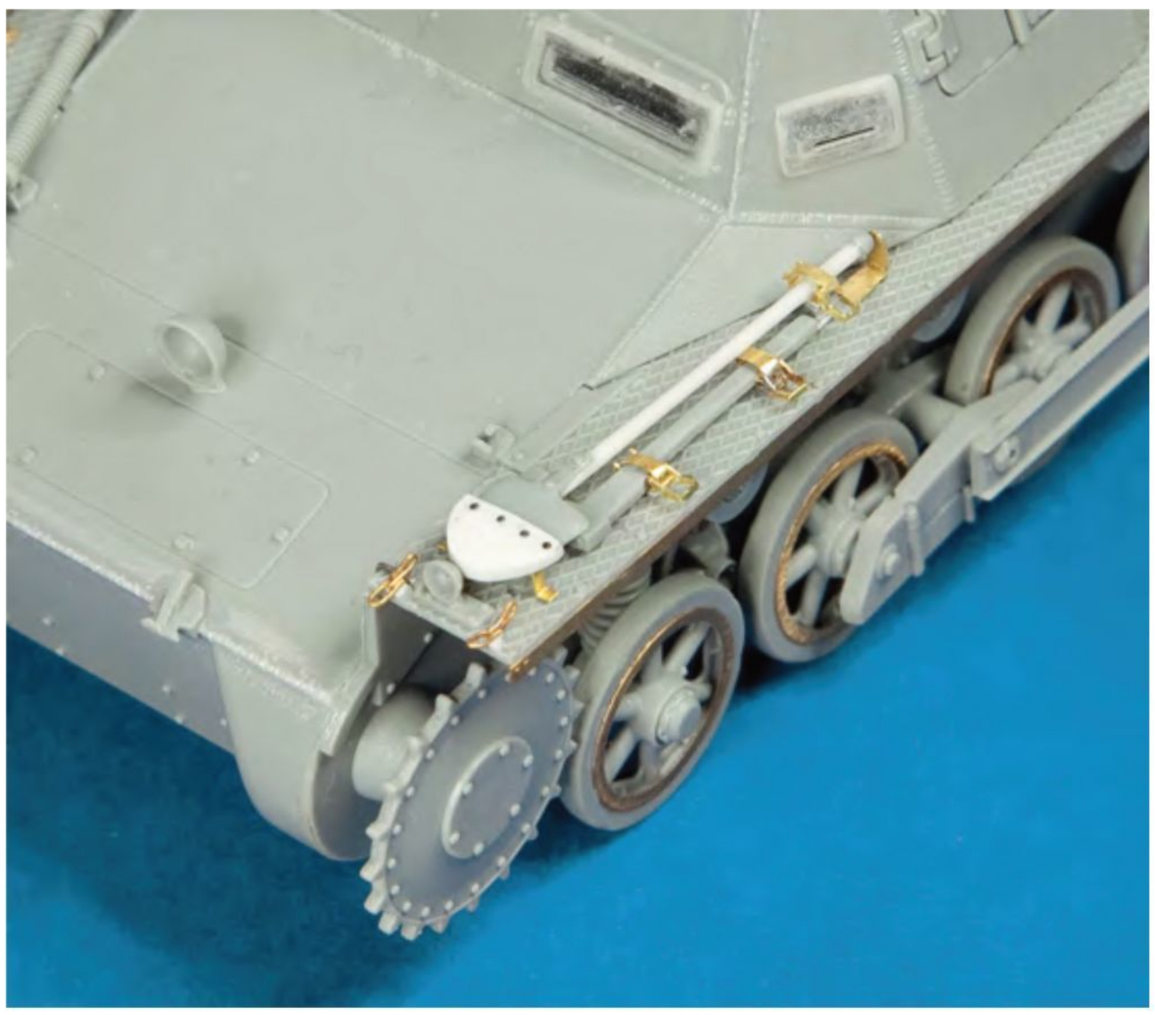
▲ **A beautifully turned brass barrel for a heavy machine gun, complete with flash suppressor and photo-etched brass details.**







▲ This Spitfire had its gun muzzles replaced with fine brass tubing from Albion Alloys...the difference being significant and certainly more true to scale. When the tubing is this thin, it can be cut with a strong, sharp hobby knife, using a rolling action.



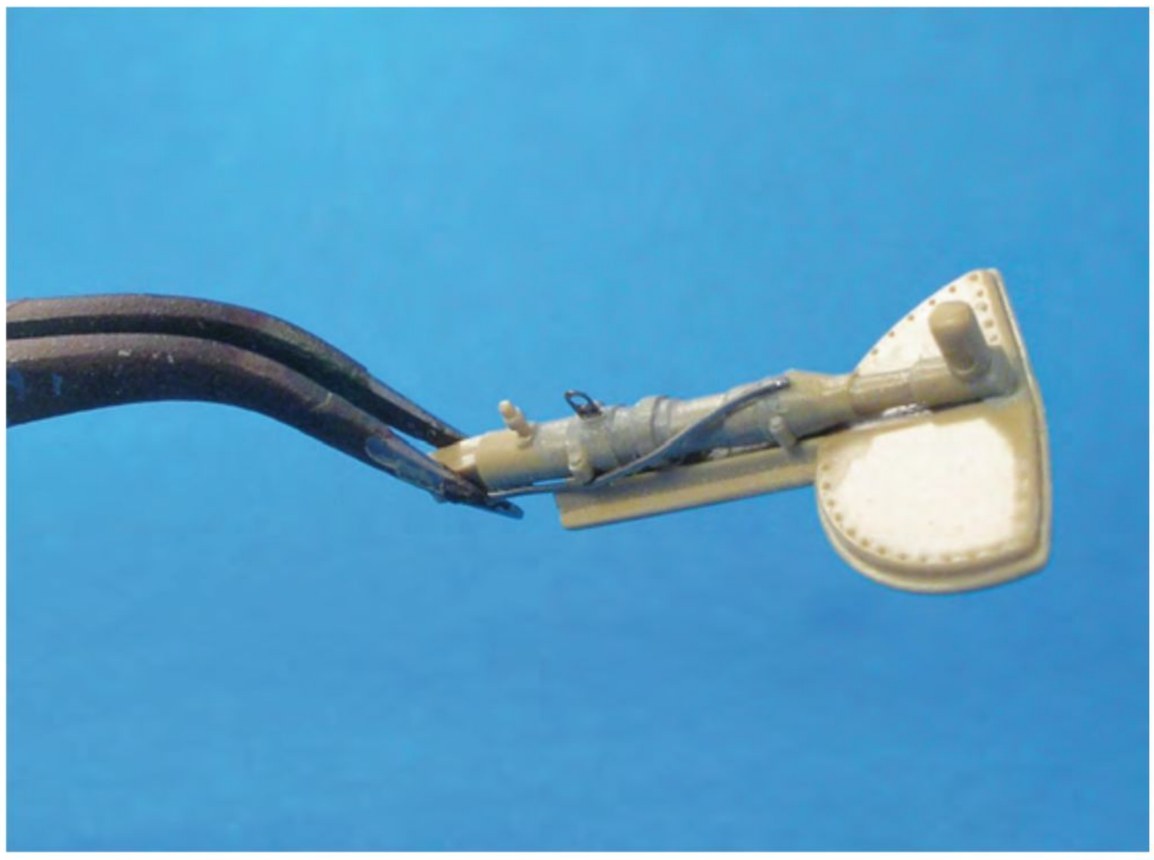
▲ This 1/35 scale Panzer I kit has been embellished with scratch-built parts from plastic card and copper wire, as well as commercially available photo-etched metal (the tool clamps). Detailing such as this need not be difficult or complicated...it often just requires patience and a steady hand.

in the armour modelling sector. The most common kit part replacement for tank modellers is the main gun barrel, which is often shunned for a turned aluminium offering, with a brass end for the muzzle brake. This solution offers great quality and saves the modeller the time of removing difficult and lengthy mould seams... and the result is guaranteed to be perfect. Other common replacements are the kit's vinyl tracks, which can be well moulded but lack weight to help represent the natural sagging of the real thing. Here, white metal is used to cast the track links one by one and they are then sold in sets to fit a specific model. For many years, Friulmodel has been the major brand for this purpose.

White metal is also ideal for casting delicate details such as landing gear struts and ejection seats; many brands offer upgrade sets in this medium. It can be cast with a high level of detail, but still be more sturdy than equivalent resin parts.

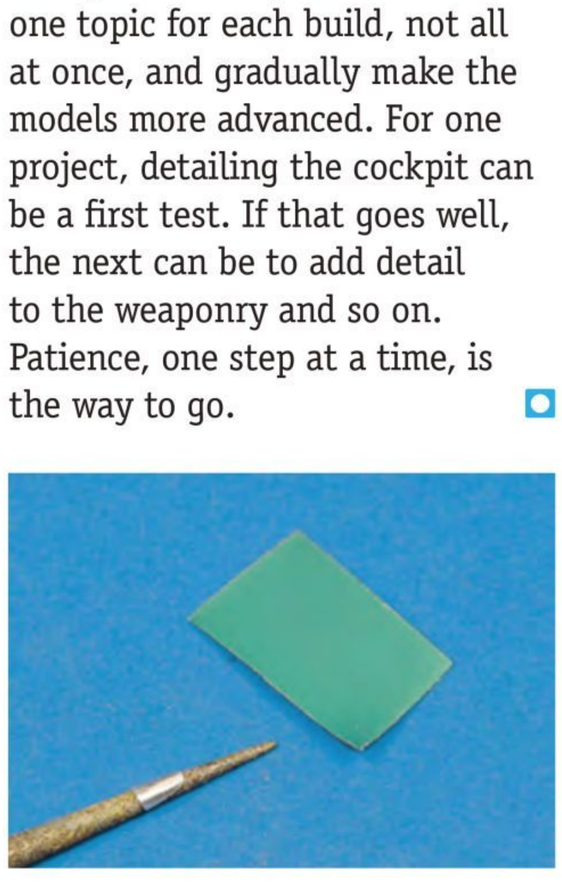
Setting the limits

With the great offerings out there, it's important for modellers to decide which level of detail they wish to achieve. One thing to remember; the most important thing is that modellers themselves should be satisfied with the result, no matter if it is a quick build or an advanced one with loads of extra detailing sets. A simple rule for those who want to reach 'show quality' is to try to improve or experiment with one topic for each build, not all at once, and gradually make the models more advanced. For one project, detailing the cockpit can be a first test. If that goes well, the next can be to add detail to the weaponry and so on. Patience, one step at a time, is the way to go.



▲ Lead wire was used to create the brake line on this undercarriage leg.





▲ ▶ This replacement air scoop on Airfix's 1/48 Seafire was created from a section of printer's metal sheet, shaped with a round file and a sanding stick. It looks most convincing when fitted to the upper nose and small additions such as this can really lift the final finish of a model.





Here's a good selection of economical synthetic brushes.



▲ This is another slightly more expensive model, which sports a comfortable grip.



▲ Flat brushes are also essential for painting larger areas and applying washes.



The luxury model among brushes, Winsor & Newton's Series 7 Red Sable...not cheap but definitely offers top-class performance.

Painting Equipment

One of the many interesting aspects of plastic modelling is its variety, with almost endless subjects in various scales and from many different historical periods.

While some builders may favour small models others are often loyal to larger scales; correspondingly some like colourful finishes while others prefer a more toned-down camouflage approach. Interestingly, the process of finishing a model can be described as two worlds - construction and painting. Perhaps it's not so strange that some modellers enjoy the construction, and pay a great deal of attention to the smallest detail, while others just want to get it done so they can express their creative side with the painting. It can be compared to working with a real car; it's not very common that the mechanic also applies the paintwork! Certainly, though, many modellers enjoy the entire journey or perhaps even consider the whole experience to be the goal with their modelling, to actually enjoy the model from opening the box to that final lick of paint.

The painting of the model also, in many ways, determines the final outcome of the build. A bad paint job can ruin many months of hard work with the construction, while careful paint application can work marvels for a model which is built straight from the box, with no fancy extras. It can rarely, however, hide flaws made during construction... rather the opposite in fact.

Work area

One of the most important aspects when painting a model is to perform one's tasks in a proper work space. Some modellers enjoy the luxury of having a separate bench just for painting, while others use the same work bench as used for building their models. Either way there are a few important things to consider.

Firstly, necessary space is required in order to accommodate the model, paint jars, paper tissues, brush or airbrush stand etc. Working in a narrow space significantly increases the chance of accidents such as spilling paint or damaging the model. Also, the work area has to be clean. The construction of a model leaves plastic scrap and sanding dust which easily sticks to a wet, painted surface. The work area should therefore be wiped carefully, including surrounding surfaces, shelves, lighting armatures or other furniture in the room that can collect dust. The importance of this cannot be neglected as dust particles can ruin an otherwise beautiful model.

Finally, good lightning is an absolute must. Not only will it help the modeller to see better, it will also help determine the colours' appearance and consistency. The best solution is to use neutral daylight lamps that give an accurate light, which will not affect the appearance of the rendered shades - as opposed to the typical yellowish glare from a light bulb. If using the latter, it is highly recommended to cross-check the colour nuances by a window to see how they appear in natural daylight.

Brushes

Paint brushes come in a variety of materials and quality; from simple and comparatively cheap synthetics to high-class red sable. Good synthetic items usually offer a stiff and firm point, but have a rather short life when compared to real hair brushes.

A good set of paint brushes is essential and a simple guideline is to spend more money on the brushed intended for detailing, and less on those for work with lower levels of precision.

However, no matter how good quality the brushes are, they will not last long without proper care. After use they should be thoroughly cleaned and the shape of the tip restored by carefully



Humbrol's simple but effective basic airbrush.



A more advanced offering is this double-action airbrush from Badger, which gives the modeller even more control over the painting process.

sliding the brush between two moistened fingers. A tiny drop of linseed oil will also help preserve the brush.

Brushes are numbered according to their size, those with the finest tip being 000, and it's recommended that the modeller has at least four or five different sized round-tip brushes and two to three flat-tipped versions. The use of paintbrushes will be described in detail in forthcoming passages.

Airbrushing

To inexperienced modellers, airbrushing is often regarded as something very advanced and expensive. Most remember their first airbrush or the first model they painted using that tool. Even if great results can be achieved with paint brushes, and they sometimes are the best choice, the finish gained with an airbrush is usually unrivalled.

Simply explained, an airbrush applies a thin mix of paint with the help of air pressure, coming from an air compressor or air propellant can. The paint and air are pressed through a narrow nozzle that mixes both into small particles, which then land on the model in super-thin layers (if applied correctly). Most have probably seen a car body painter applying paint with a spray gun; an airbrush basically follows the same principal but in a much more refined manner.

As with paint brushes, airbrushes are available in a great variety in terms of price and functionality. The simplest apply the paint with one fixed setting (single-action), where the paint volume and air pressure cannot be adjusted. These airbrushes work perfectly fine for beginners and for simple one-colour schemes. They often perform surprisingly well and are well worth the money.

More advanced airbrushes offer other options such as regulation of the airstream and the colour volume (double-action) and they sport interchangeable needles and paint cups to customise the airbrush for a specific painting task. Good airbrushes come at a price though, and it's up to each modeller to balance cost and functionality according to his or her needs. The most common airbrushes are those in the middle price range, which means approximately £80-£100. A good air compressor however, can cost two, three or even four times more than the airbrush itself, but on the other hand, they will most likely last the modeller's entire career if cared for properly. Airbrushes will be covered in more depth later.





▲ Canned air is a good alternative for those who use the airbrush rarely, or prefer to work in a quiet environment (some compressors are almost silent but many aren't!)

TOOLS

As important as the proper tools are for the construction of a model, the same is true for painting. There is a great selection from which to choose, in hobby shops, art shops, mail order houses, shows and well-appointed DIY retailers. Experienced modellers have their favourite brands for types of brushes, and the most important thing is to feel comfortable with the chosen products. Price and quality do generally go hand-in-hand but this isn't always set in stone. The modeller will also need a good set of mixing cups, paint stirrers, tissues and pipettes. Most of these things are, of course, available in hobby shops or craft stores, but sometimes the easiest and cheapest solution is to be found closer than that. For instance, when mixing paints, plastic cups found in the grocery store work perfectly fine, as do wooden coffee sticks for stirring. When working with strong thinners, metal foil baking cups are also a cheap and handy solution. Drop appliers, or pipettes, can be found in the pharmacy.



A variety of materials to make painting easier and neater: mixing cups, stirrers, a pipette and protective gloves.

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Here is a small selection of paint brands dedicated to modelling.

Paint Types and Brands

The type of paint a modeller uses is, in many ways, a matter of taste. Colour ranges from the various manufacturers are often more suitable for one genre, say aircraft, than another…even inexperienced modellers will probably feel safe in mixing products to their own nuances. Availability is also an important factor, and unless the modeller has a large stock of paints, or plans his or her project well in advance, the need for rather quick access to new paints may arise. Availability, in turn, depends largely on where one lives - not just in which country but also whether one lives in a rural setting or a big city. Certainly, everything is available through mail order internet shops today, but paint colours are still something which many modellers want to be able to assess quickly and easily and in person, before use.

Health issues are also an increasingly important factor. Not many years ago nearly all paints were more or less toxic, but now there are safer alternatives for those who value their health. A general rule, however, is to work in a well-ventilated area regardless of paint mediums, and if airbrushing, wearing a mask is recommended strongly.

Acrylics

In general terms, acrylics mean colours that are water-soluble. This however, does not necessarily mean they are water based, as some comprise alcohol (isopropyl) and pigment, whereas others really do contain water and pigment. So, in a way, there are 'true' and 'false' acrylics and not all are kind to one's health.

Some acrylics are suitable for brush painting while others are



▲ British stalwart Humbrol offers extensive ranges of enamels and acrylics…they are arguably the most widely available of all paints.



▲ Vallejo's acrylics come 'neat' and pre-thinned for airbrushing. This brand is very popular among armour modellers and figure painters.

▲ Andrea's range, from Spain, is highly suitable for brush painting and is much used by figure modellers, but can be hard to find in shops.

▲ Tamiya's acrylic range is an old favourite among modellers, known for its quality and is widely used.

▲ The Japanese brand Mr. Hobby offers acrylics with a high degree of colour accuracy.

▲ Italy's Lifecolor has a great range suitable for airbrushing and brush painting.

designed specifically for use with an airbrush, and it's important to choose the right kind of paint regardless of whether one switches between different brands, depending on the task. Today, most hobby colour manufacturers offer an acrylic range and they have grown increasingly popular. Humbrol has a range that works both for brush painting and airbrushing, as does Revell. Tamiya's paint contains alcohol and is great for airbrushing, but it does not perform well with a regular brush. Vallejo and Lifecolor also offer extensive ranges suitable for airbrushing and brush painting. Mr. Hobby is very popular with aircraft modellers for its accuracy and performance with airbrushes and, like Tamiya, is alcohol based. Recently, there has been a surge of new acrylic brands, including AK Interactive, AMMO-MIG, Hataka, Mr Paint and Mission Models.

The main advantage with acrylics, apart from being less unhealthy, is they dry quickly when compared to oil or lacquer-based paints…which allows for a speedy painting process. This is especially useful when many colours are involved, which would otherwise mean long waiting periods between coats.

Enamels

Enamels are oil-based paints, which require spirits to dilute or thin them. This means they are toxic, and should not be used in closed areas without good ventilation. The most common brand is no doubt Humbrol, but Testors, Revell, Tamiya and Xtracolor also offer enamels. The latter produces very accurate shades in gloss form, which usually speeds up the decal application process. The characteristics of enamels are that they dry slowly (compared to acrylics) and usually need 24 hours or more to be completely dry. This can be both good and bad, depending on the intended task; again, it's very much a matter of taste. Enamel manufacturers used to have a much larger range of paints and still do to some extent, and that is of course one reason for its popularity…there was simply much more to choose from. For a long time, the colour ranges were also much closer to nature's colour spectrum in terms of earth shades, while acrylics tended to be somewhat stark and artificial.

Use of acrylics has blossomed in the past ten to 15 years and the scales have definitely tipped in their favour, with the main reason being the toxic nature of enamels (but also the increased offerings by the acrylic manufacturers). Still, most modellers prefer to render the weathering of their models exclusively with enamels, more of which will be dealt with in the weathering chapter of this publication. Enamels also offer far better pigment grain in terms of metallic colours, which few acrylic brands can match.

Oils

In recent history, oil paints have been the main medium for artists and many of the all-time classic paintings have been created by using them. Among modellers, oils were, for many years, the first choice of figure painters and they still are to some degree - even if acrylics now also loom large in that field. For armour and

THINNERS

In general, all paints need to be diluted before application, except for those that are pre-thinned by the manufacturer and ready for use. Which thinner the modeller uses depends on which colour and paint brand selected. Oil and lacquer-based paints need spirits for thinning. Most common is white spirit and this is what many paint manufacturers more or less re-label as their own brand of thinner. Turpentine is also a good solution, while a stronger (and more health-hazardous) alternative is cellulose thinner. This medium should be treated with the utmost care and tested before use as it can actually melt certain kinds of plastic. It is, however, a very good substance for airbrush cleaning.
Acrylics can be thinned with water. Some work just fine with water straight from the tap, while others will perform better with distilled/de-ionised water and it's essential to find out which is best for a specific brand or type of paint. As mentioned earlier, some acrylic paints contain alcohol, and are therefore best diluted with alcohol-based thinner.
Most paint manufacturers offer their own branded thinners, suitable for their range of colours. There are, though, other more commonly available options if the branded products are not available. For instance, white spirit can be found in most paint shops or hardware stores, and some modellers use window cleaner as a thinner for alcohol-based paints with great results.



A selection of thinners from various sources.



▲ **Humbrol's enamel thinner, designed for its own paint range…but it can be used on others.**



▲ **Mr. Hobby offers its own acrylic thinners, one being slow drying to more easily achieve a smooth finish.**



▲ **Tamiya provides acrylic and lacquer thinners. The latter is also often used by modellers for acrylics too.**



▲ **White spirit can be found in art supply or DIY shops. It's generally cheap and easy to obtain.**



▲ **Clear varnish can also be sourced from the art supply shop as with this Windsor & Newton spray can. Another popular medium is Johnson's Klear (now Pledge Future) floor polish.**



▲ **Mr. Hobby and Tamiya acrylic ranges offer clear varnish in gloss and matt formats.**



▲ **Humbrol and Model Master (from the USA) also provide varnish in different versions.**

such as Winsor & Newton and Daler-Rowney, can be found in all artist shops at various price levels, and some modelling brands are now offering their own range of oils with very fine pigment grain, suitable for modellers.

Primers

Primers are used to prepare the model's surface for the paint coat. They are not absolutely necessary for plastic parts, but they do offer an essential 'key' when painting photo-etched or white metal. They also have the advantage of revealing any flaws from the construction, which usually appear under a thin coat of paint. Primers are available from many of the major brands in both aerosol cans and regular bottles for mixing and applying with an airbrush (or brush) and are sold in hobby shops. Some have a thick consistency and can be used as a very fine filler. Primers can also be found in auto retailers, regular paint shops and art supply stores.

Clear varnish

Varnishes are colourless mediums used for several purposes, but their main role is to give the finished model the proper shine…or lack thereof. They also work as a protective layer for weathering and for sealing decals. There are acrylic and oil-based varnishes from a great many manufacturers, and just as with paints they possess very individual performance traits. There has always been much debate among modellers regarding varnish. One reason for this is that many modellers have, at some point, experienced a final coat of clear having ruined their model, so there may be a huge wariness of a certain brand. So when they find a varnish that suits them they will most likely stick with it to avoid damaging their models.

The worst thing that can happen with varnish is that it can turn milky white, or frosty, or that it can crack during drying. In most cases this can be avoided and the proper application of varnish will be explained later in this book.

Interestingly, varnish doesn't necessarily have to be a dedicated modelling medium. Floor polish has, for many years, been a favourite, especially for aircraft modellers, with Johnson's Klear (or Future as it's known in the USA) being the most commonly used. It should be noted, though, that the formula of these products changes from time to time and they should always be tested on a scrap model before use.

Here is a selection of primers for undercoating.



▼ **Tamiya provides aerosol primers in two grades, as well as a milky-thick version for brushing.**

▼ **Vallejo's primers buck the trend as they are available in dedicated military colours.**



▲ **Tamiya and Humbrol ranges have many shades in spray can form, which is a great option for those who only paint one-colour schemes or do not wish to invest in an airbrush.**



▼ **Games Workshop's Chaos Black was not originally intended as a primer, but is popular among modellers.**

aircraft modellers, oils have long been used mainly for weathering purposes. The main reason for this is that the medium's long drying time allows the modeller to blend in the colours, making them look like worn-in grease, dirt and dust. The wide colour spectrum available also gives the modellers much to choose from. As with enamel, one of the drawbacks is that oils have a distinct smell and require turpentine or mineral spirits for thinning. The long drying time can also be a problem for those who wish to work quickly. Oils

B-25 HISTORY | PHOTO REFERENCE | PROFILES | CUTAWAY ARTWORK

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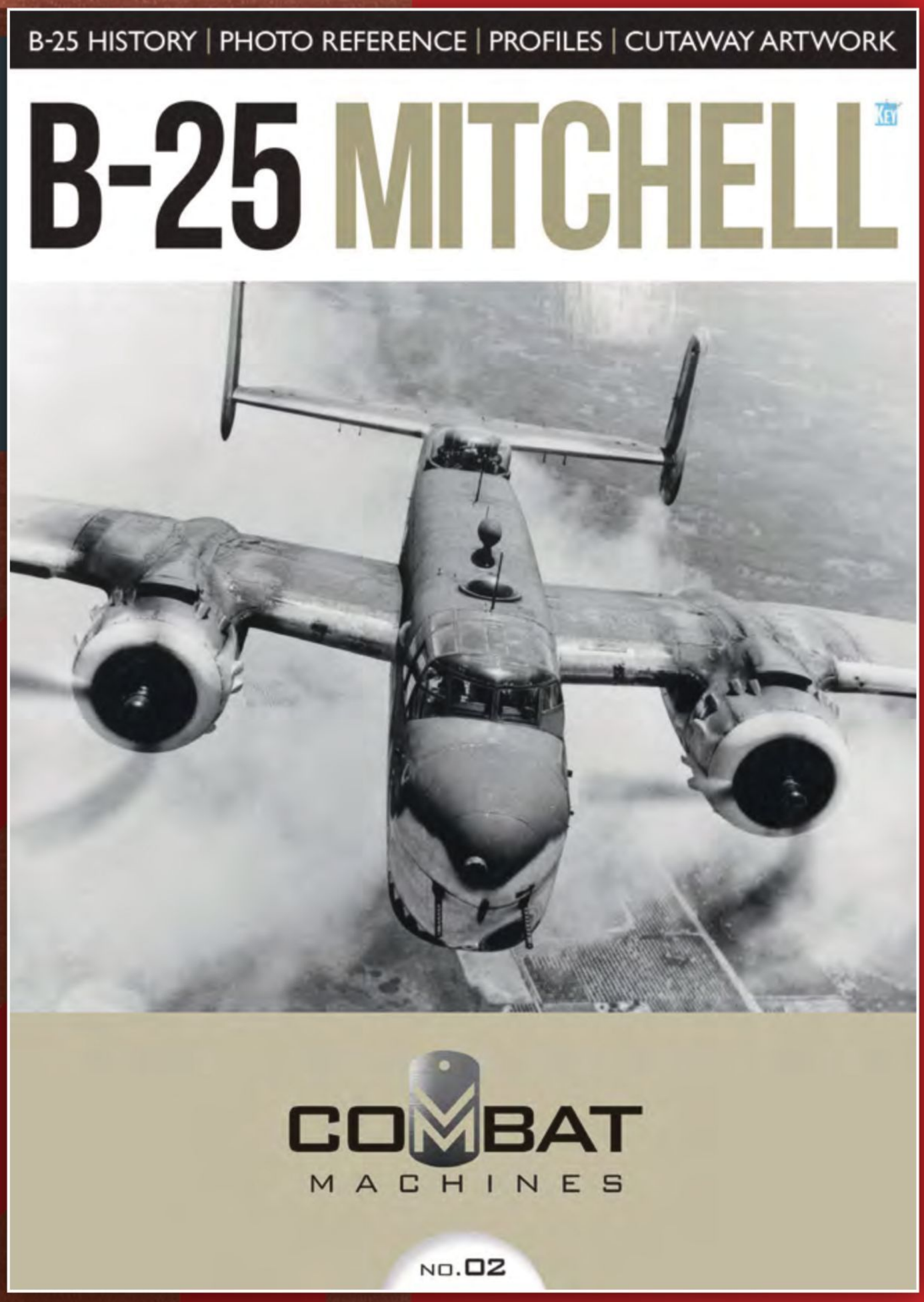
The second volume in Key Publishing's Combat Machines series explores the legendary B-25 Mitchell light bomber, which also excelled in various other roles.

Following the high-quality design and format of last year's Combat Machines 1: B-17G, Volume 2 offers period photos with informative captions, and extensive history text to tell the Mitchell's story.

The type's development is studied, ahead of chapters covering many facets of the B-25's wartime genesis…from the famous Doolittle raid on Japan, and the USAAF unit's efforts that inspired Joseph Heller's novel Catch 22, to strafing in the Pacific and US Marine Corps operations, export users and a very personal focus on the Pacific Theatre B-25 'Dirty Dora'.

This is an all-encompassing view of the Mitchell, across 84 pages, which also provides many colour profiles and extensive model kit, decal, accessory and book listings. It's the ideal reference to accompany Airfix's new-tool 1/72 B-25 kit later this year.

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Preparing for Paint

Any painting of a model requires careful preparation, regardless of the subject or if using an airbrush or a regular paint brush. Firstly, the surface of the model has to be cleaned thoroughly. This stage is often skipped or done without care, but it is well worth the few minutes of work it requires. Finger grease, sanding dust and such can be removed carefully with regular dishwashing soap and water, applied preferably with a soft paintbrush, followed by cleansing with clean water and a damp cloth or fine tissue. The model is then set aside to dry thoroughly, and air from an airbrush on low pressure can speed up the process.

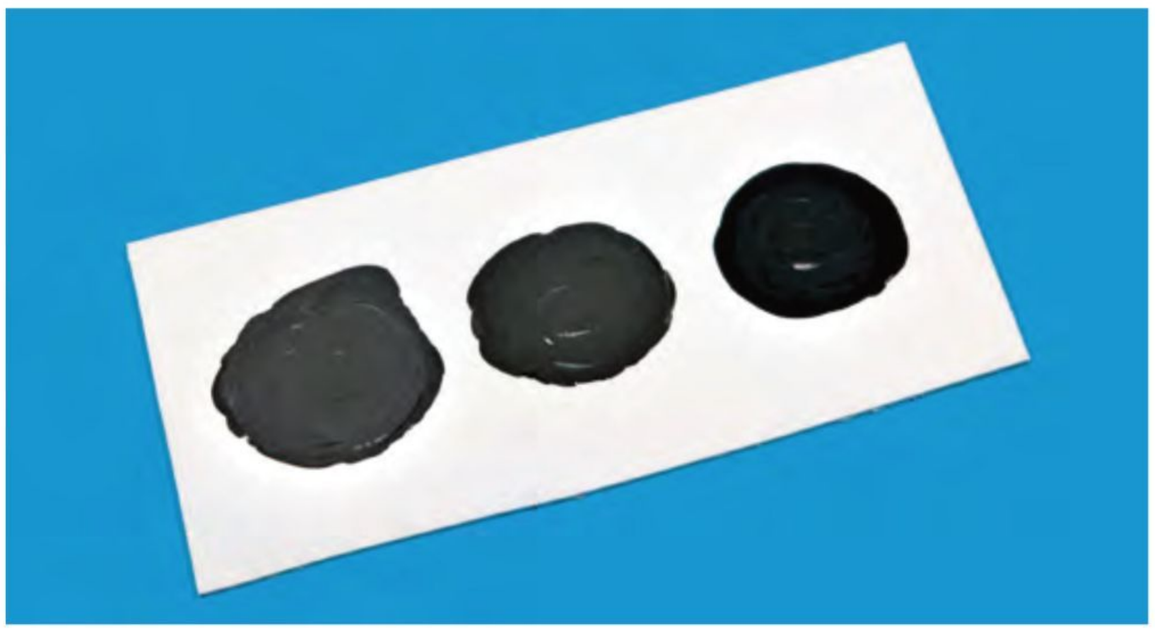
This tank is a fine example of the use of multiple shades of base colour, for a three-dimensional effect and greater variety in finish. (Model by Andreas Grewin)

Before painting commences, the painting instructions should be carefully studied. More advanced modellers with an eye for historical detail will want to cross-check references...in most cases plenty are available in specialist bookshops.

Paints can be chosen according to the kit's painting instructions, or sourced from various brands depending on the modeller's preferences.







▲ It's often necessary to mix a few subtly different shades on a test panel to ensure the correct result. Here, three mixes of grey have been prepared.



▲ The model should be cleaned with soap and water, applied with a soft brush; this will eradicate skin grease, sanding dust and other finish-spoiling entities.

Handling the model

One of the difficult aspects of painting is the actual handling of the subject. Not only can it be fragile, the wet paint surface can also be easily damaged by fingerprints or by letting it touch the surface of the working area. To avoid this, the model can be rigged into a special-purpose handling tool, but easier solutions are also available. For a propeller aircraft it is common to insert a firm metal rod through the nose, and on a jet, through the jet exhaust orifice. This allows the modeller to reach the entire model during painting. A simple stand for tank and car models can easily be created by using a knob or wooden tool handle with a screw attached at the end. The screw is then simply inserted through the bottom plate of the model as the hole will not ultimately be visible. Care should be taken, though, if the model has a visible interior that can damaged.

Priming

As mentioned previously, priming of the model is not always necessary if it comprises purely plastic. Thorough cleaning of the surface is usually sufficient, but primer will provide grip for the following paint and also helps to fill small scratches on the surface. It is vital that the primer is allowed to dry for at least 24 hours to be on the safe side, or it will be difficult to apply successive coats of paint.

Choosing colours and paint schemes

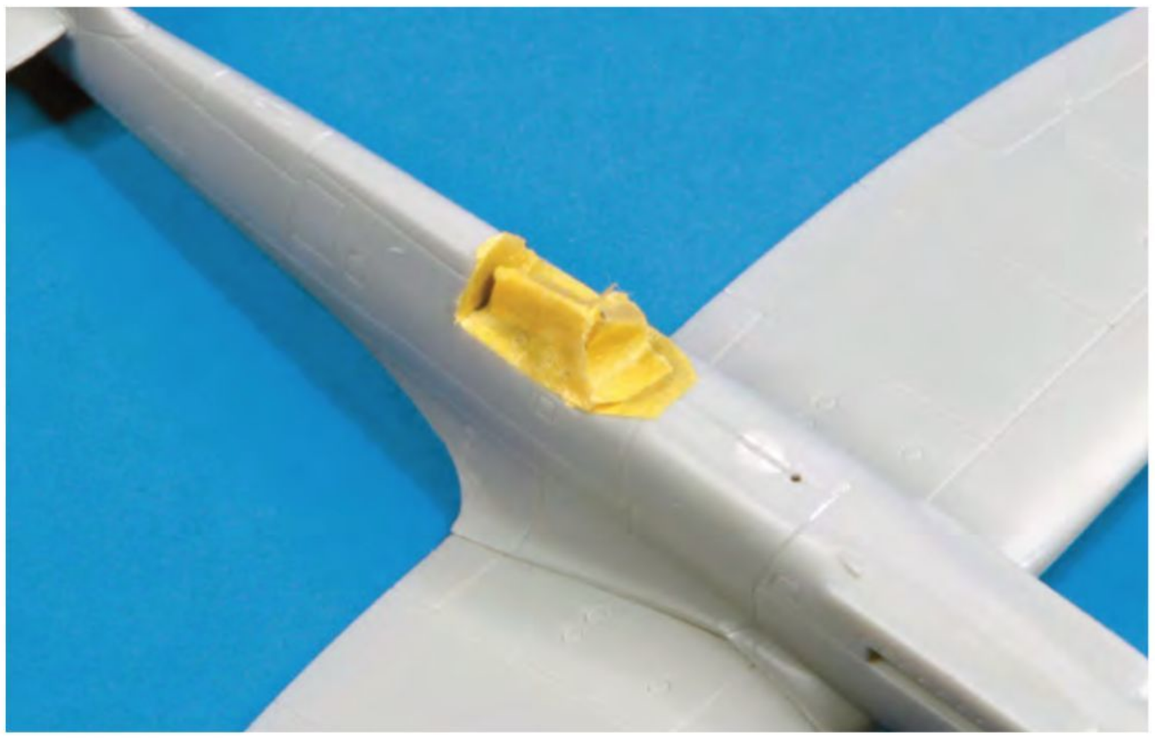
Kit instructions almost always include a painting guide, to help the modeller choose the colour scheme and to select the correct colours accordingly. Usually, the guide refers to one or several paint brands and their respective code numbers. The paint guides are generally good and beginners will feel comfortable using the suggested paint charts. More advanced modellers will want to double-check the information in the instructions, or perhaps choose a different scheme than that offered by the kit. There are many books available for reference on most tanks, aircraft, ships and cars…and the possibilities are seemingly endless.

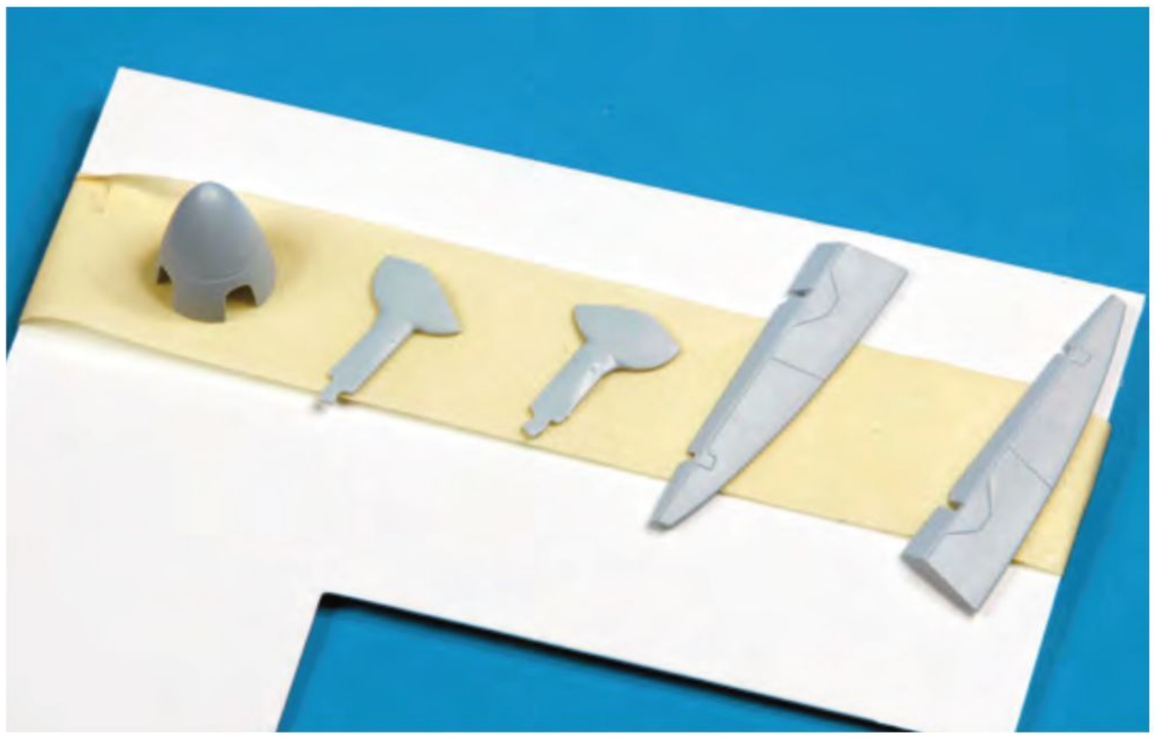


▼ It is also vital to carefully mask the cockpit area, to avoid spoiling the already-applied interior colours and detail. Tamiya tape has been used here.



▼ Small parts can be attached to a piece of plastic or cardboard, with masking tape, for easier handling during the painting process.





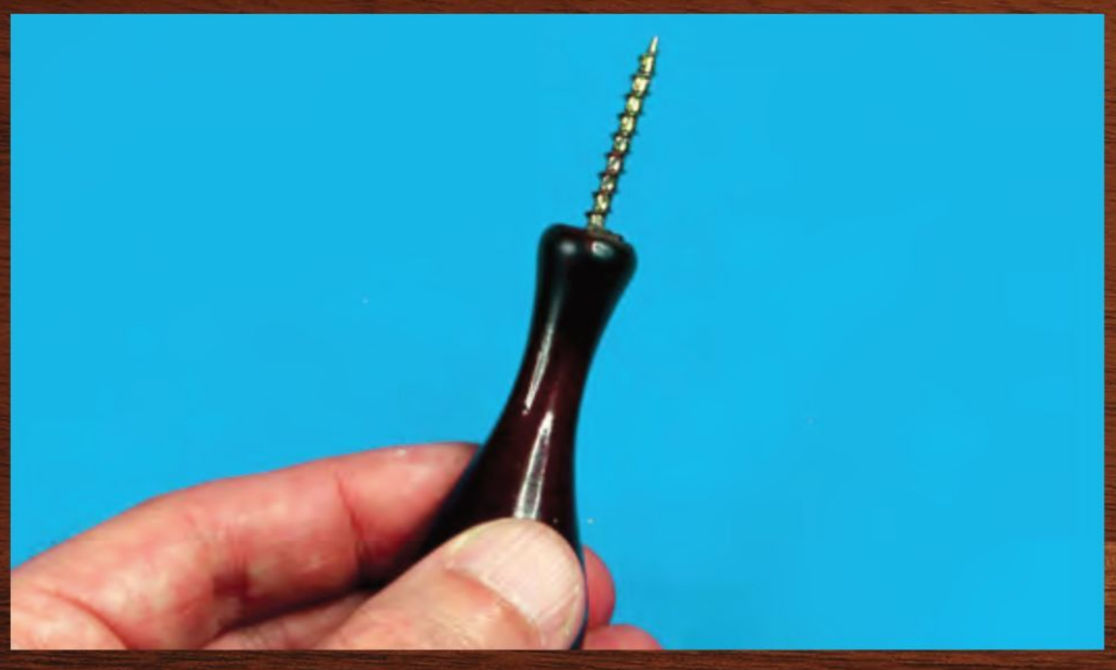


▲▼ A grip can be very useful when handling a model tank or car, where the underside will not be visible after painting. The tip is simply attached through the underside of the model.



▲ Firm metal rod is a good tool with which to handle an aircraft during painting.

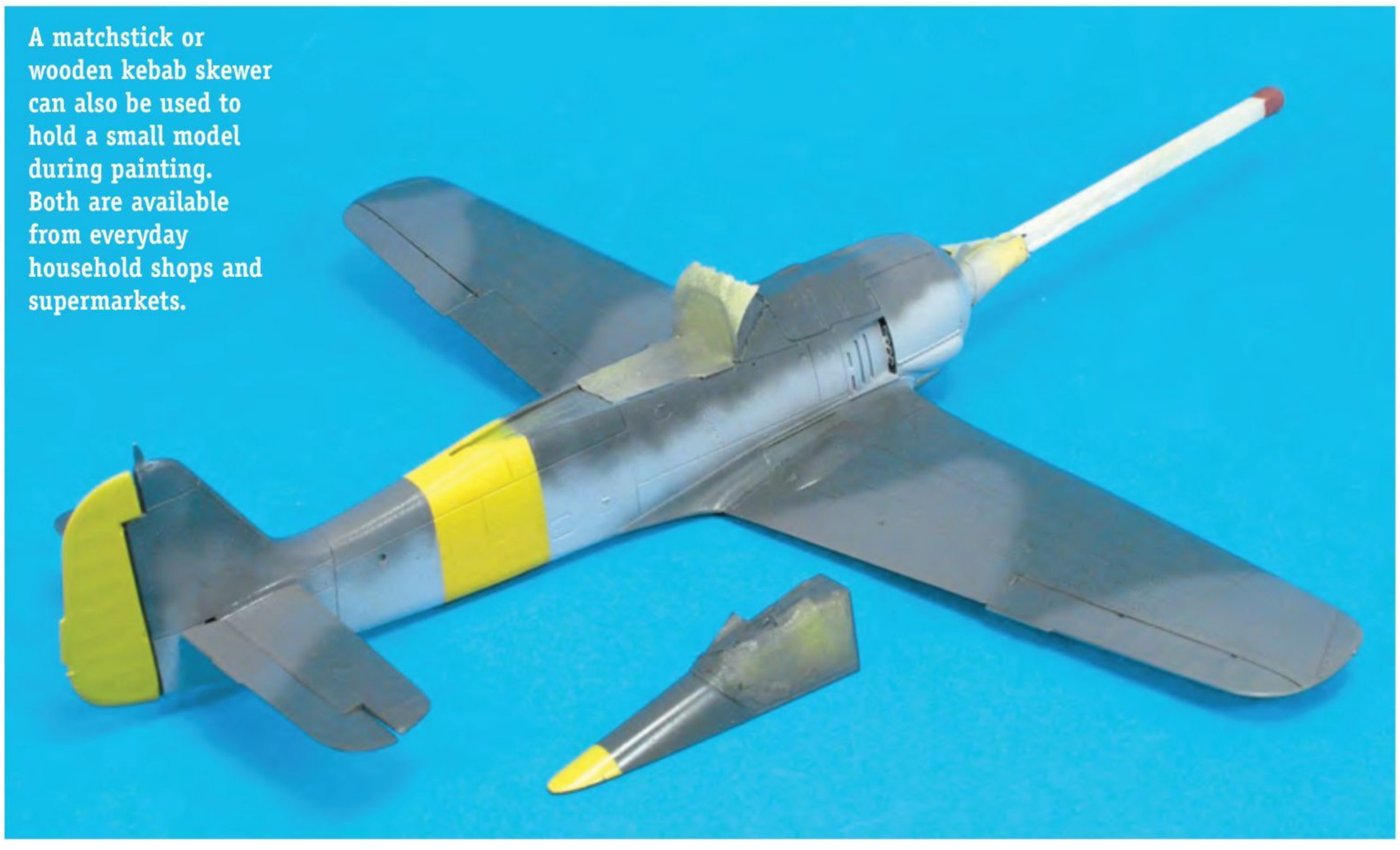
▼ It is recommended to use a primer which will help the paint to adhere better.





Paints often carry names that were registered by the relavant war/defence ministries, or that have been adopted by modellers over the years. Examples of these shades include Sky, Intermediate Blue, Dunkelgelb (German), or Dark Sea Grey; names that are descriptive. This can be of great help when selecting colours from a new brand. Many internet modelling sites also offer paint cross-reference charts, meticulously created by modellers with great expertise, and these charts work as a converter in that they describe which colours from different brands match each other.

Regardless of brand, once the paint scheme is decided the necessary colours should be acquired. If the colours do not already sit in the modeller's collection they can often be mixed. It is also advisable to get a bottle or two extra as it is frustrating to run out of paint at a vital stage. Another great tip is to make sure that black and white from the chosen paint range is available, as they can be used to lighten or darken the chosen colour mix.



A matchstick or wooden kebab skewer can also be used to hold a small model during painting. Both are available from everyday household shops and supermarkets.

Adjusting for scale

One matter not often considered by paint manufacturers when creating their paint ranges is the 'scale effect'. Paint looks very different depending on how large the surface is, and the subject on which it is applied. A large surface reflects more colour, thus looks brighter than a small surface. For modellers, this means that in most cases the paint needs to be mixed to a slightly brighter tone. A colour which looks good on a 1/32 model would probably need approximately 10% more white in 1/48, and perhaps as much as 20-30% more on a 1/72 build. The best way is, of course, to test the paint mix on a scrap model or piece of paper beforehand. Another solution that can create a great visual effect is to first apply a coat of the standard colour to serve as a base, then, subsequently apply a few thinned lighter mixes; this creates both variety to the surface and adds depth. This technique is, though, best suited to military models...while a brand new sports car would look best with a solid coat.

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Tools for paint brushing: mixing cups, brushes, paint mixer, thinner, water, thick paper and, of course, paint.

Brush Strokes



Before mixing, bottles should always be well shaken to disrupt the pigment, which will have gathered at the bottom over time.



▲ The thoroughly shaken paint is then poured into a palette, ready for neat use or to receive thinner.

▼ Small amounts of water have been added with a brush, to ensure a thinner consistency for easier application.



Painting with brushes is something everyone has tried, if not on plastic models, then at least on paper. But regardless of paint types and surfaces, painting is very much about finding the right consistency. The size of the surface to be painted largely determines which consistency the modeller needs. A small detail, such as a switch on an instrument panel, can be painted in one go with a rather thick paint mix. Painting a large flat surface, such as the upper wing of an aircraft, will require several thin layers or the surface will look uneven.

The paint mix should be applied in long strokes to avoid

a patchy look, and in the same direction…left to right for example, while cross-painting from top to bottom will increase the risk of a chequered surface. The exception to this is, of course, if the item has a complex surface where the brush needs to reach into corners and recesses.

Regardless of the paint medium, it's vital to always shake the paint bottle or jar thoroughly before painting begins. Paints that have been sitting on a shelf or in tool boxes for long periods divide into layers, and the upper portion can look like semi-transparent glue, with all the pigments sitting on the bottom of the bottle. After a good shake, a stirrer should be used to further prepare the paint.

Another important factor to keep in mind is that light colours have a lower opacity than dark colours, and should therefore be applied before a second darker coat. For instance, trying to cover a black surface with white would require many layers, compared to the opposite.

Painting with acrylics

When brush-painting with acrylics it's recommended to use 'true' acrylics, which are non-alcohol-based such as those produced by Humbrol, Vallejo, Andrea or Revell whose formula suits brush-painting very well; their opacity is what gives a high degree of coverage. For acrylics, which are fast drying, the consistency is highly important as once the paint is dry it's virtually impossible to even out the surface if the paint has been applied too thickly. Acrylics can be very difficult to remove once they are dry, and it's better to over-paint if an item has been incorrectly covered, rather than to remove the original paint layer itself.

When painting with acrylics it's necessary to have a good mixing cup, a water cup and a piece of thick paper on which to test the paint. First, the paint is poured into the cup, then a small amount of water is mixed with the paint. The paint mix is then tested on the thick paper, to determine how it flows and to check its opacity. More water or paint can then be added to the mix until the right consistency is achieved. This has to be done regularly during the painting session, as the water in the mix slowly evaporates over time, so small adjustments can be necessary.

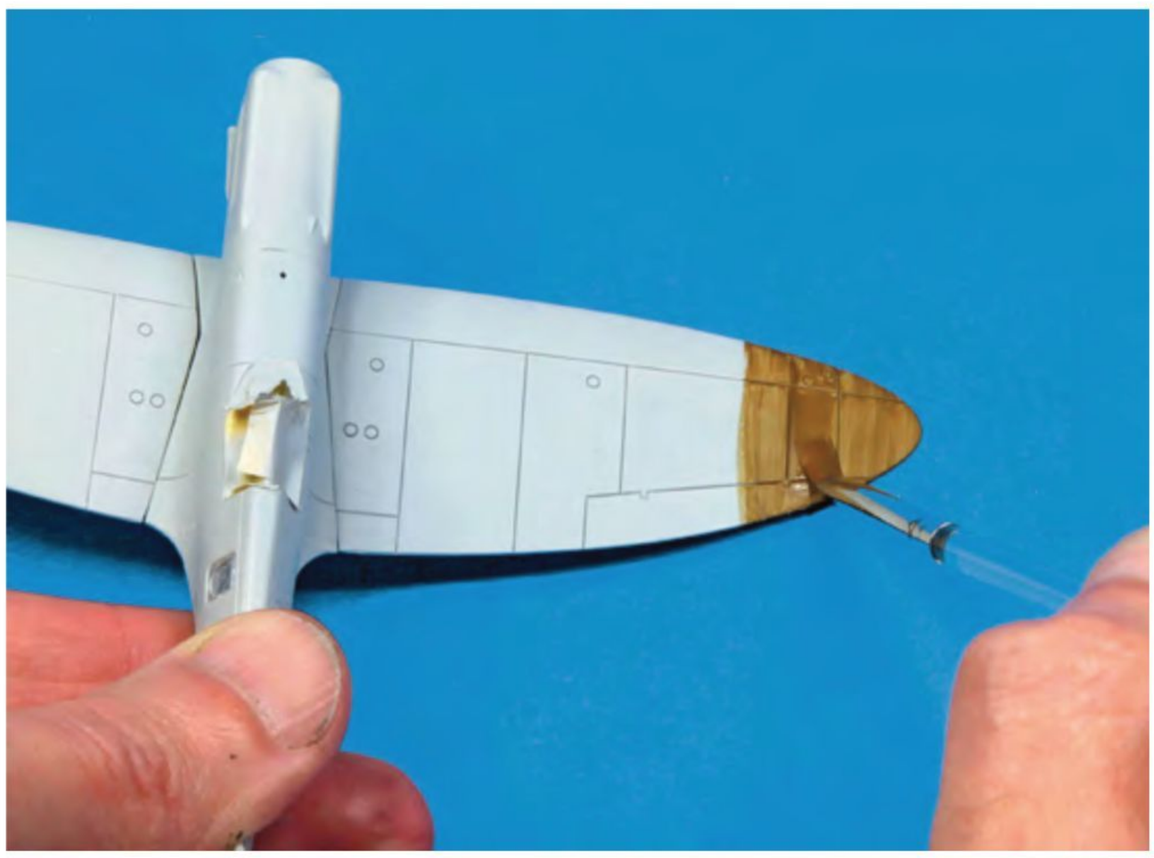
Painting with enamels

The biggest difference in terms of using enamels when compared to acrylics is that they are slow drying, which allows for a slightly different approach. Consistency is not equally important as with acrylics, since the paint can simply be levelled out if applied too thickly. Secondly, they can be easily dissolved and removed if applied in the wrong spot.

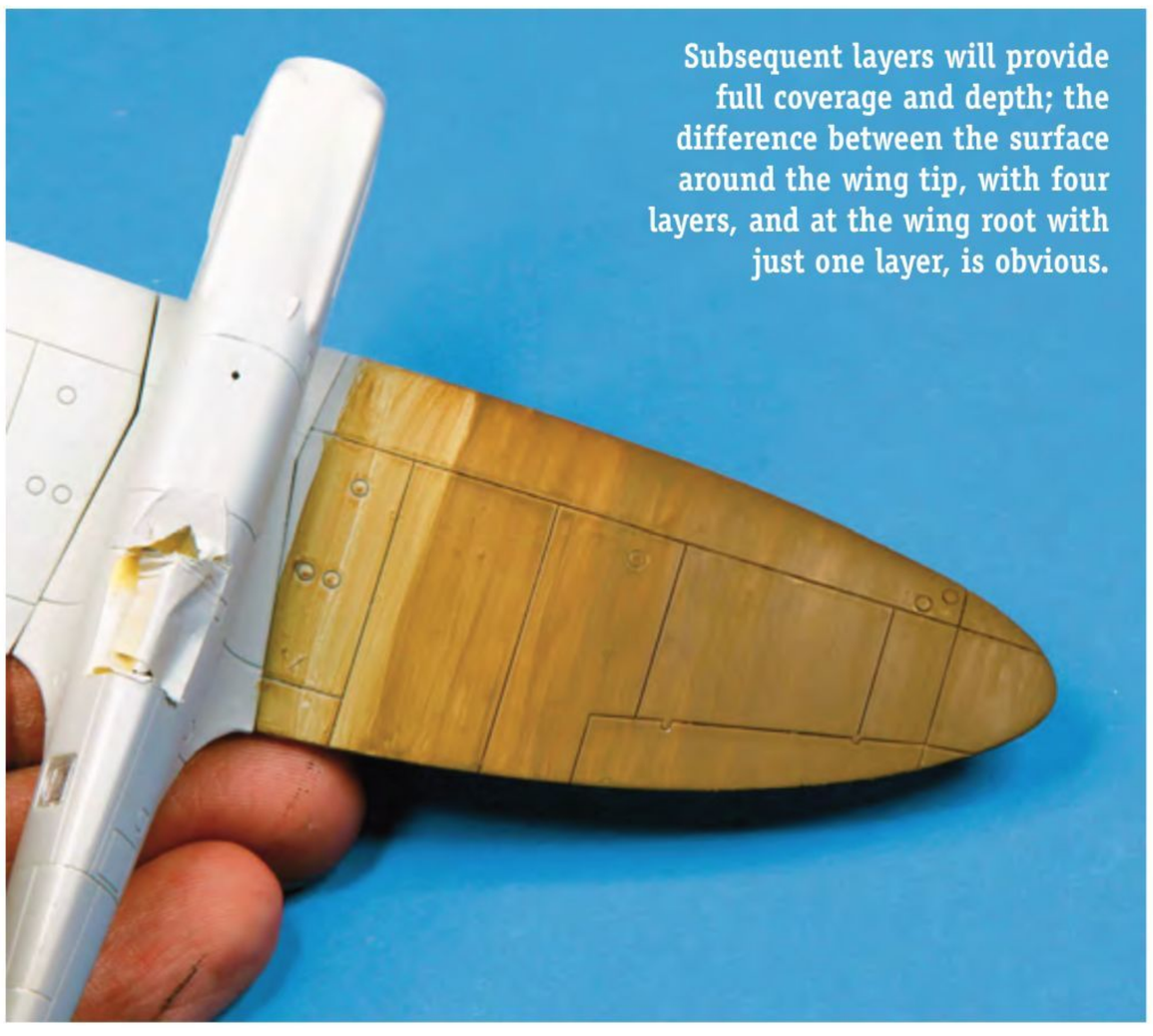
When using enamels, a suitable thinner is vital to the paint's performance and should be selected according to recommendations for the specific paint, though white spirit or



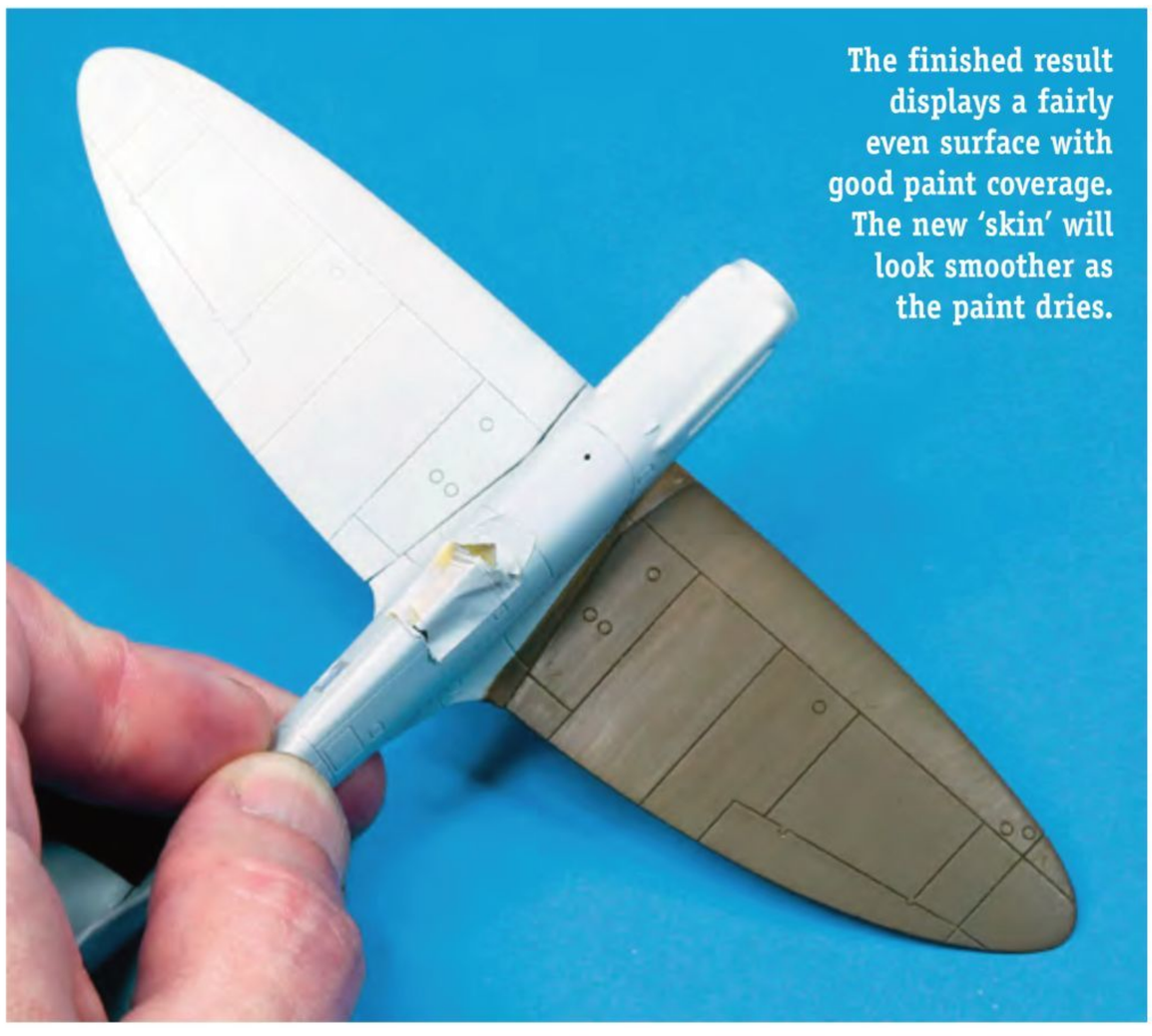
▲ The paint mix consistency is important and should always be tested first on a piece of paper, before it's applied to the actual model.



▲ Thin layers are applied in long strokes, without stopping in the middle of the surface. A flat brush is ideal for this purpose.



Subsequent layers will provide full coverage and depth; the difference between the surface around the wing tip, with four layers, and at the wing root with just one layer, is obvious.



The finished result displays a fairly even surface with good paint coverage. The new 'skin' will look smoother as the paint dries.





◀◀ Enamels need stirring before use. This procedure can take as long as five minutes to ensure that the paint pigment has properly mixed with the oil suspension.

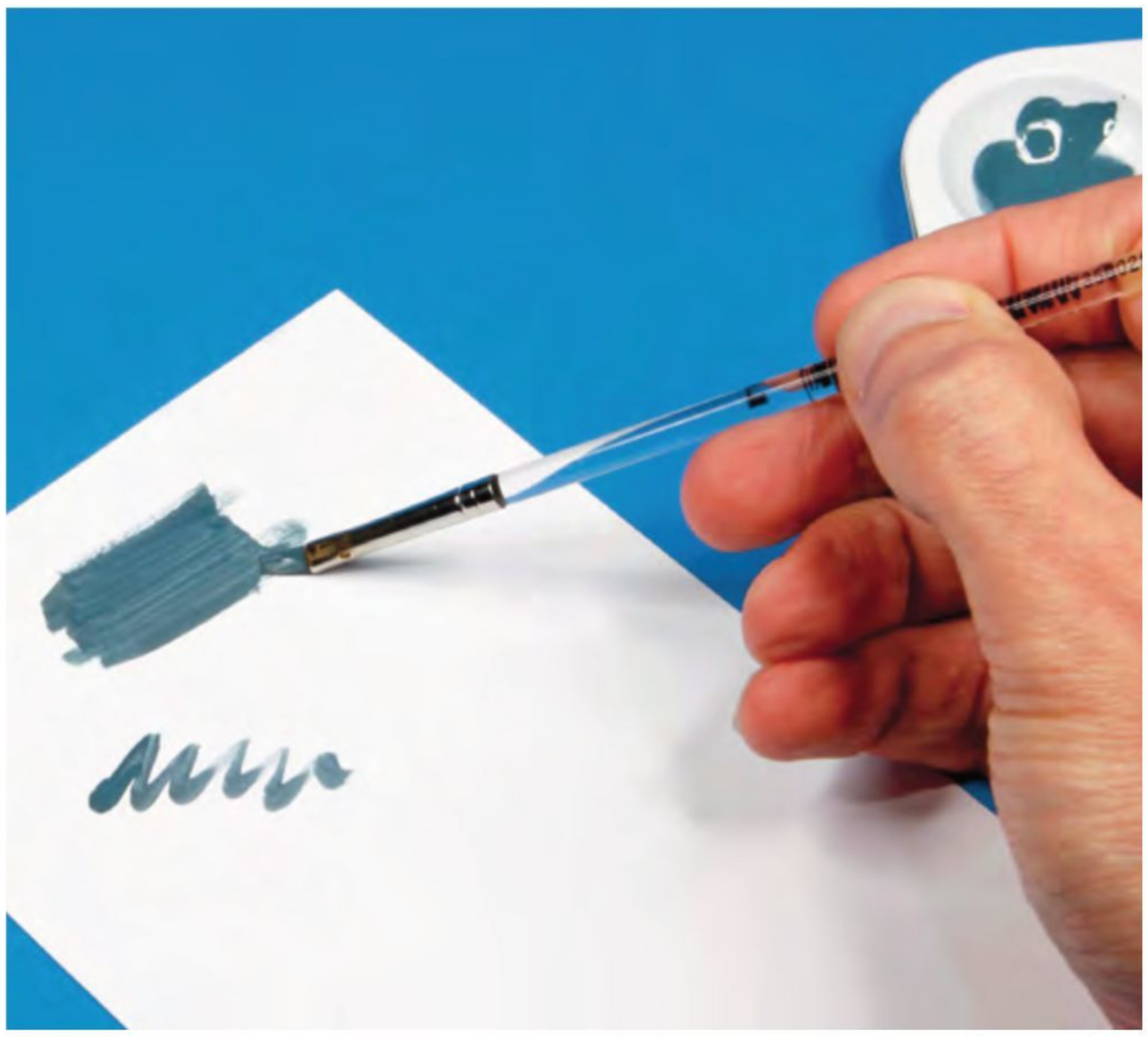
◀ As with acrylic, the enamel paint is then transferred to a palette with the stirrer.

▶ Small amounts of thinner are transferred to the paint to ensure a thin mix, which is easier to apply. A pipette is perfect for the task.





▲ The thinner is thoroughly worked into the paint by use of a brush. If the mix is still too thick, add more thinner and if too thin, more paint. Simple!

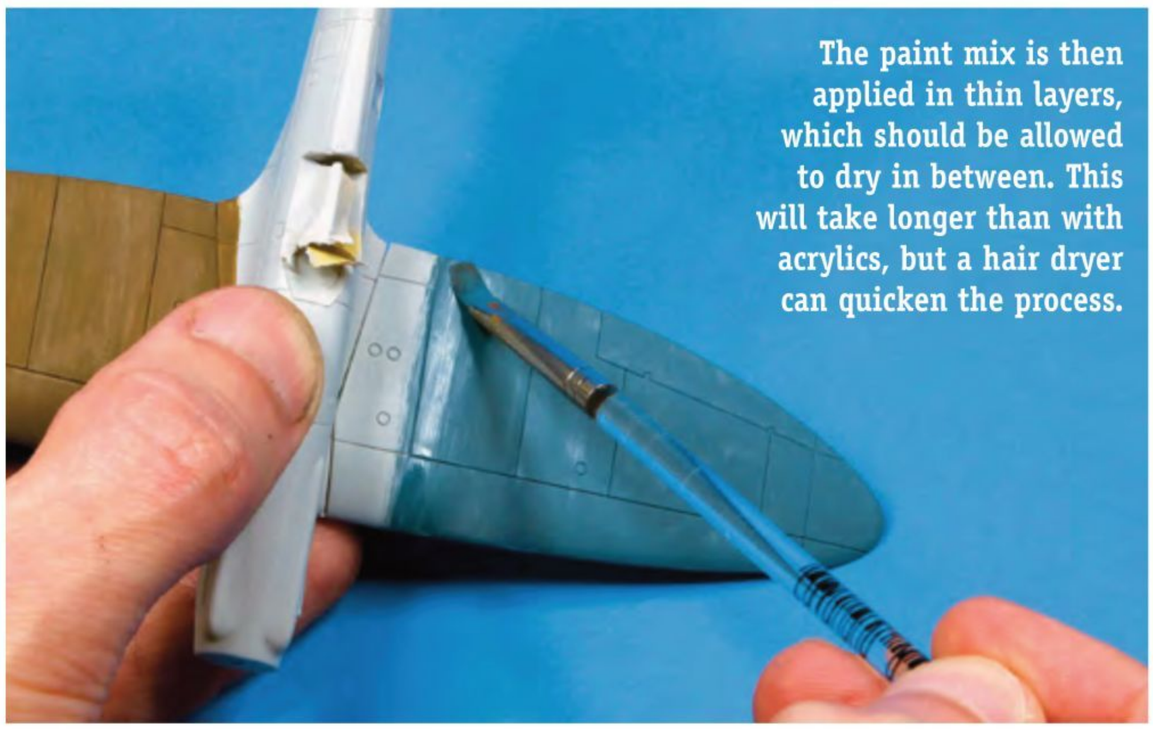


▲ The subsequent paint mix should then be tested on a piece of paper, as done with acrylic, to properly assess the consistency. This is vital for good results.

turpentine will work with most types. As with acrylics, the painting mix should be blended in a cup and tested on a piece of thick paper, and adjusted accordingly. One important thing to bear in mind is that since enamels dry slowly, paints can continue to mix once applied to the model, creating unwanted nuances…for instance where two different camouflage colours meet. To avoid this, the first coat should be thoroughly dry before the next is applied. A simple way to speed up the drying process is the use of a hairdryer, set on low heat and the airflow kept from a distance to avoid melting the plastic. Let the air flow for a few seconds first before actually directing it at the model, to avoid any hairs or dust being thrust onto the wet paint.

Dry-brushing

An old technique for bringing out details on a surface is dry-brushing, and as the name implies, a nearly dry brush is used. On a relief surface, some details stand out and to further enhance these they can be highlighted, just as the real object would reflect light. This is done simply by using a lighter hint of the base colour. A flat brush is dipped in the paint mix, then nearly all the colour is brushed off on a rag or a piece of paper until the brush leaves nearly no colour at all. The brush is then stroked lightly over the surface relief, so that small amounts of the colour adhere to it; this procedure is repeated until a difference between the base colour and the highlight is clearly visible. While an 'old-school' technique, it's highly useful for accentuating moulded cockpit detail, for example, and with metallic shades, for representing metal surfaces where paint has been worn away.



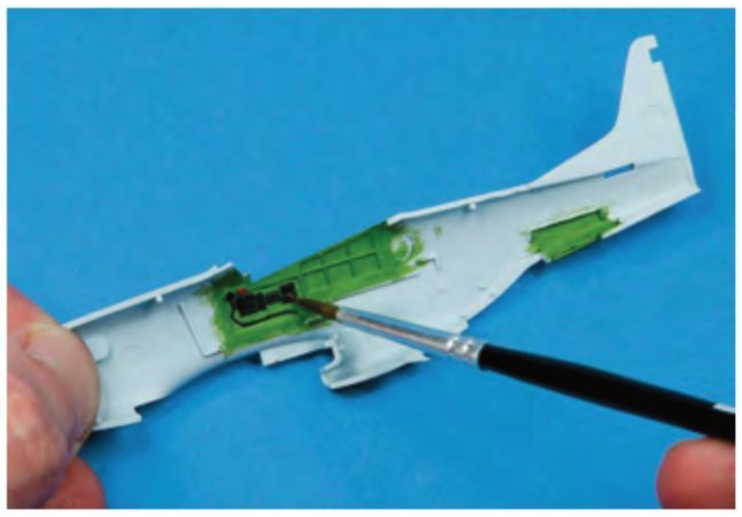
The paint mix is then applied in thin layers, which should be allowed to dry in between. This will take longer than with acrylics, but a hair dryer can quicken the process.

BRUSH SIZES

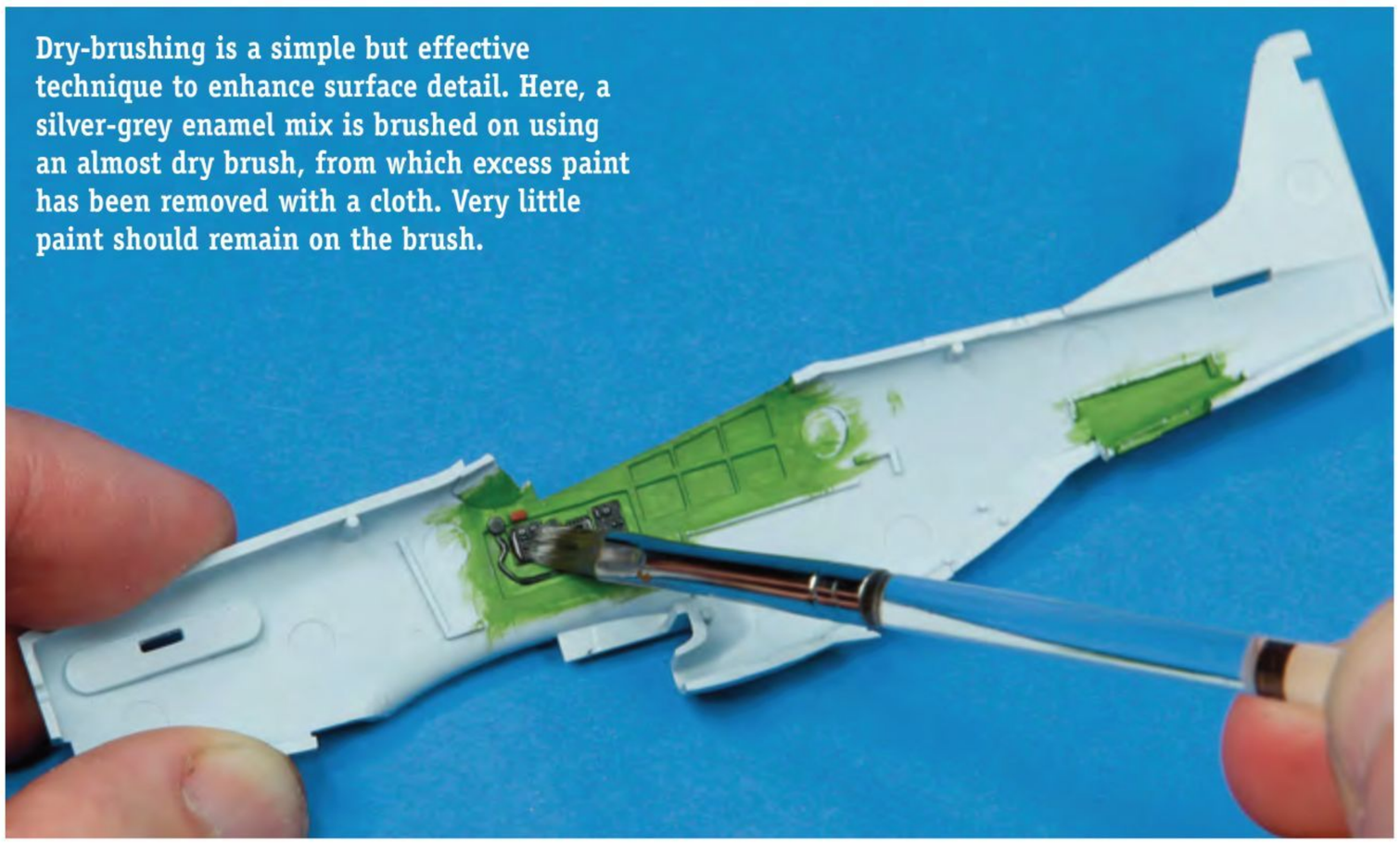
The choice of brush size is mainly determined by the object that is to be painted, obviously, but it's also largely a matter of taste or what the modeller is used to. For small details a Size 1 or 2, or perhaps even smaller is suitable. However, the brush must be able to carry a certain amount of paint, so it's preferable to use a Size 1 brush over a Size 0 if possible. The smaller the brush, the quicker the paint dries on them which will reduce the working time - and the brush will need to be dipped frequently. For larger areas, either a round-tip or a flat brush can be employed. Large brushes carry much paint which allows for long strokes and even surfaces, and this is very useful when working on a large, flat surface.



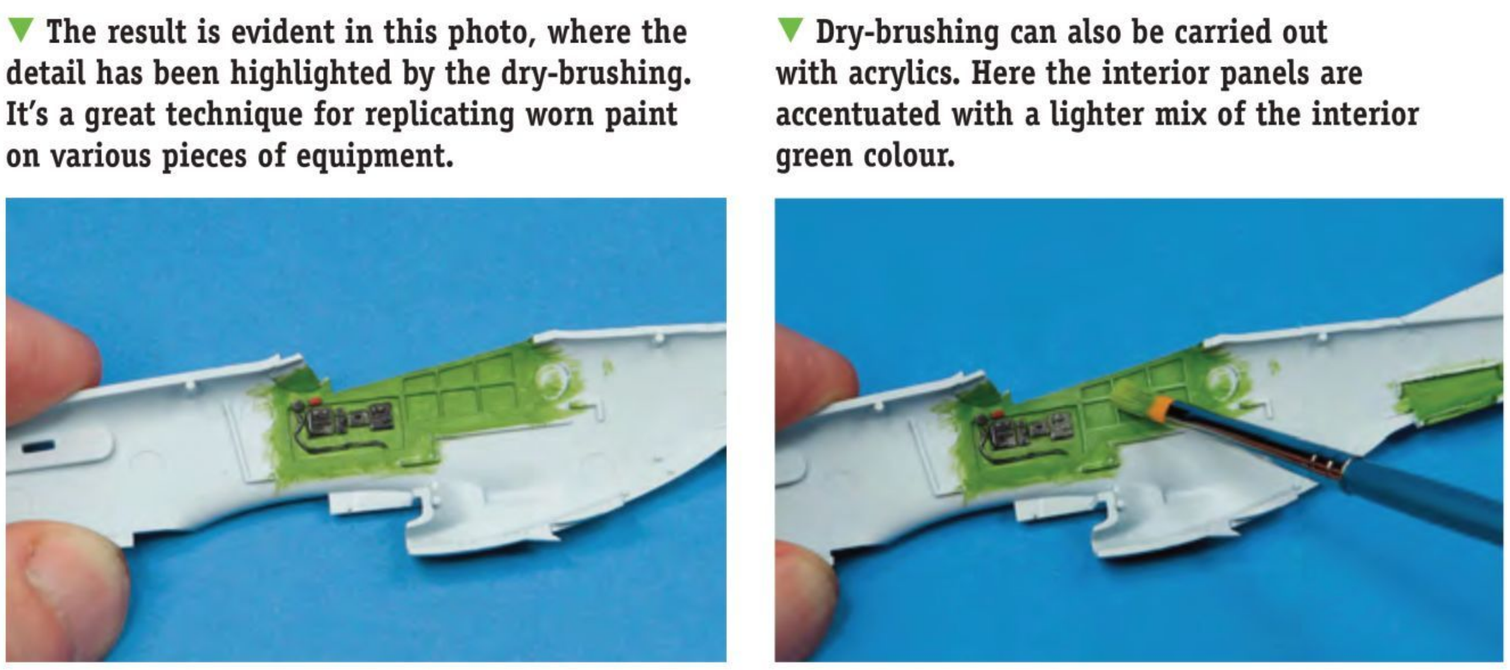
▲ A round-tip brush is appropriate when painting uneven surfaces, such as this P-51 Mustang cockpit interior.



▲ The small details are also painted with a round-tip fine brush, in this case with fast-drying acrylics.

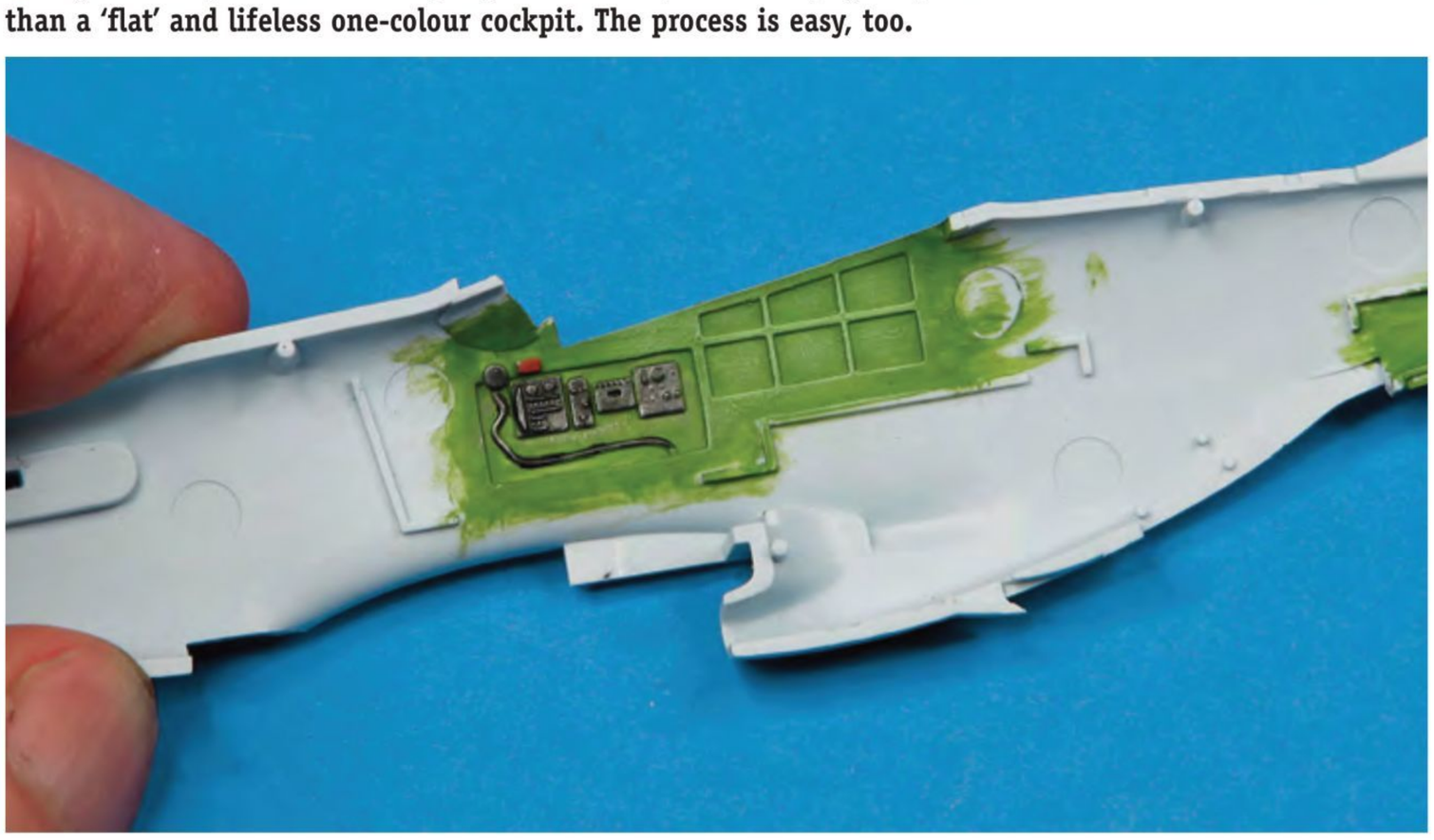


▼ The result is evident in this photo, where the detail has been highlighted by the dry-brushing. It's a great technique for replicating worn paint on various pieces of equipment.



▼ Dry-brushing can also be carried out with acrylics. Here the interior panels are accentuated with a lighter mix of the interior green colour.

▼ Dry-brushing ensured this highlighted surface, which displays depth and visual interest...much better than a 'flat' and lifeless one-colour cockpit. The process is easy, too.







Good accessories make airbrushing much easier. Apart from the airbrush itself, this simple set-up comprises mixing cups, a pipette, brush, stirrer, a simple stand for the model and protective gloves.

Under Pressure

Achieving a perfect surface on a model is one of the more vital goals in kit-making. The reasons for this are many, but apart from simply looking attractive, a smooth surface is also more realistic.

If one studies real objects they don't exhibit brush strokes or irregular surfaces, except perhaps battle-weary vehicles and aircraft. And when translated from the model's scale to real life, a brush stroke or a paint spot would rise several centimetres from the surface. So, a poor surface can really ruin a model's overall impression.

Airbrushing is, essentially, a rather straightforward and simple task in theory. However, in reality many factors can influence the result of the painting. Apart from the quality of the airbrush, which will certainly affect the result, there are other more basic things to consider.

▼ A good quality air compressor can cost between £200 and £500, but is well worth the investment as it will last a lifetime if cared for properly.



▼ A gauge displays the air pressure, which can be adjusted by simply turning a switch. Around 20psi (1.3bar) is a general setting.



▼ Air cans offer little or no adjustment in terms of pressure management. Good results can still be achieved, though.



Paint consistency

As with other sorts of painting, the most important factor is the consistency and its significance cannot be emphasised enough. Regardless of the painting equipment's quality, a bad paint mix will not perform well; too thin and it can splatter, or create a rough star pattern as the paint simply slides on the surface. Nor will it cover particularly well without the application of many coats. Mixing too thickly, on the other hand, will cause the airbrush to 'spit' paint… and there's also the risk of paint build-up which will create an uneven surface. A thick mix will also block the airbrush, resulting





in a clogged nozzle.

There is no exact science for how the paint should be mixed. It varies among brands and airbrushes. A general rule, though, is the paint should resemble milk in its consistency, and when a regular paint brush is dipped in the mix it should drop from the bristles in a couple of seconds - not run off like water, nor stick to the brush for long before dripping off. There are special-purpose airbrush thinners available, but in most cases the thinners used for brush painting work with airbrushes. But it's important that the correct type of thinner is used for the chosen colour brand, so instructions should be carefully studied.

Acrylics (non-alcoholic) that use water as a thinner often perform significantly better with distilled/de-ionised water than that from a tap.

Air pressure

The second factor that greatly determines how the paint performs is the air pressure at which the airbrush is used. Good air compressors have a gauge to relay the pressure output being delivered, which can be adjusted with a regulator. As with paint consistency, there is no set rule for the correct air pressure, but it is driven by the task. Generally, for basic airbrushing of a model, around 20psi (1.3bar) would be a guideline. Air cans

▲▲ A coat of primer will act as a 'key' for following paint layers. The shade is a matter of taste and availability; some prefer a light primer while others favour darker tones. Note that pink is regarded as the best primer for red surfaces.

▼ The choice of thinner is important. Some will not work with certain paints and manufacturer recommendations should always be followed.





▲ Paint should always be mixed thoroughly before airbrushing, as pigment usually settles on the bottom over time.



▲ Water or thinner is most easily applied with a dropper/pipette, which gives better control over the volume and minimises spillage.



▲ A regular paintbrush helps with mixing the two elements, which is a very important procedure. Gently blend the two together.

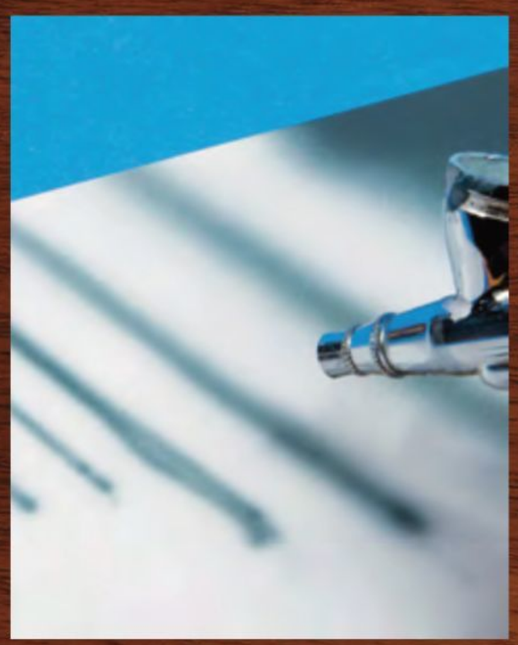


▲ The paint mix can be tested on paper to reveal its consistency, and is easily adjusted by adding more thinner/water or paint.



◀▶ When the right consistency is achieved the paint mix should be transferred to the airbrush with a dropper, rather than pouring it from the paint cup, which can easily become messy.

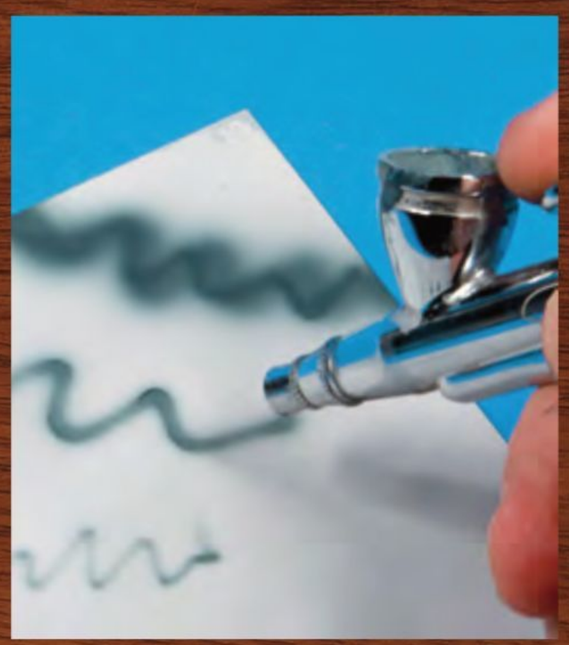




▲ It's vital to test the performance of the mix, preferably on a piece of plastic. Lines in various sizes should be applied.



▲ The paint mix's coverage should also be tested by applying several layers until the surface displays a solid coat.

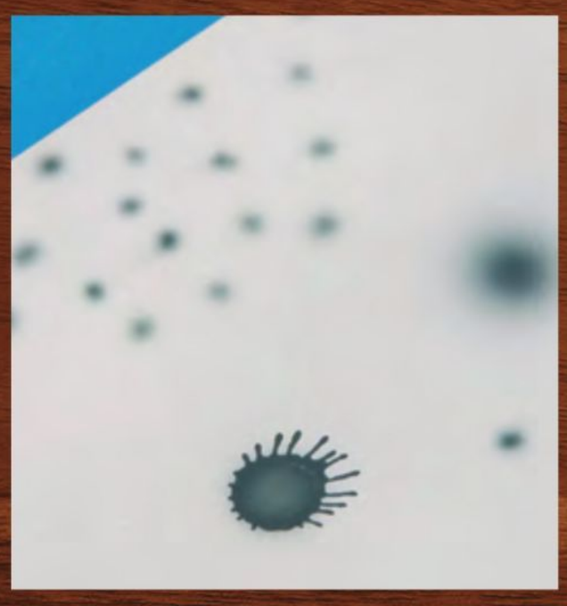


▲▶ Next, wavy patterns are tested, from the thinnest possible to the widest, to ascertain the versatility of the mix.





▲ The final test is with dots; this cannot be performed if the air pressure and paint mix are not harmonious.



▲ Overly high pressure or too thin a paint mix will result in a splatter. This can ruin the paint job on a model and possibly demand a re-paint.



▲ This is how a too-thick mix can appear. The edges show a lot of dust, while the centre has a high level of paint build-up.



▲ A too-thin mix will cause the paint to slide on the surface and offers poor coverage; the air pressure must then be adjusted.

or cheaper compressors offer little adjustment in terms of air pressure and in some cases none. In that scenario, the modeller must rely on a good paint mix and accept the limitations involved, although a decent airbrush can help greatly when using a simpler air source.

HEALTH ISSUES

As any industrial paint sprayer will confess, there are safety concerns with atomised paint and thinners…and none more so than with lacquers. One should always use an airbrush in a well-ventilated room and wear a proper filter mask. Latex gloves are also a good idea, to protect one's hands from thinners, and if budget allows, a spray booth is desirable. This tool is fitted with an extractor fan and filter, which helps keep the air clean and draws away paint atoms from the user.

Getting started

A good source of accessories will make airbrushing a pleasant experience. Paint cups, stirrers, pipettes, brushes and paper tissues should always be at hand. The donor paint jar or bottle should always be mixed thoroughly before use as the pigment always falls to the bottom over time. The paint is then best transferred from bottle to airbrush paint cup with a paint dropper to avoid spillage, followed by adding thinner, which is mixed with the paint by using a brush. Alternatively, the paint and thinner can be mixed externally in a pallet, then transferred to the airbrush. When thoroughly blended, the consistency should be tested on a piece of paper, which will give a hint if more paint or thinner is needed. Patience is the key, and very small adjustments can mean a lot to the performance of any given mix.

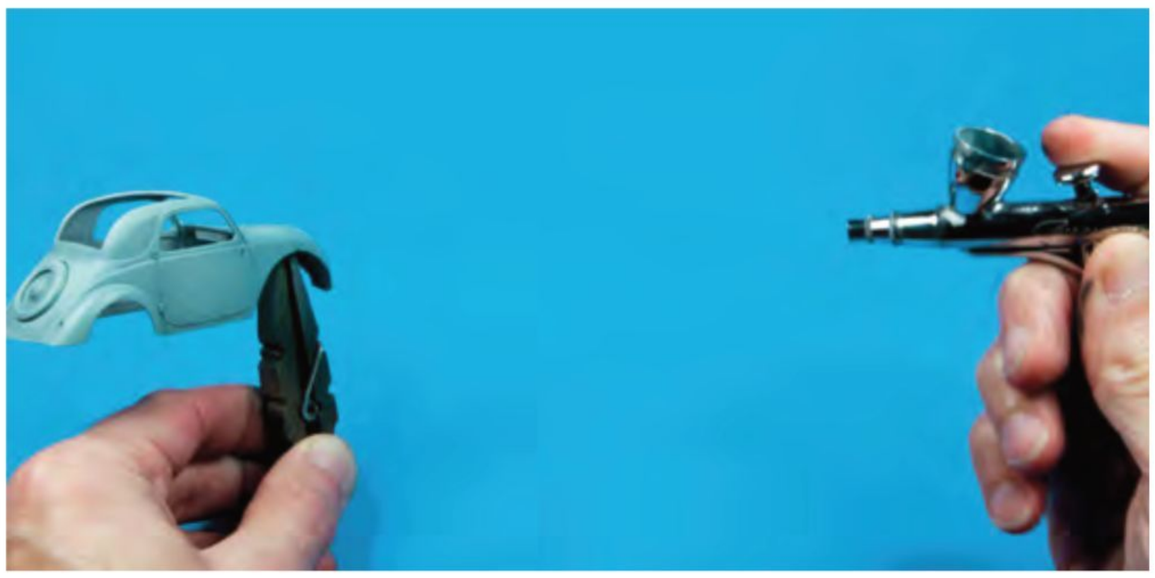
The next step is to test the diluted paint through the airbrush, and this is best done on a piece of plastic (such as a large spare kit part or sheet of plastic card), preferably already coated with the appropriater surface primer; the reason for this being that paper absorbs paint and will not give a true result. When testing, random patterns and paint flows should be trialled to see how the mix performs, from very thin lines to wide coverage. If necessary, adjustment to the air pressure or paint consistency should be made and the mix re-tested.

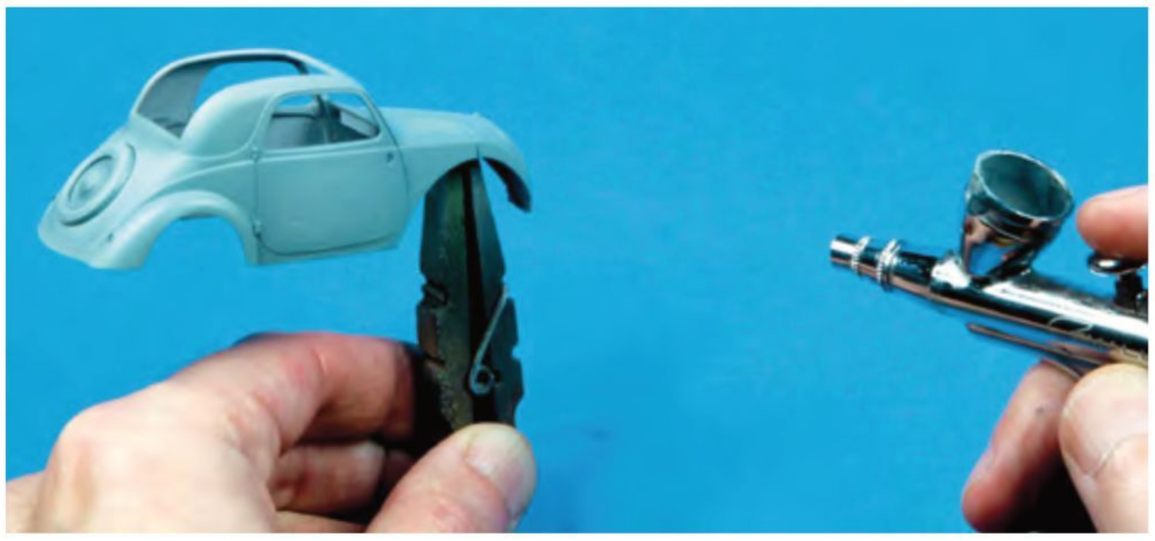
Application

Using an airbrush doesn't require any particular set of skills, at least not for basic or intermediate work. There are a few important things to keep in mind, though. When applying the paint, a sweeping motion from one side to another should be practised, and spraying paint before reaching one end of the model, then continuing after the other end has been reached, will ensure even layers and coverage. It also minimises the risk of splatter, which can sometimes occur when paint initially leaves the airbrush. Another factor is the distance between the model itself and the airbrush. Too close and one risks unwanted paint build-up or splatter due to high air pressure. An overly wide gap can cause the paint to dry in the air before reaching the surface, creating what is generally referred to as the 'orange peel' effect…a rough, stippled surface akin to sandpaper, which is extremely undesirable (especially with gloss finishes).

For the best results the model should be turned 360 degrees during the painting process, in order to achieve good coverage. It is important that the airbrush is pointed at the model from a good angle. For instance, when painting the outer half of a wing, the model should be placed with the wings facing the modeller, like a cross. If sitting on its belly with the fuselage side towards







The distance between the model and airbrush is important. Too close can cause paint build-up or splatter, while too great a distance will prompt the paint to dry in the air. A separation of approximately 8in (20cm) is recommended for good, regular coverage.

A clothes peg is a simple but useful tool for holding small models during painting. Special purpose holders are also available.



the modeller the paint would 'bounce' when hitting the outer wing, if the airbrush is not tilted vertically…with the added risk of spilling paint from the cup. The result of the paint bouncing would be the same as spraying from too great a distance from the model, whereby the paint dries before it reaches the subject (in this case the fuselage side of the model).

Cleaning

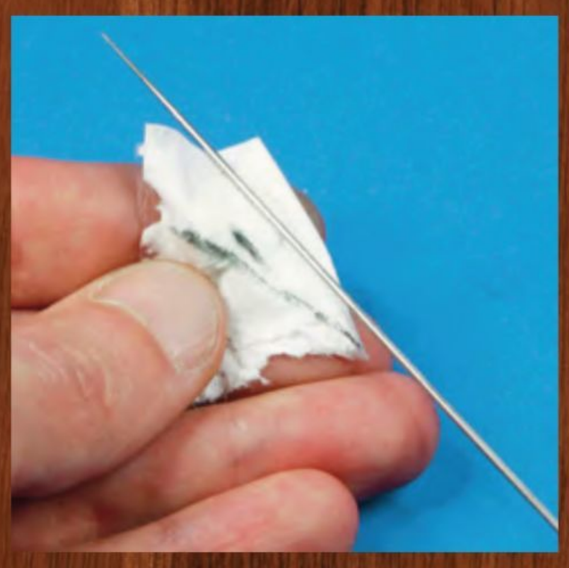
An airbrush is a sensitive tool despite its relative simplicity. It should be treated with tender, loving care as the performance is decreased significantly if paint is left to dry inside. A general rule is to always spray clean thinner through the airbrush when there are short breaks between sessions, and to disassemble the airbrush if it is to be left without use overnight. Q-Tips and tissue paper will do most of the work but there are also special purpose tools for cleaning the nozzle. No matter what tools are used, the quality of the cleaning is equally important. Extra strong mineral spirits or specially designed airbrush cleaning fluids are also available to make the task easier. Extra care should be taken when cleaning the needle as it has a very fragile tip which largely affects the performance of the airbrush.



Cleaning and maintaining the airbrush is vital to maintain good performance. A Q-Tip dipped in thinner works well.



Paint often collects at the tip of the airbrush and this should be removed carefully, and cleaned after every session.



The needle also needs cleaning but should be handled very gently. A damaged tip will seriously affect the performance of the airbrush.



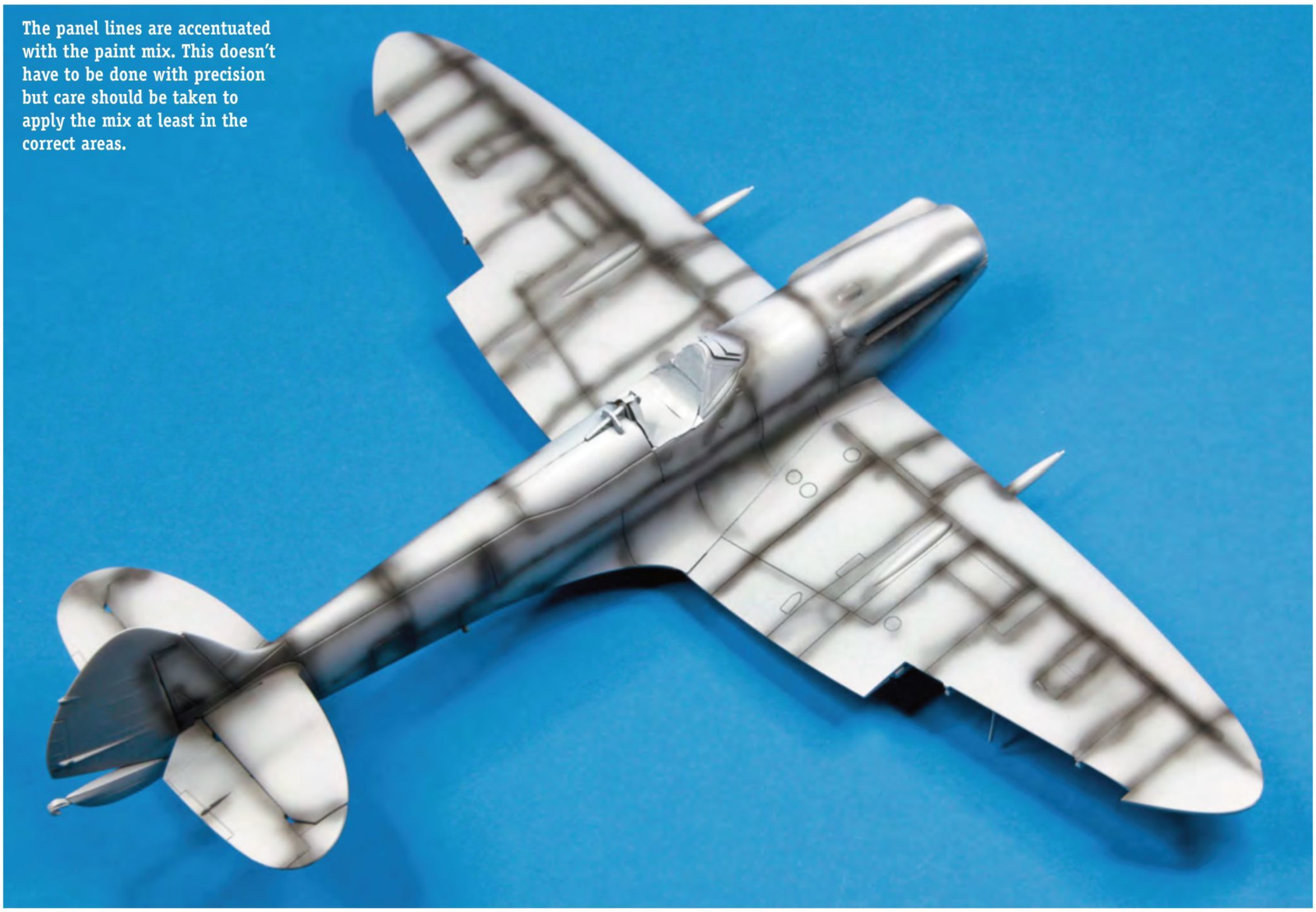
Thinner can also be poured straight into the airbrush and left to dissolve the stubborn paint remnants…



…these are then easily soaked up with a piece of paper tissue or cloth.



Q-Tips also work well inside the airbrush, for reaching corners without risking damage to delicate parts.



The panel lines are accentuated with the paint mix. This doesn't have to be done with precision but care should be taken to apply the mix at least in the correct areas.

Creating Depth



▲ Pre-shading can be carried out with numerous colours but black or dark brown are the most common. Smoke is also a handy, semi-gloss option for use with certain types of thinners.

▼ To be able to get really close to the surface, the tip of the nozzle may need to be removed. Care should be taken not to damage the delicate needle end when handling the airbrush in this fashion.



▼▶ This sequence shows the pre-shading of a small car, followed by a first coat of paint, and three subsequent light over-sprays. The pre-shading is just visible under the main coat, which gives depth to the surface.





This under side of a 1/48 Seafire wing ably displays the effect of pre-shading. The panel lines are clearly visible, giving a grimy and worn impression.

▶ When painting a model without pre-shading, the chosen primer colour can play an important role in affecting the final appearance.

▼ Sets containing several variations of the same colour are available from several manufacturers, such as Lifecolor. This can save time and ensures the shades come from the same colour spectrum.





Achieving a smooth and flawless surface is an important aspect of airbrushing and a perfect paint scheme always looks impressive.

But unless the aim is to display the model in mint condition, its surface will need help to look more three-dimensional and 'alive', just as a real aircraft or tank reflects the light and has shadows on its surface. Moreover, nature's elements will also take their wearing toll on a surface of an aircraft or vehicle, which is perhaps most evident when studying military hardware operating in desert environments.

Shadows

When looking at an object with an irregular surface it's obvious that it displays a variety of shades, even in a new condition. Along the lower edges of the surface, in recesses and on the underside, the paint appears to be darker even if the surface is, of course, painted in one colour. Scale models have comparatively small surfaces and are mostly displayed under artificial lightning, far from the power of daylight. This means the modeller has to 'help' the viewer, by emphasising effects which appear naturally on a real object.

Shadowed areas can be created in various ways. Applying them before the main paint coat is known as pre-shading, which is a very descriptive name. Pre-shading is easily applied with an airbrush, with a thin paint mix at low pressure.



TOP TIP

As always when airbrushing, the consistency should be tested on a piece of plastic.

The choice of colour is as much a matter of taste as which shade the model will have after receiving its main coat. Black works with most colours, but can cause some lighter colours to look odd; for instance desert yellow can exhibit slightly green overtones when applied to a black surface. The opacity of the paint is also an important factor. A heavy coat of pre-shading may look too stark on a light model and will need several layers of top coat, while it may be absolutely necessary to show any effect at all on a darker surface.

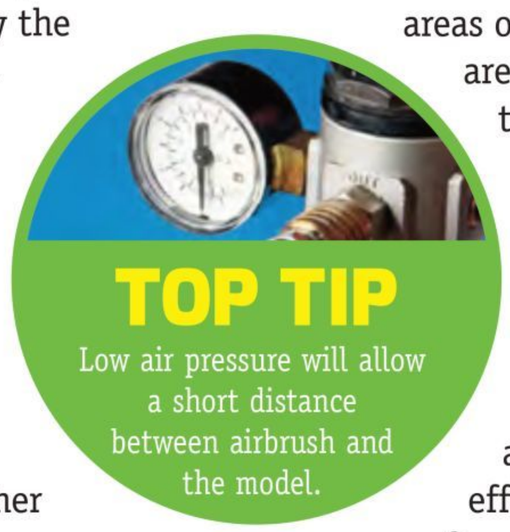
The key to a good pre-shading effect actually lies in the application of the main paint coat, rather than the pre-shade itself. This is because the application on the main coat of the model determines how much of the shadowing will be visible. When applying the main coat it's necessary to study the model ▶



from a distance between the layers, to see how much of the effect remains - and application should stop when the desired result is achieved.

Pre-shading doesn't have to be done with great precision, apart from with smaller models with narrow surfaces. Still, it should be applied where it makes sense, and not on surfaces which would more likely catch light than be exposed to shadows. On aircraft, the most obvious areas are panel lines, wheel wells and around the engine exhausts. Armour modellers would want to apply them around hatches, weld seams, engine decking and the lower hull. Trial and error is the key and it's well worth experimenting with these techniques on a scrap model.

Obviously, pre-shading only works best on a bright surface such as white or grey, as a dark colour on a dark surface would not show much effect at all. Some modellers prefer to work the other way around, in creating the shadows after the base coat… so-called 'post-shading'. This procedure is basically the same as pre-shading, and the shadows are applied in the same areas. However, one big difference is that the paint mix should be even thinner, to allow the base coat to shine through. Another factor is that if post-shading is too heavily applied, it can ruin the paint job and will require re-painting of the base coat. Post-shading is particularly effective on decaled areas where a pre-shade effect would be lost.



TOP TIP

Low air pressure will allow a short distance between airbrush and the model.

Highlights

Just as important as the shadows, are highlights which simulate reflected light. Although the model catches the environment's lighting, the effect is barely visible. To remedy this, certain areas of the model are selected and treated with a lighter colour of the base coat. This can be done with a paint brush or airbrush, although the effect will be much softer with the latter. The model should be studied carefully before the highlights are applied, since they will look odd if they end up in the wrong place. On aircraft, large flat panels would reflect much light and these should be highlighted. Smaller items, such as service hatches, can also be emphasised in a lighter colour to make for a more interesting overall look. On tank models there is room for extensive use of highlights, as they generally possess very irregular surfaces with many details. Hatches, upper edges of armour plate or turret sides, the top side of a gun barrel and the centre of a large, flat surface are just a few examples. Highlights may look slightly exaggerated if applied heavily, but much of the effect may disappear if the model is treated with weathering effects which usually darken the surface. Again, trial and error on a scrap model is recommended.

A recent trend in terms of painting highlights is colour modulation. This technique takes the effects a step further,





◀▲ This test model sports both plastic and photo-etched metal detail and therefore needs a primer…in this case black was the chosen shade, which is often a good choice for armour subjects.



▲A first coat of paint is thinly applied at a steep angle from above, allowing the dark primer to show through for a much more interesting three-dimensional effect.



▲ Another coat gives the model a more solid look but the dark primer is still having a positive effect…be sparing with the paint at this stage, though, because it's all too easy to overdo the effect.



▲ **The upper wing on this Seafire displays both the effects of pre-shading and highlighting of panels, as well as post-shading, for a livelier finish.**



▲ **Post-shading helps to blend the decals into the rest of the model. The aircraft's panel lines have been further accentuated as well, with the same technique.**

but is not to everyone's taste as it can look a little stark when carried out to full effect. Colour modulation incorporates the same effects of highlights but they are exaggerated and made to look as if the light comes from a certain direction, rather than making the whole area brighter. For instance, a hatch would be painted very brightly in one upper corner, and subsequently toned down to the lower edge of the hatch, just as it would look in a photograph. In the hands of modellers who master this technique amazing results can be achieved, but it's perhaps not something a beginner should attempt on their first model.

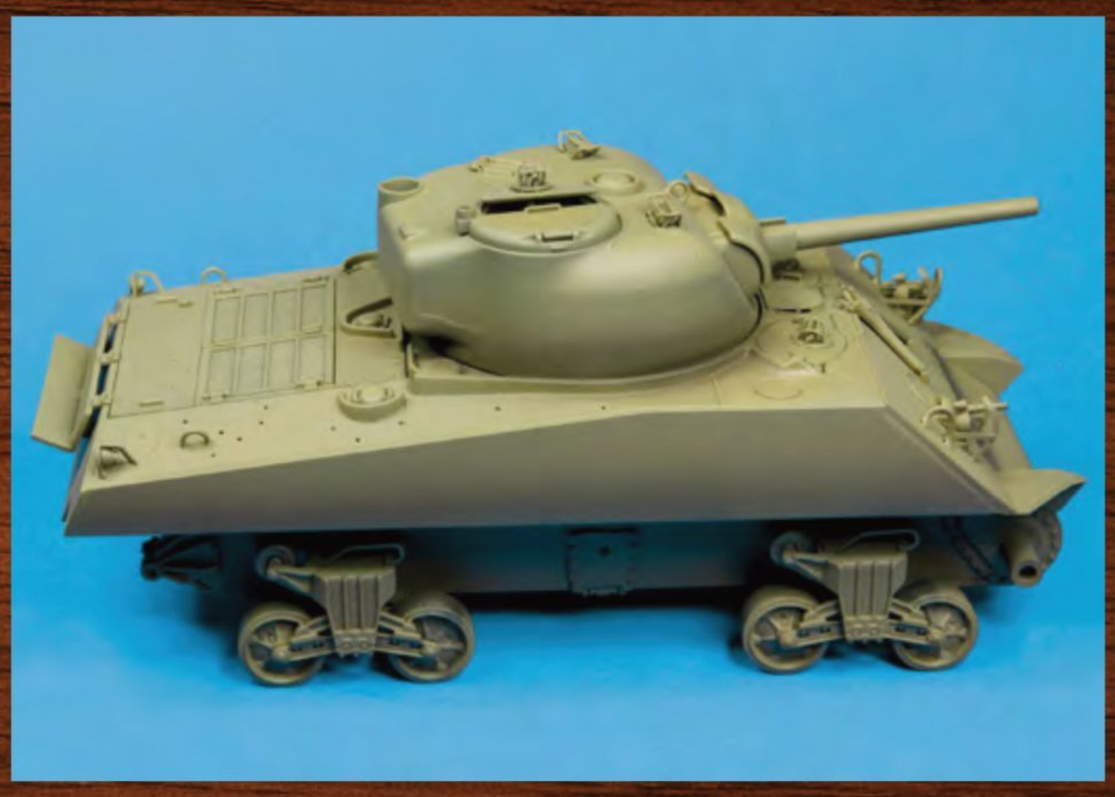




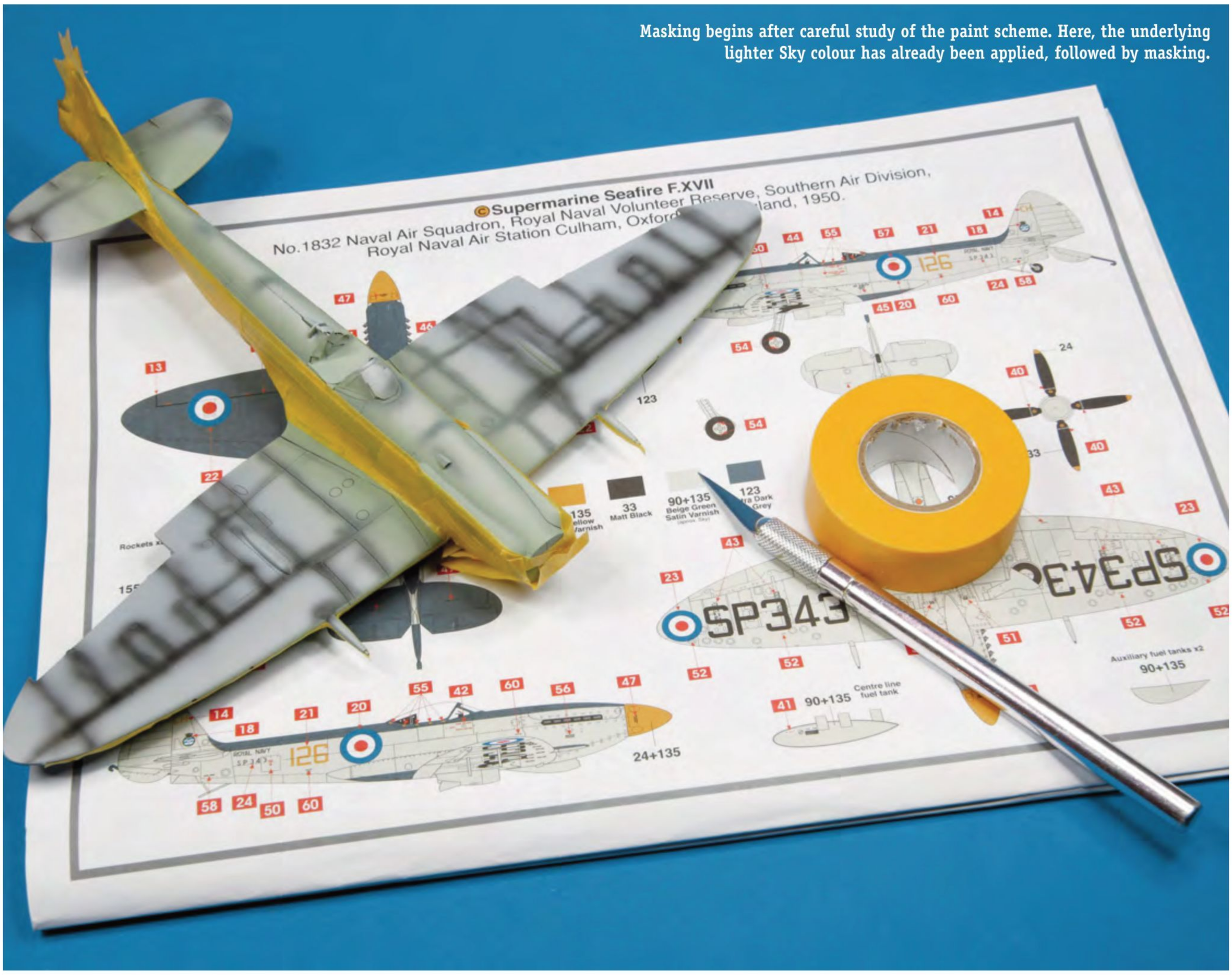
◀▲ **More yellow and white are mixed into the colour and the effects are now beginning to show. Note how the colour gets increasingly lighter from bottom to top.**



▲ **Details such as hatches, gun mantlet and large flat areas are further highlighted with an even brighter colour, to attain more visual interest. Visit any good model show and one will see these effects up close.**

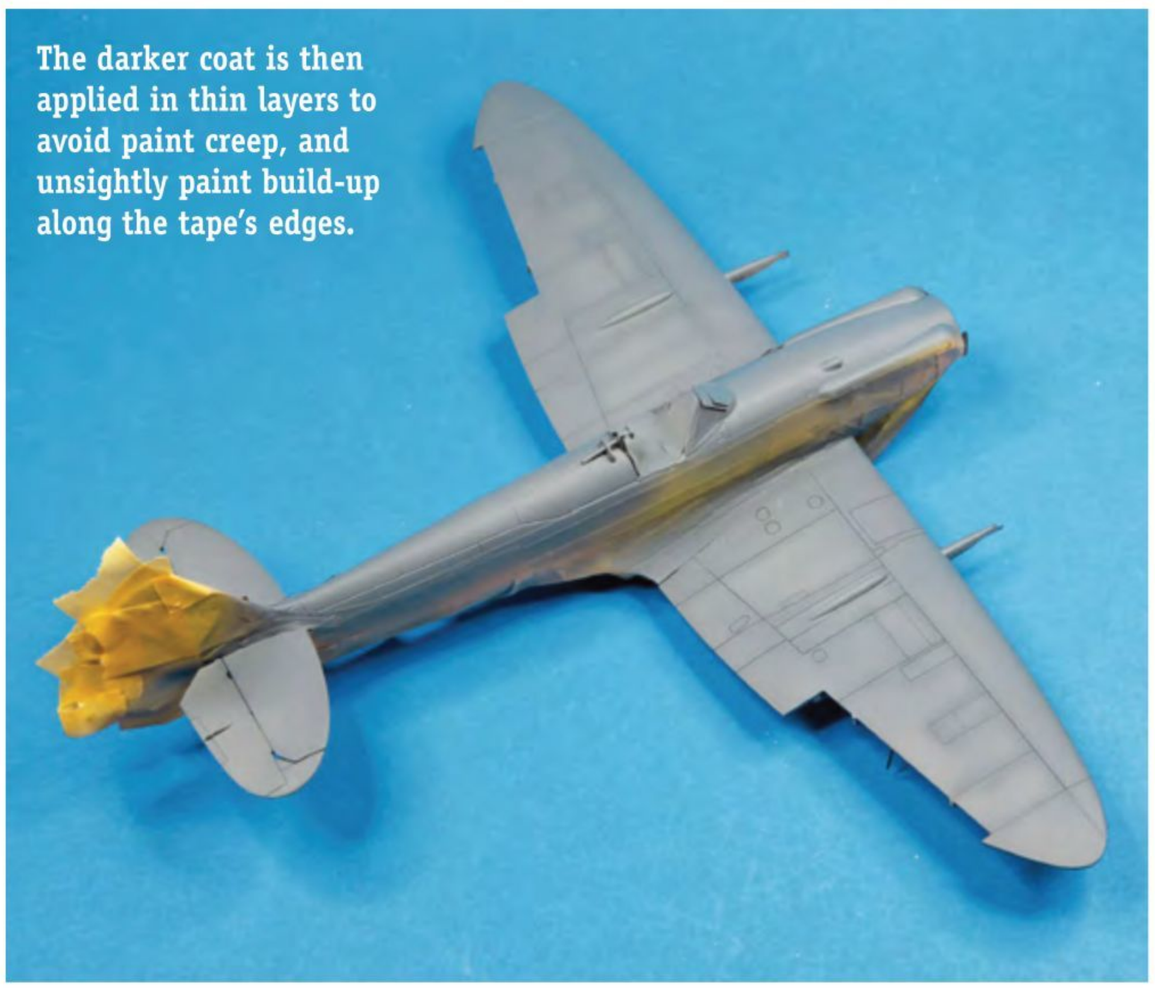


▲ **The same shadow effect can be achieved with post-shading. Here, the lower part of the hull has been painted with gradually darker nuances, which ensures a more realistic and scale-like appearance.**

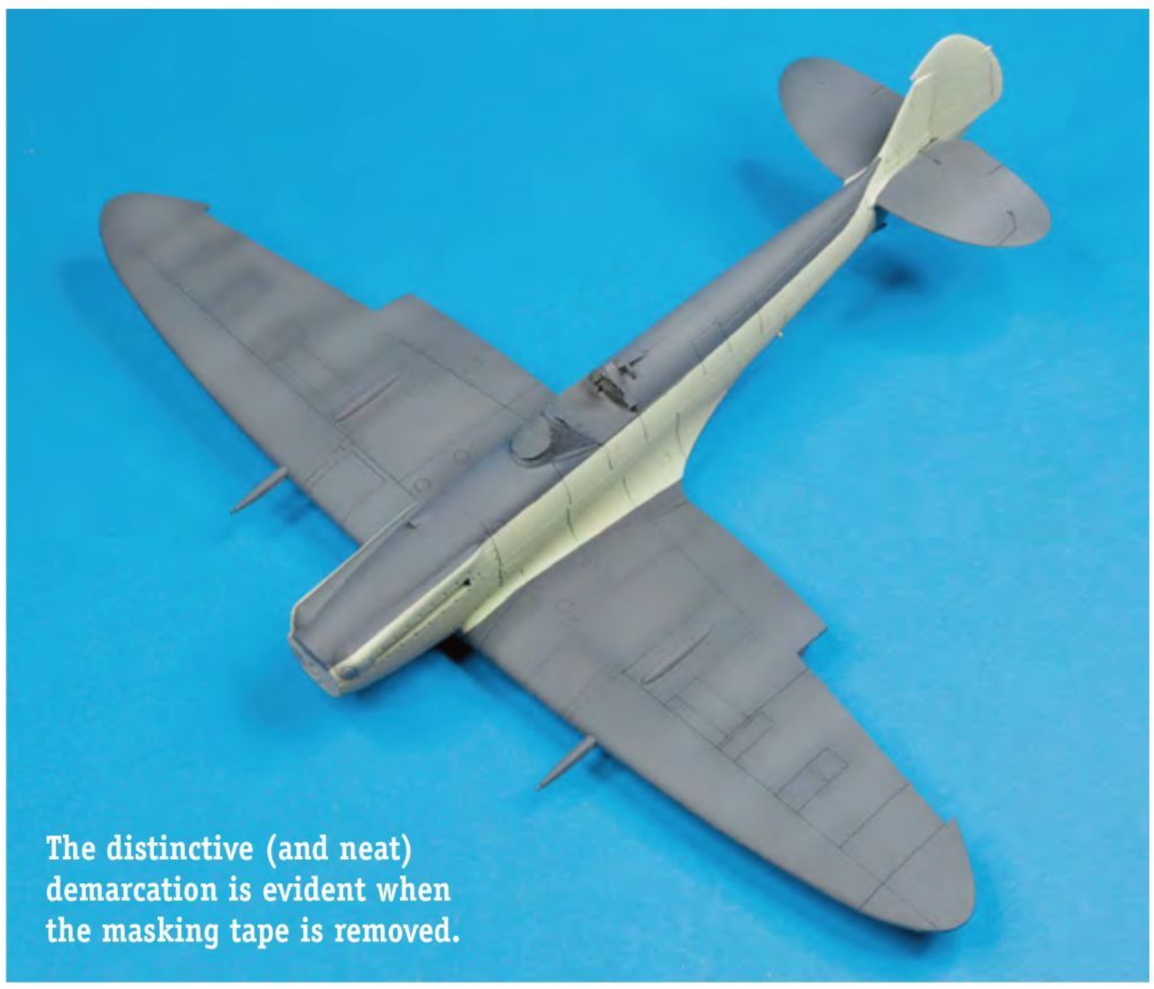


Masking begins after careful study of the paint scheme. Here, the underlying lighter Sky colour has already been applied, followed by masking.

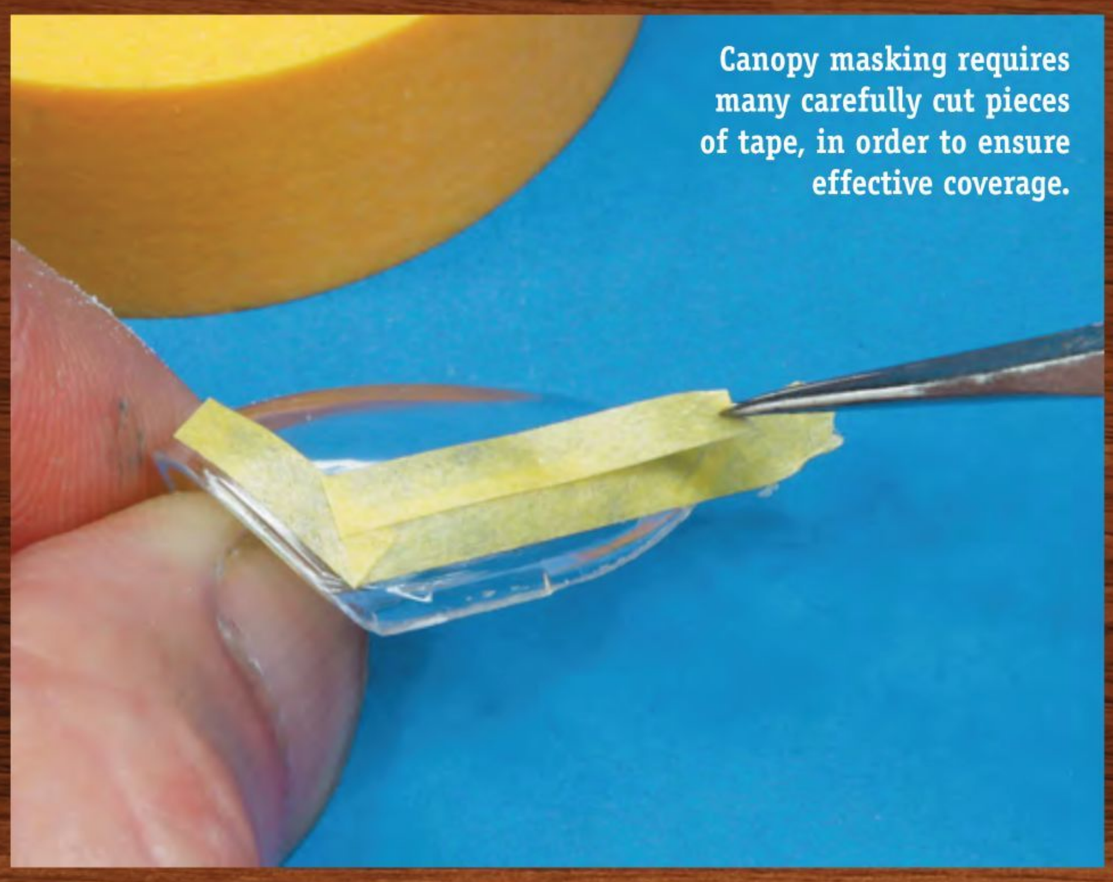
Masking Tape Methods



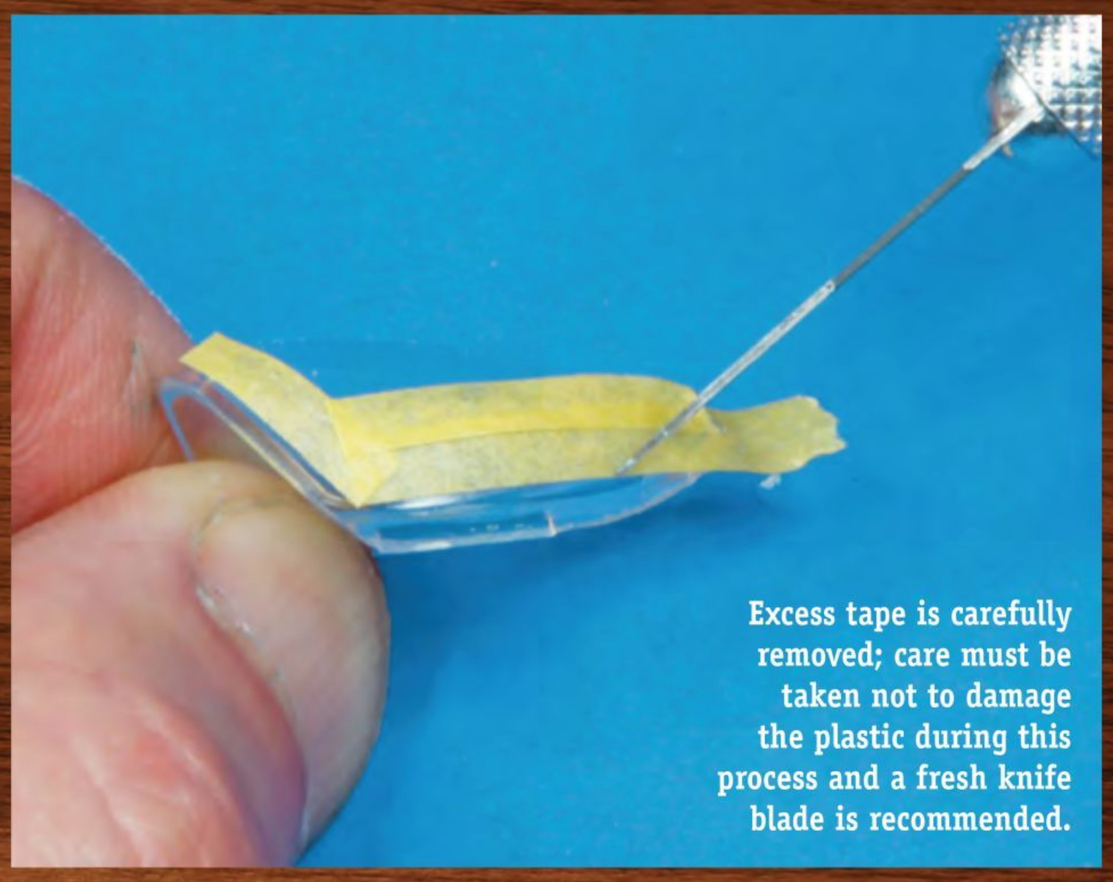
The darker coat is then applied in thin layers to avoid paint creep, and unsightly paint build-up along the tape's edges.



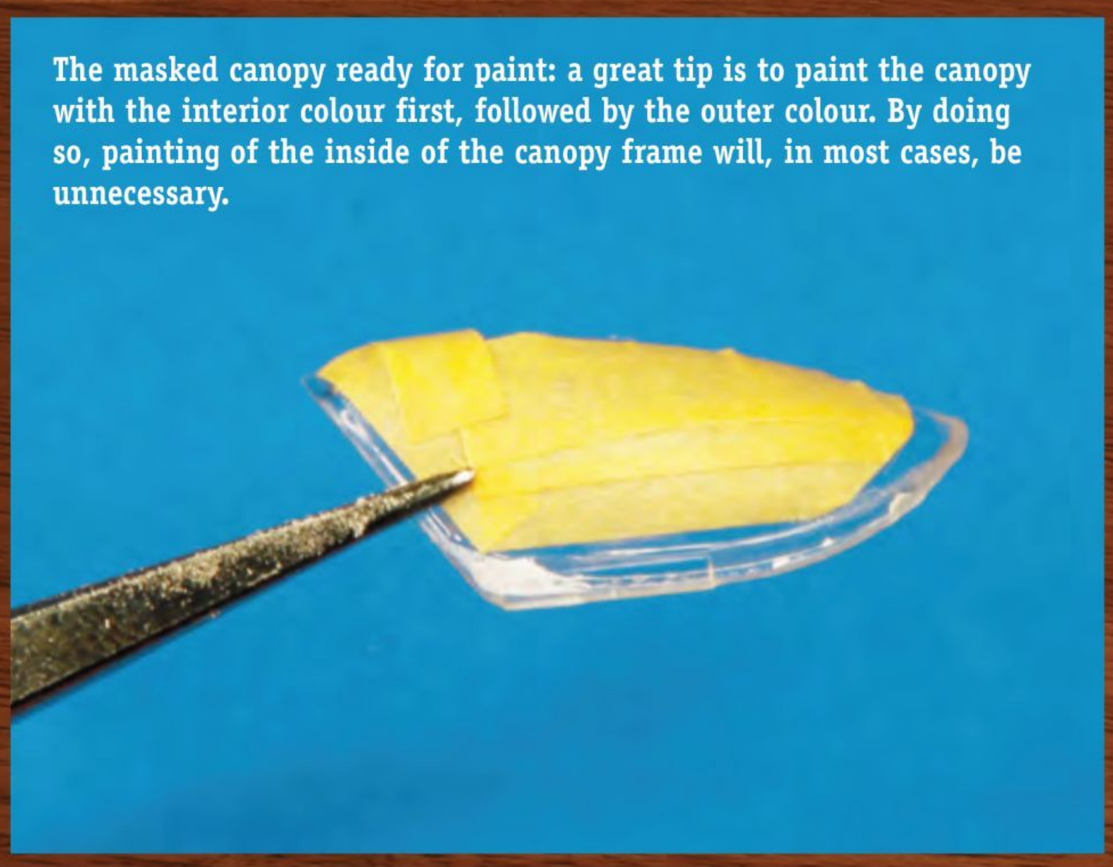
The distinctive (and neat) demarcation is evident when the masking tape is removed.



Canopy masking requires many carefully cut pieces of tape, in order to ensure effective coverage.



Excess tape is carefully removed; care must be taken not to damage the plastic during this process and a fresh knife blade is recommended.



The masked canopy ready for paint: a great tip is to paint the canopy with the interior colour first, followed by the outer colour. By doing so, painting of the inside of the canopy frame will, in most cases, be unnecessary.



Here's the finished result after a clear coat and the application of decals.

Most models feature a multi-coloured paint scheme, or small details that sport a different colour than the main areas of the subject. When brush painting, each area is carefully brought out one by one in the acquired colours and, since there is no overspray, there is seldom the need for masking. When using an airbrush (or a spray can), however, some areas will need to be masked in order to protect them from the following layers of paint. For instance, the fully painted cockpit of an aircraft would be ruined if colour strayed into it when the rest of the model was painted. And if the model has more than one colour in the scheme, careful planning and masking will be required.

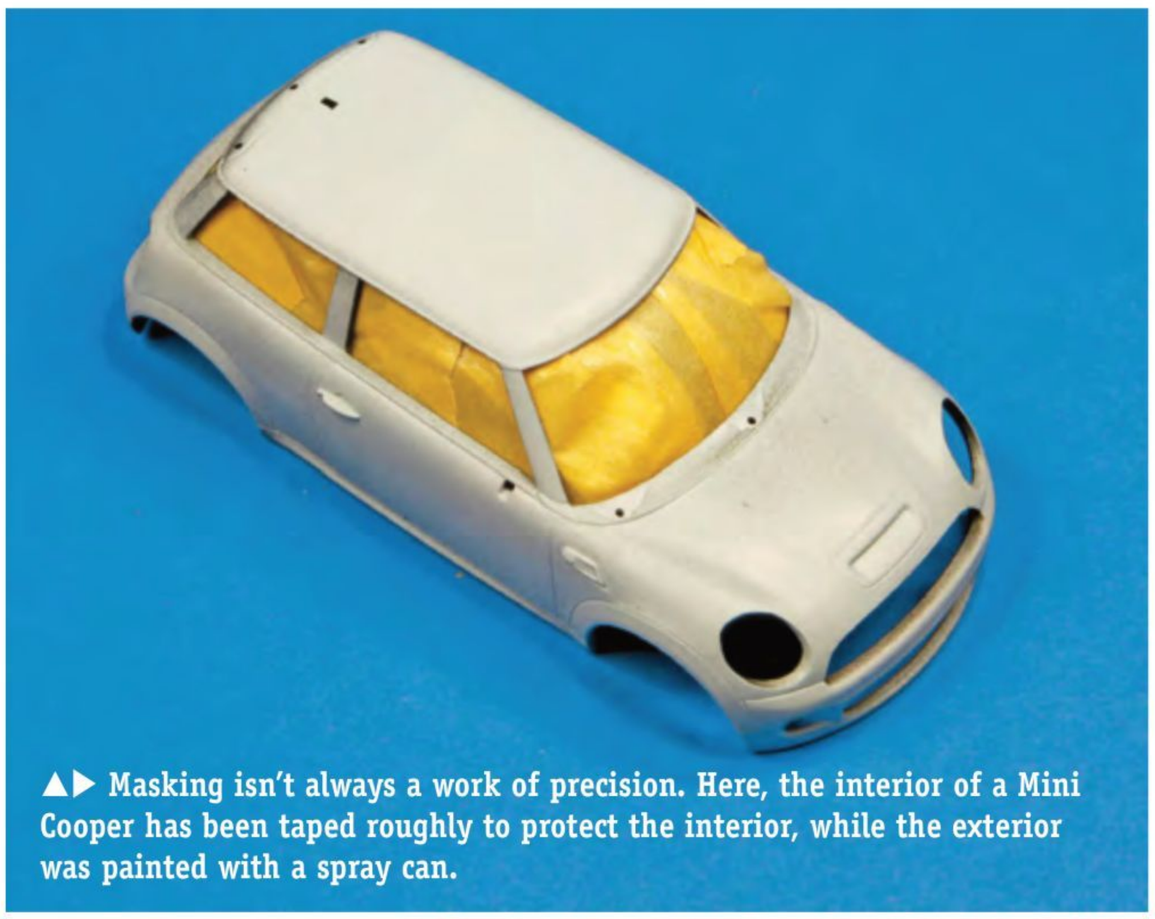
Preparation

As always, it's necessary to first study the selected paint scheme carefully; often the masking procedure is not straight-forward but needs much planning. Which colour should be applied first? How can hard-to-reach areas be masked effectively? Modellers will find masking sometimes takes longer than the actual painting. As mentioned previously, modellers must also consider the fact that light colours are best applied before darker shades, for better coverage, and this is even more important when thin layers are the order of the day.

Some models carry three, four or even more colours and can be a real challenge. Not only must the model be masked for the application of the first colour, the applied shade must then in turn be masked ahead of the next one and so forth, and this can require many steps. To complicate matters, it's not uncommon that minor leakage can occur during painting, which requires a second coat of paint… an often tedious task on a multi-coloured model. Therefore, it's also vital to mix a generous amount of paint if the shade is customised by the modeller, and not used straight out of the bottle. It's very difficult to recreate an exact paint mix, which may be necessary if a second round of paint is necessary for touching-up.

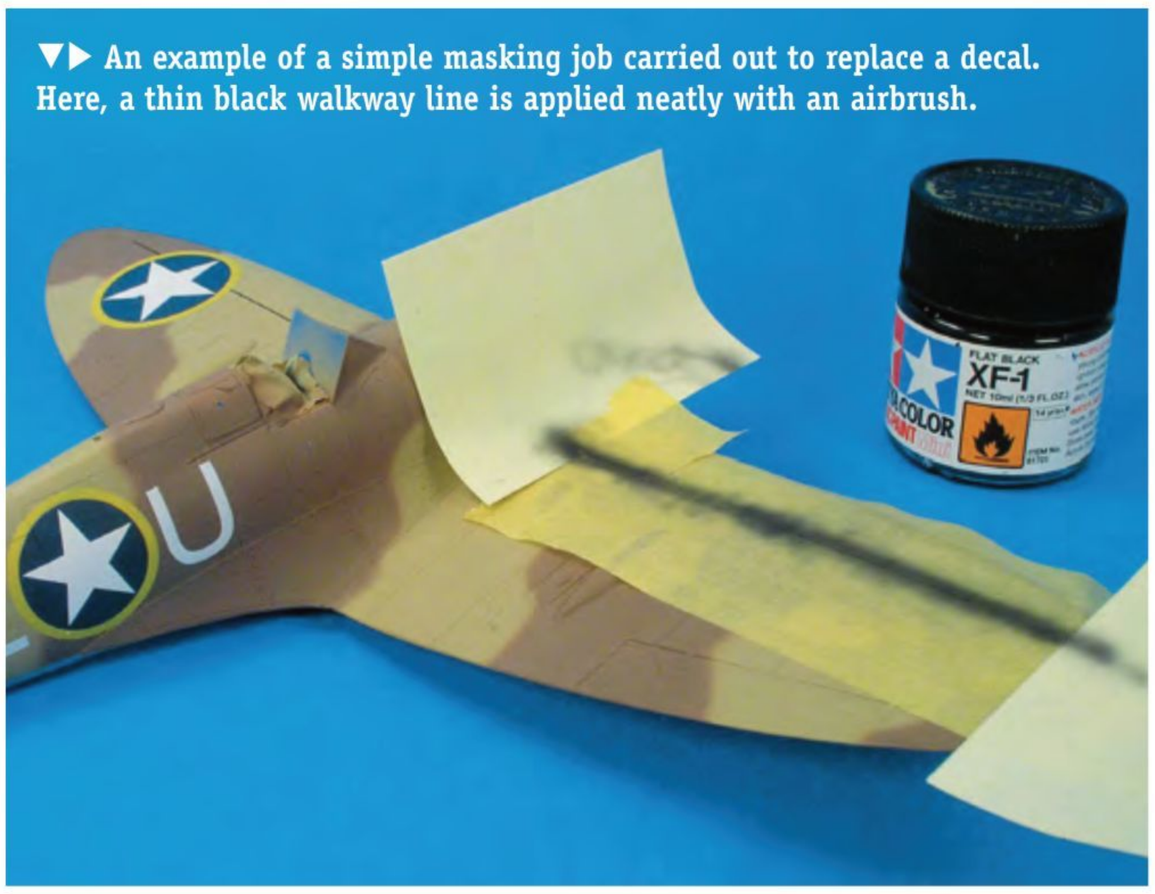


▲ **Commercially pre-cut canopy masks will save much time - and will avoid the risk of damaging the clear part during the process.**

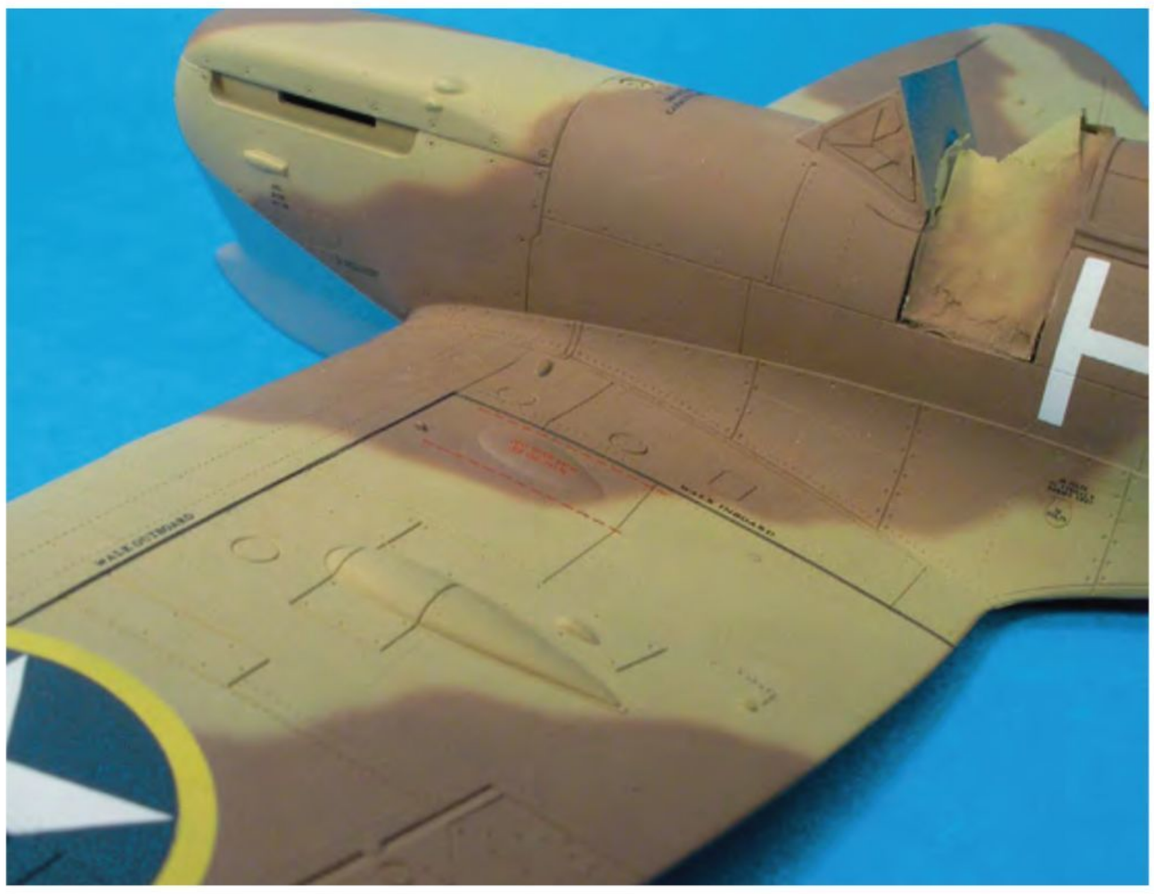




▲▶ Masking isn't always a work of precision. Here, the interior of a Mini Cooper has been taped roughly to protect the interior, while the exterior was painted with a spray can.

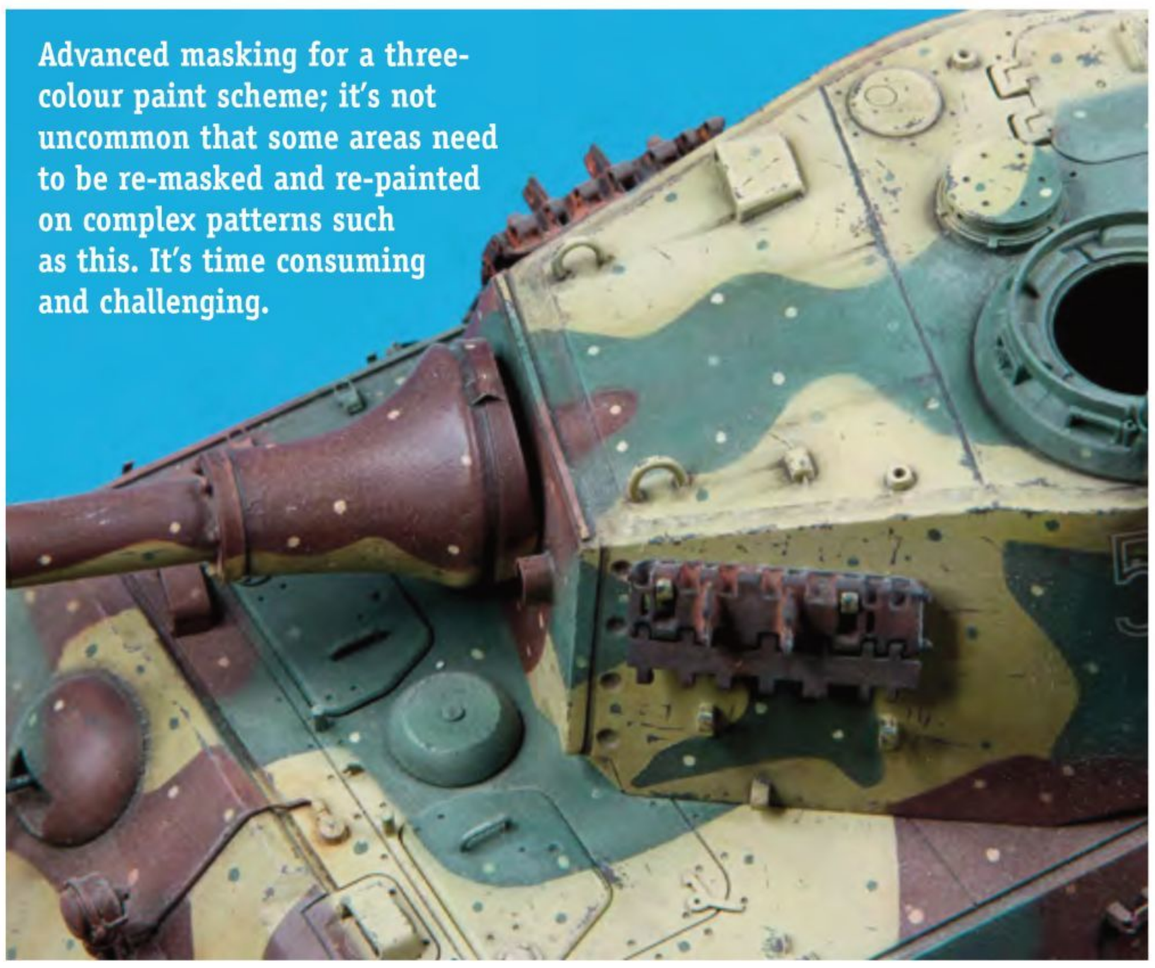


▼▶ An example of a simple masking job carried out to replace a decal. Here, a thin black walkway line is applied neatly with an airbrush.



Commercial masking tape

Special purpose masking tape is offered by several manufacturers. The common characteristic of these tapes is that they stick to the surface firmly, but the glue is mild and doesn't peel off the paint during removal, if the underlying colour has been allowed to dry properly. The tape is cut easily with a hobby knife, after being rolled out on a cutting mat. There are also commercially available pre-cut masks, mainly designed for canopy masking but also for insignia, which can be very useful if the modeller prefers to use paint instead of decals for the markings. A good tip when cutting advanced shapes in masking tape, such as a wave pattern, is to first apply the tape to a piece of clear A4 filing pocket as used in offices. Then the pattern is drawn onto the tape with a permanent marker pen. This makes the tape sturdier during cutting and sharp scissors are the best tool here, as they follow the contours easily. When the pattern is cut out it is removed carefully and transferred to the model.



Advanced masking for a three-colour paint scheme; it's not uncommon that some areas need to be re-masked and re-painted on complex patterns such as this. It's time consuming and challenging.

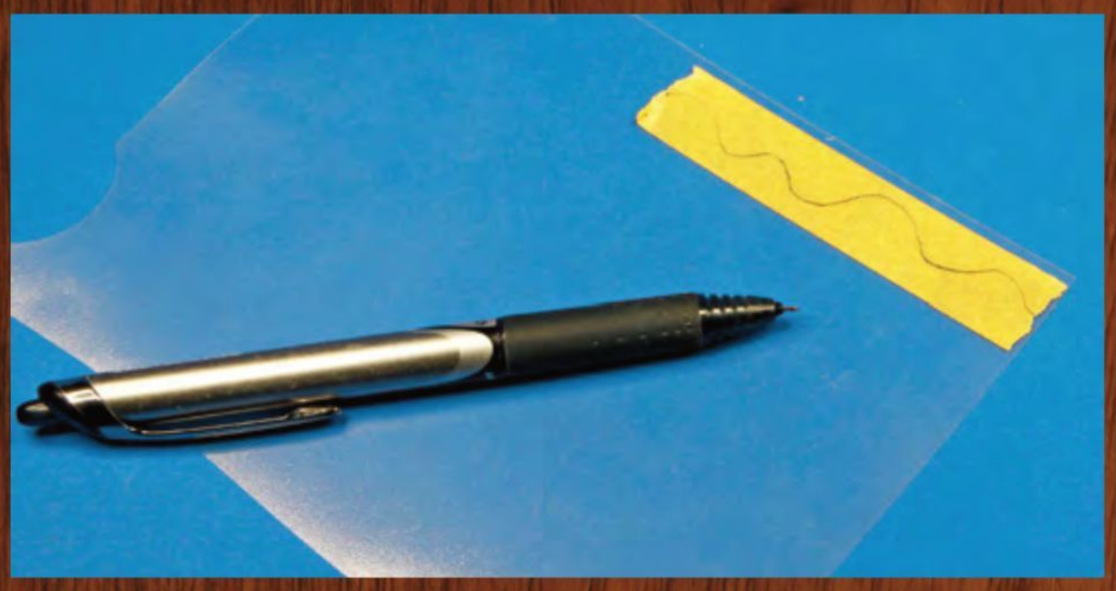
Thin layers

When using an airbrush on a masked model it's important to apply very thin layers of paint, for several reasons. Firstly, an overly thick layer can cause a build-up of paint against the edge of the masking tape, which will leave a visible edge when the tape is removed. Secondly, leakage (known as 'paint creep') is more likely to occur in places where the tape has, perhaps, not been applied properly. Lastly, the glue on the masking tape can in some cases react with the thinner, if the paint is applied too heavily…which can result in traces of the glue sticking to the model when the tape is removed.

It's also very important to let the paint dry properly before the masking tape is removed as the surface is damaged easily during this process. In the end, the agony connected with masking is definitely worth it when the tape is carefully peeled off, to reveal perfect demarcation between colours.



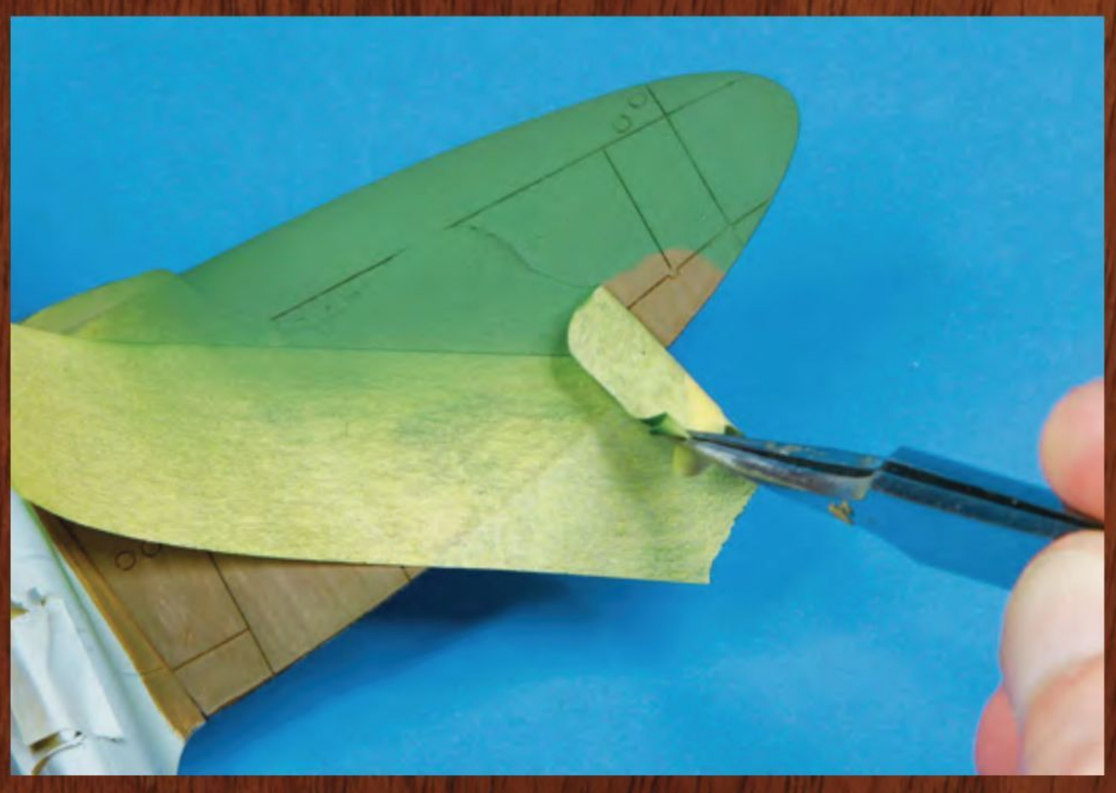
Office plastic sheet and sharp scissors are a great help when creating advanced shapes out of masking tape.



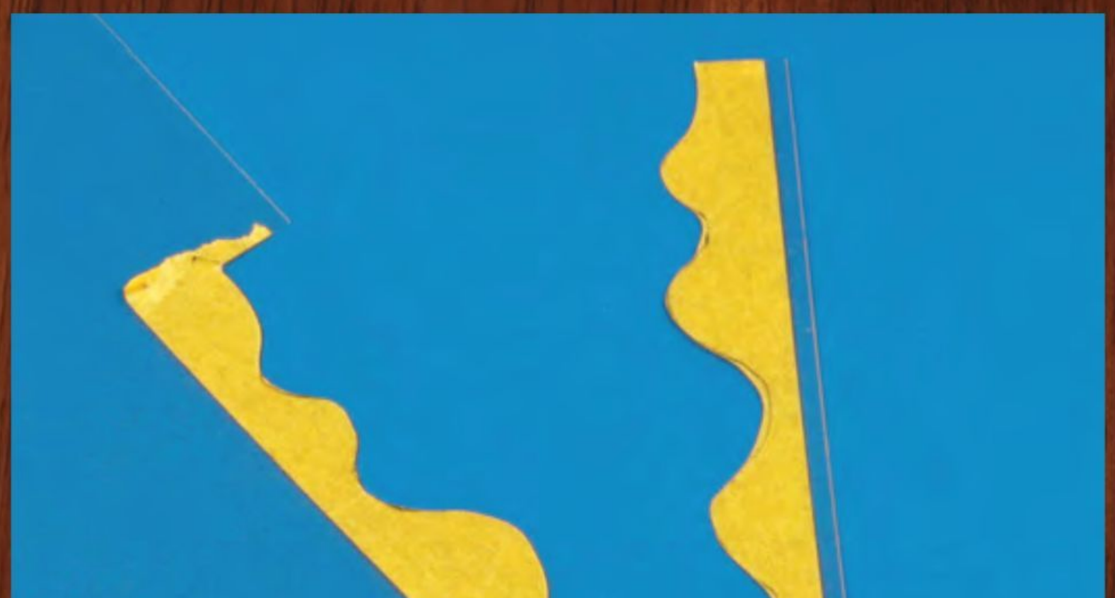
▲ The tape is transferred to the plastic sheet and the desired shape drawn with a fine-tipped permanent marker.



The tape is removed carefully from the plastic and applied to the model.



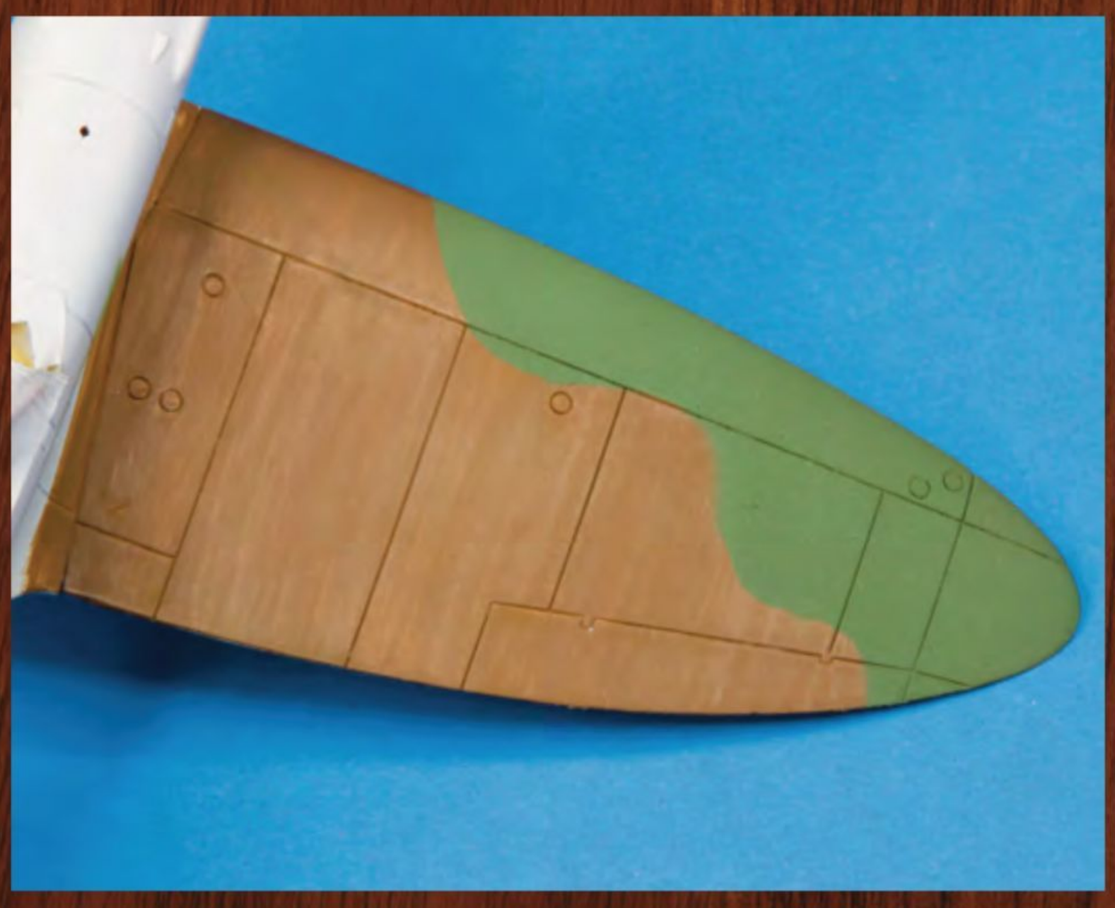
▲▶ After a solid coat is achieved and allowed to dry, the masking tape is removed carefully with fine tweezers to reveal a sharp demarcation.



▲ The contours are then cut neatly with scissors...the sharper and finer the better.



▲ For the second camouflage shade, thin coats of paint are applied with an airbrush.





A selection of metallic paint mediums including enamels, acrylics, artist pencil, printer's ink and special-purpose lacquer paints.

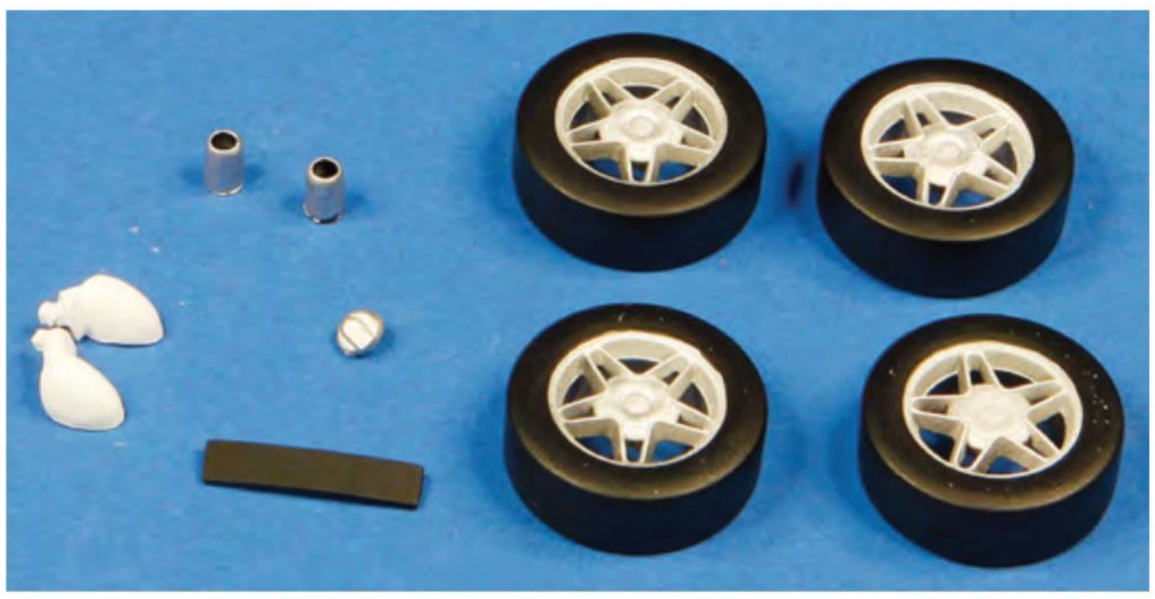
Rendering Metal

Metal finishes are among the most challenging tasks for any modeller. Interestingly, that can be said for many of the major paint manufacturers too, as it's apparently not easy to create a medium that looks realistic in the small scales involved in modelling. The main issue with metallic paints is that the pigment grain is often too coarse to look convincing. In general though, enamel metallic paint often looks slightly better than its acrylic equivalent. Achieving a realistic and good quality metal finish requires practice and a certain amount of trial and error, to ascertain which combination of tools and materials will give the modeller the effect they are looking for. A good source of knowledge and inspiration can be found in the car modelling community, where there are experts who attain amazing results with their metallic finishes.

Choices

As mentioned, most major brands offer metallic colours in acrylic and enamel, but there are alternative companies which stand out for their special-purpose paints. The most widely known among aircraft modellers is probably Alclad II, a lacquer which comes in a variety of metallic finishes such as Chrome, Aluminium, Dark Aluminium and Polished Steel to mention a few.

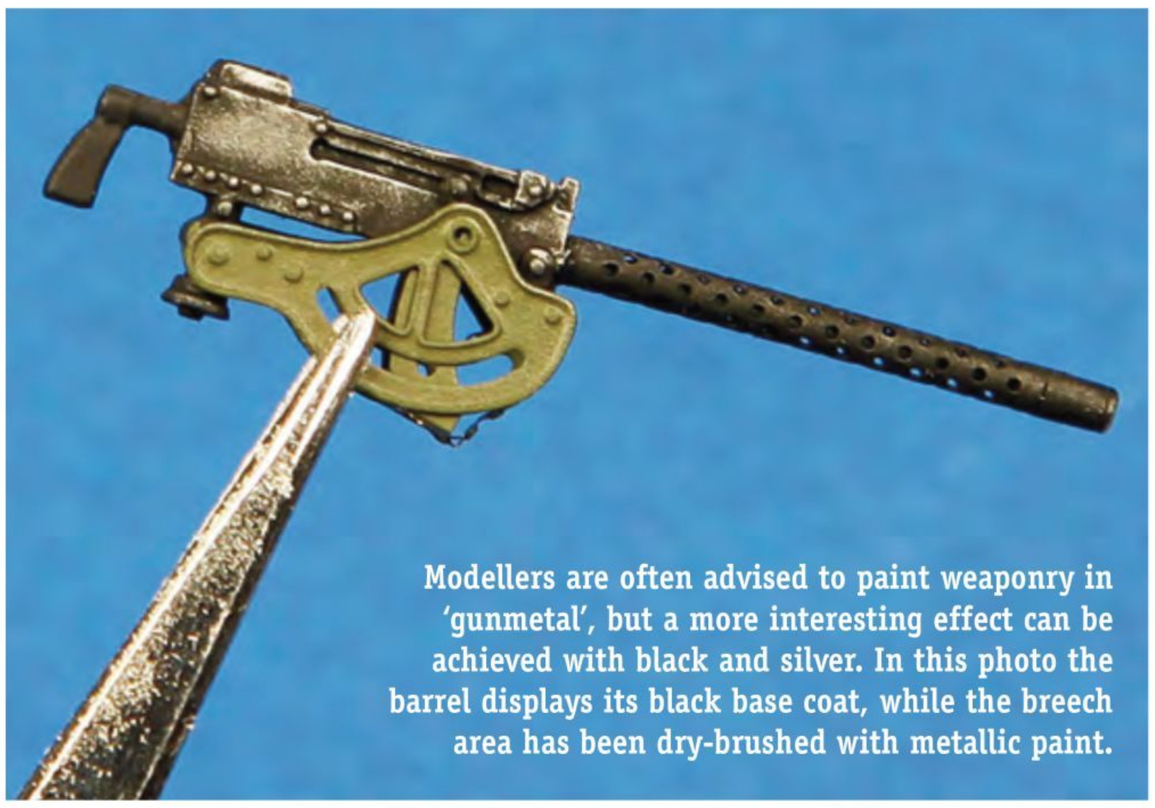








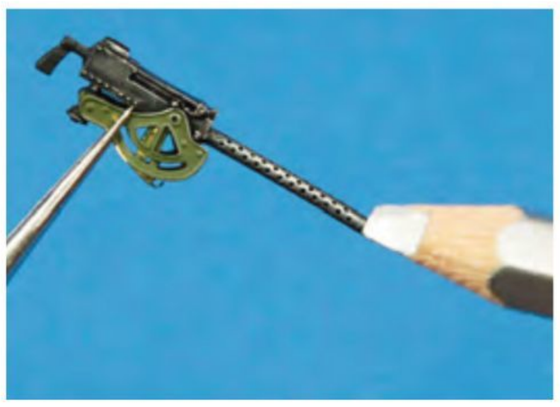
▲▶ On this Mini Cooper, metallic areas were painted with both airbrush, as on the wheels, and with a brush for interior and exterior details of the body.



Modellers are often advised to paint weaponry in 'gunmetal', but a more interesting effect can be achieved with black and silver. In this photo the barrel displays its black base coat, while the breech area has been dry-brushed with metallic paint.



▲ Silver, mixed with a small amount of black, is being dry-brushed onto the black barrel for a worn paint effect.

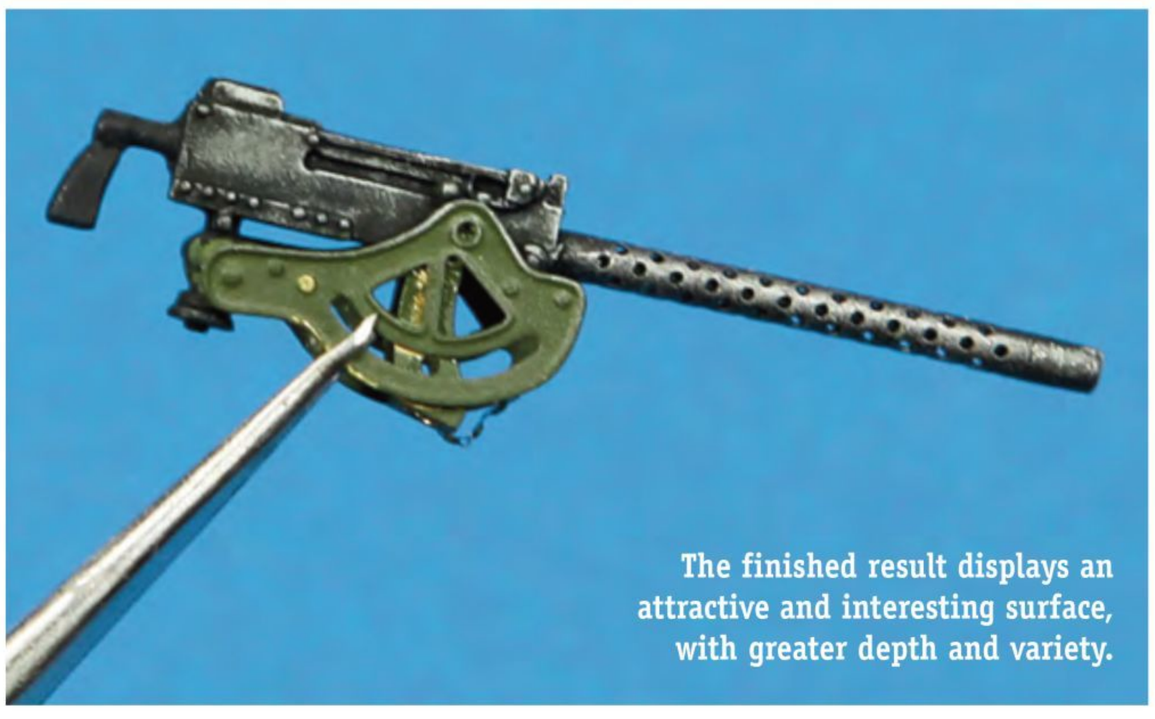


▲ The metal effect is further enhanced with an artist's silver pencil on more exposed edges.

They are designed for application with an airbrush and are ready to use straight from the bottle. As with any lacquer-based product, there are health issues, and when airbrushing Alclad, it is highly advisable to wear a proper filter mask, and work in a well-ventilated room (an airbrushing spray booth is also a good tool, for those who can afford it). Zero Paints are well-known to car builders, but their reputation is beginning to spread into other modelling areas and they offer a wide range of shades.

Another medium widely used by figure modellers are printer's inks. This is a thick mixture, more of a paste than a paint, which has a very fine grain; it's the perfect choice for detail painting with a brush as the bristle strokes are hardly visible after application thanks to its consistency. The nuance, however, slightly veers towards grey and doesn't have the bright shine as a regular bright metallic paint such as Humbrol 11 Silver, or Metalcote Polished Aluminium from the same manufacturer.

Graphite pencils and metallic pencil crayons found in art supply shops are also worth trying, and the benefit of these is that the modeller has a high degree of control over their application, as opposed to brush painting which demands good paint consistency, a high quality brush and a steady hand.



The finished result displays an attractive and interesting surface, with greater depth and variety.



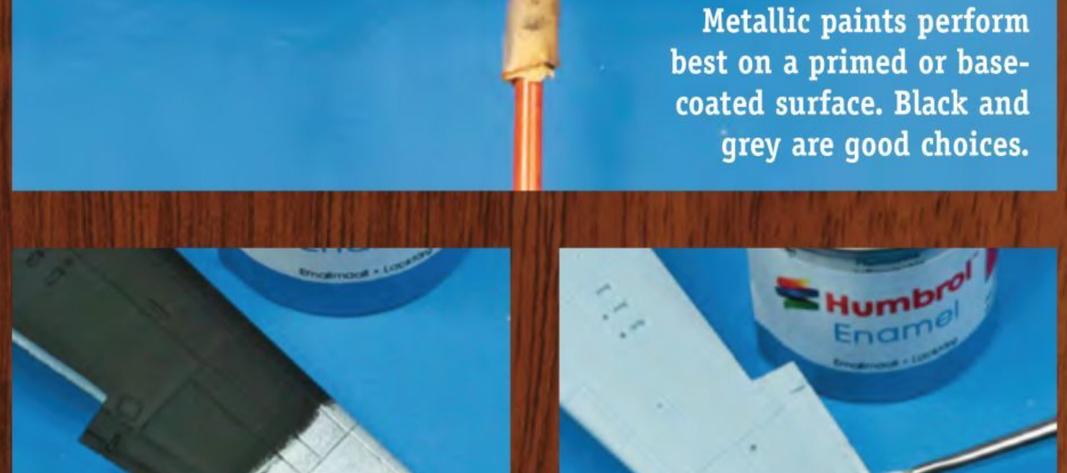
Metallic paints perform best on a primed or base-coated surface. Black and grey are good choices.



▲ Here, Humbrol Enamel 11 Silver is tested on a black base coat applied to an Airfix 1/72 P-51 Mustang. It covers surprisingly well with just two coats.



▲ The same colour tested on grey. On this surface the coverage was even better as grey and silver are close to each other in finish.



▲ After a few coats the difference is barely visible but the area with grey undercoat appears slightly smoother.



◀ An acrylic silver paint from Andrea was also tested alongside the enamel for comparison.

▼ Acrylic coverage is not as good as with the enamel, as is evident when both are applied on black and grey; the black undercoat shows through clearly. The difference is not that clear on the left half, over the grey undercoat.



Application

Just as with most paint, metallic shades perform best on an undercoated surface, which allows them to adhere better to the plastic; grey and black are the most common colours to use as a base. On a grey surface it's easier to achieve a smooth, silver finish, while a black base is good when greater depth is the goal, such as on chrome finishes or for dull aluminium.

When applying enamel metallics with a brush, the paint can be more or less used out of the bottle or tin, after a good shake/stir. These are rather thin but offer good coverage, and do not require as many layers as other paint types. On large, flat areas it's recommended to use a flat brush to create as few brush marks as possible. Acrylic metallic shades do not generally provide the same coverage as enamels, so several more layers must be applied. Here, it's important the layers are applied thinly to get a smooth finish. For the best results with a metallic surface, the paint should be applied with an airbrush, except for small details. The airbrush renders an even surface that is hard to achieve with a brush. Metallic paint can be very volatile, though, and creates lots of paint dust, so it's important to keep the air pressure low or the effect can easily be a grainy surface. Subsequent thin layers are the key to success.

Surface variations

When viewing real aircraft with a bare metal finish (especially from a wartime period), the surface will display a great variety of colour nuances…not just a solid, shiny surface. This is due to the effect of exposure to heat, make-up of individual panels, the effect of weathering and also how the light is reflected on the surface. To replicate this, some panels of an aircraft can be masked with tape and painted in a different shade than the basic coat; two or three different mixes will make an effective difference. The effect can be further enhanced with other methods which will be dealt with in the weathering section.

Protective sealing

After a metallic coat is applied, it's recommended the surface is sealed with a coat of clear varnish. This will give the model a higher degree of shine if a gloss coat is applied, or less lustre if a matt coat is rendered. Moreover, the clear coat will also protect the surface when handling the model during the decaling and weathering process, thanks to its hard surface. For ultra-shiny finishes, buffing with polishing cloths will be the final stage, but this should be done before the clear coating.

A more challenging option

There is another method of reproducing a metal finish on an aircraft, and this is with the use of a product called Bare-Metal Foil. It is a very thin, adhesive foil which comes in various shades, but its application is very challenging and not to be tackled by the novice modeller. Once some experience has been secured, and a few models are under one's belt, then it may be the time to attempt it…but it is labour-intensive and requires a great deal of patience!



▲ This 1/72 P-51 Mustang has been base-coated with black for the airbrush test.

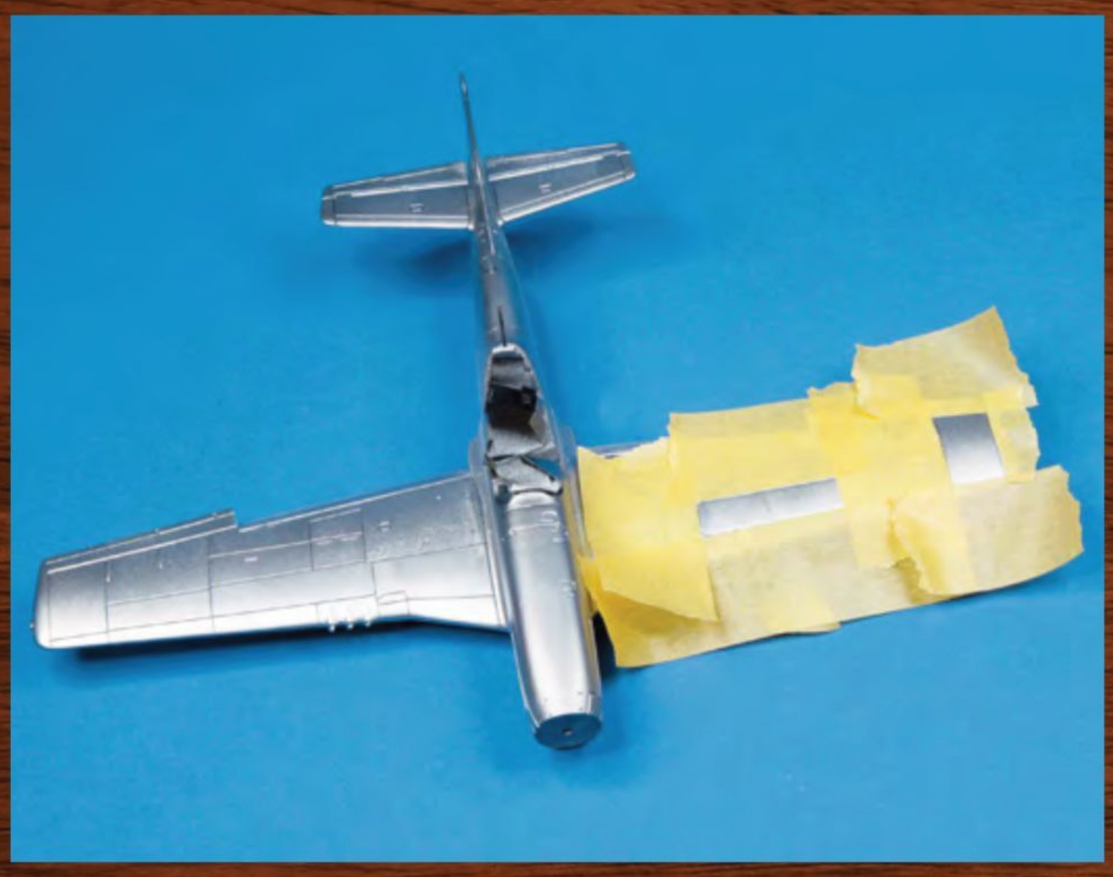


▶ Subsequent layers of Alclad II Lacquer are applied, with a low air pressure set on the compressor.

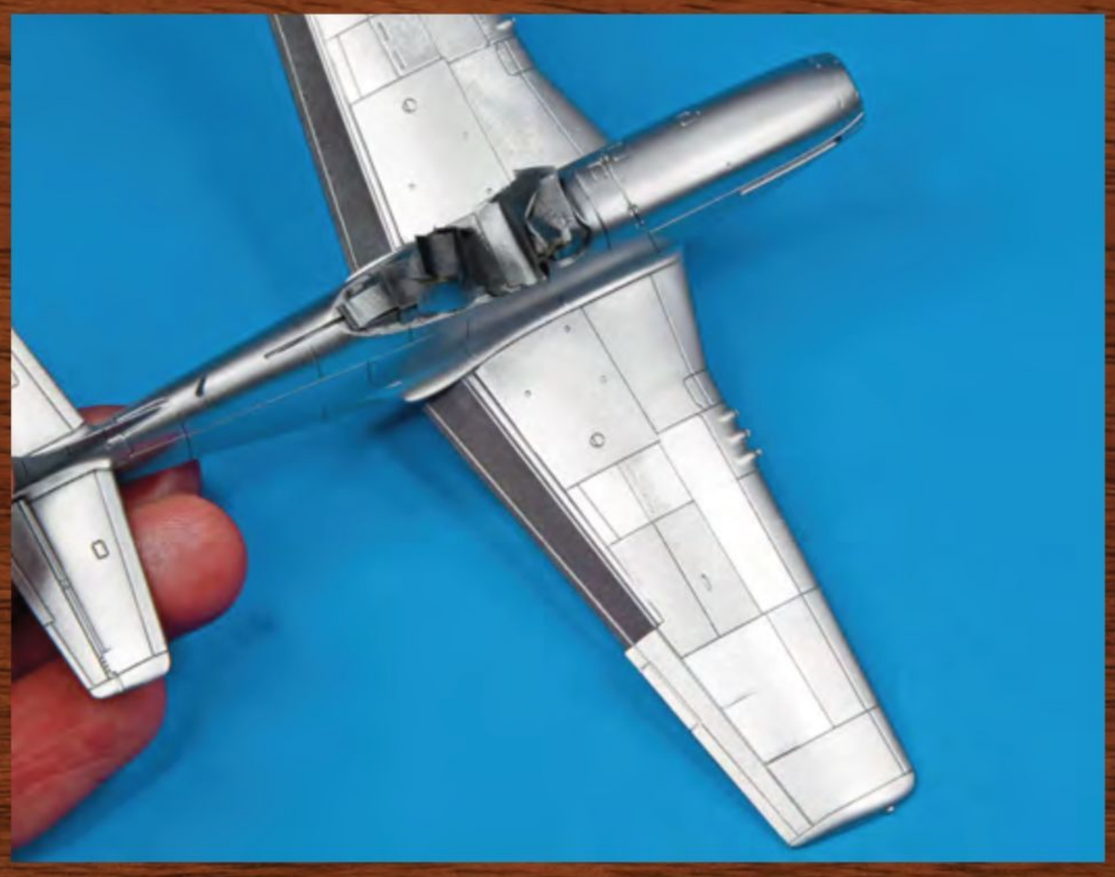


▼ A solid, shiny surface was achieved after the application of many thin layers.

▼ Several panels were then masked in preparation for different metallic shades to be applied.



▼ The right wing displays the subtle effect of a darker and a lighter mix of individual panels, which ensures more visual interest.



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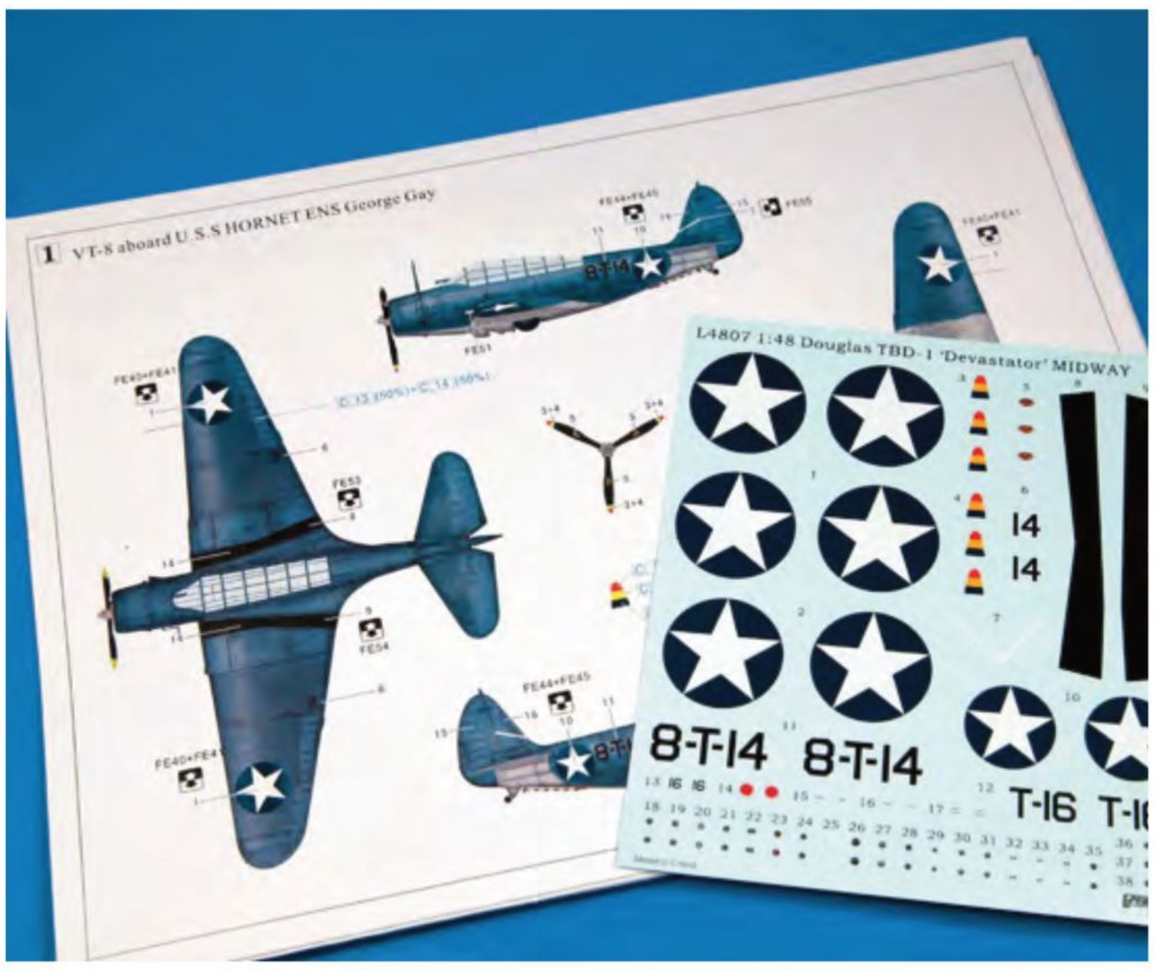
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Fun with Markings





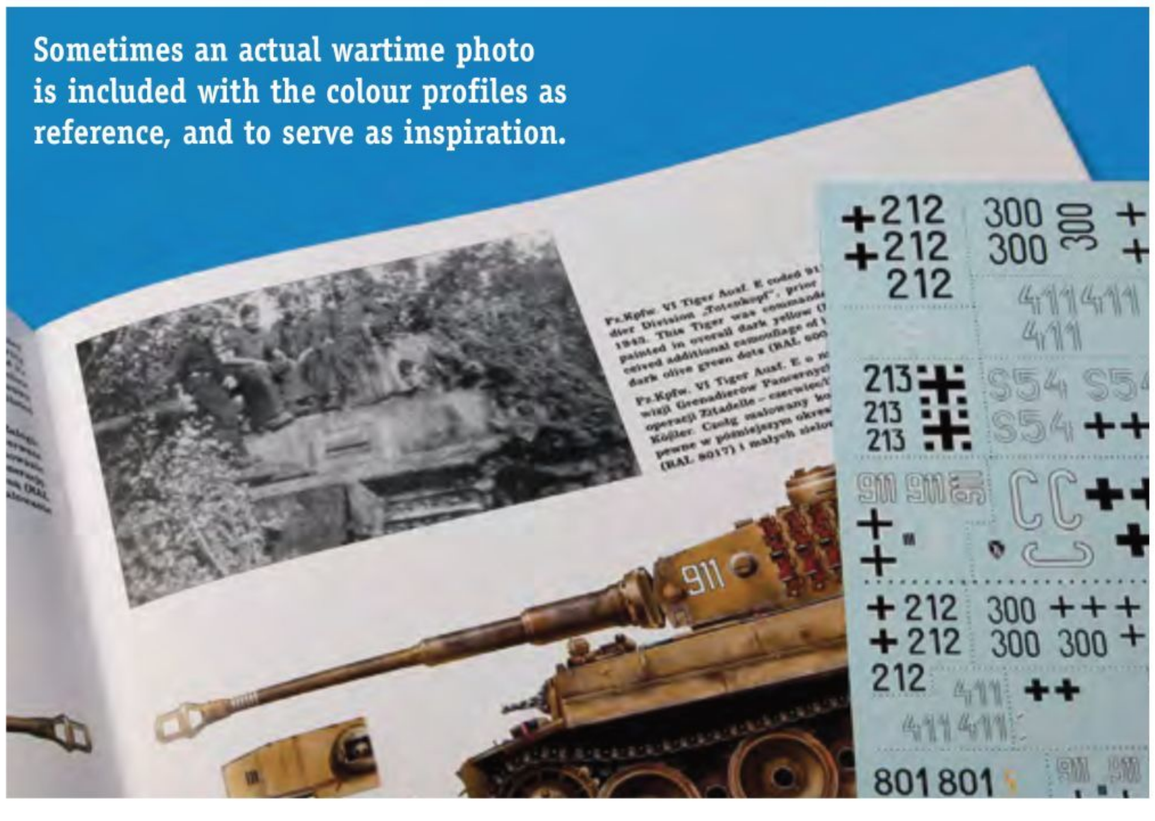
▲ The most common provision is that a kit's standard decal sheet includes markings for a few different versions.

◀ Other kits can include up to five or six options as standard, which represents good value.





▲ Special booklets on a specific unit or type offer well-researched subjects for both armour and aircraft modellers.





Here's a selection of tools to make decal application easier, safer and to ensure good results.



Decals will perform better on a gloss-coated surface, such as on this 1/48 Airfix Seafire.

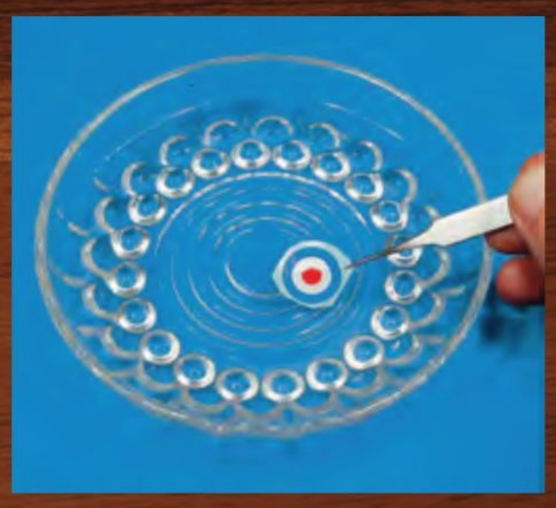


◀ The decals are cut away carefully from the backing sheet with a hobby knife or a pair of scissors.

▶ The surface of the model receives a coat of decal setting solution in preparation for the markings.

▶▶ Decals will need to soften in water in order to loosen them from the backing paper. This can take up to five minutes depending on the brand.







The decal is then transferred to the model with tweezers and a wide paint brush.



When the decal begins to set, a new layer of decal fluid is again brushed onto the decal to soften it further.

Too many modellers, the choice of markings and insignia is the most interesting phase of any given project…it's something of a reward for the occasional struggle of assembly and painting.

The average builder may not have any specific preferences in terms of subject, nationality or unit to which any aircraft, tank, ship or other war machine belonged. Others, though, are quite the opposite and like to specialise in all sub-types of an aircraft, or there's the opportunity to build every type flown by a particular squadron. Additional themes could involve certain battles, or aircraft flown by an ace pilot.

The fantastic thing with decals is that even if the same kit is built several times over by different modellers, the results can be completely different depending on the chosen livery.

Thanks to the original markings of historic subjects, especially on aircraft, research can often lead to a fascinating journey: tracing the location where the photo was taken, the approximate date, accurate identification of sub-type and many other factors. Regardless of the modeller's preferences, the marking options and associated references are seemingly endless. Well-appointed hobby shops and mail order retailers have literally thousands of 'aftermarket' decal sheets for every imaginable model; very few subjects are still unobtainable, especially with the useful numbers of generic decal sheets for serial numbers, code letters, kill tallies and unit markings. Due to this, bespoke scheme rendition is now much easier.

Today there are many brands which specialise just in decal production, and offer well-researched subjects. The decal sheets mostly provide markings for two to six aircraft, along with (usually) colour instructions/ illustrations for decal placement and necessary paint shades. Some brands take this even further, by offering a booklet with colour profiles, original war time photos and matching decals for the depicted machines. This is a great help to the modeller in terms of saving time on research, and when building to a theme. ▶

Preparation

Despite the fact decals often bring a model to life, some find decal application rather scary… thinking (correctly) that a bad decal job can ruin an otherwise great model. However, careful preparation, the right equipment and patience will produce the desired results.

To begin with, all necessary tools must be at hand. This includes a hobby knife, a pair of scissors with which to cut the decals from the sheet, and tweezers will help to hold individual decals. A couple of clean brushes will aid in positioning the decal, and both a fine-tipped round brush and a wider, flat brush are handy. Lastly, setting solutions are highly useful when applying decals and can make a world of difference compared to using just water. Some example brands are Micro Set/Sol, Humbrol Decalfix and Daco. A word of warning though; some manufacturers advise that their decals should only be applied with water and no special purpose fluids to avoid possible damage, so it's vital to check the decal instructions before starting.

Decal fluids are available from several manufacturers and some only use one mix, while others offer two mixes, with one for application of the decal and the other for softening the decal further to make it conform to uneven surfaces and fine detail.

Some decals tend to be slightly transparent, which can lead to unwanted results when the underlying coat of paint affects the colour of the decal; a good example is when a wing or fuselage roundel has a white portion, but one can see camouflage colours through it. This is most common when decals are applied over contrasting colours. In these cases it is worth considering painting the underlying surface in a matching or neutral colour, before adding the decals.

Arguably the most important factor when applying decals is that they generally should be a laid on a gloss surface, to avoid 'silvering'. Matt surfaces are not as smooth as gloss, so if one applies a decal straight onto matt paint, tiny air bubbles can form underneath the decal



▲ If decal solutions are not enough to make the marking conform to the surface, it can be carefully cut with a sharp blade. The cut must be precise in order not to ruin the decal.



▲▼ The edges are then forced down into the panel line with a fine brush soaked in decal solution, which should ensure convincing results. Add more solution if it still doesn't conform.





▲ The decal rarely ends up in the correct place from the start but needs to be re-positioned; this is done easily with a wet brush.



▲ Once in place the excess fluid can be removed carefully with a brush or a cloth.



▲ If the decal appears to be having trouble settling, more setting solution can be applied.



▲ A brush or a Q-tip/cotton bud can burnish the decal into the surface detail carefully, making it follow the contours.



▲ Here, the decal is in the right position and set to conform well to the fuselage. It should then be left to dry for the requisite time.



▲ On areas with deep, irregular panel lines the decal can be softened further with a strong solvent, which can make the decal fragile so it cannot be re-positioned after application.



A fine brush helps to stretch the decal into the panel lines, as can be seen in the left white bar area of the decal.



◀▶ Some decals can be very small, such as these stencils. Still, they help to make the model look more detailed and realistic.



carrier film, and they manifest themselves as a silver-looking sheen. As a rule of thumb, always apply gloss varnish before decaling, or lay them on gloss paint, such as Xtracolor.

Application

This is a rather straightforward procedure if things are done slowly and gently. Decals are very fragile and must be handled with care, especially when they are soft. After the desired decal is cut from the sheet it should be placed in a fairly flat container, semi-filled with water. It's not recommended to use a regular drinking glass as the decal can slip off the sheet and sink to the bottom and is easily damaged when collected. It's much better to use a saucer or shallow dish.

While the decal softens in the water, the surface of the model where the decal is to be placed receives a few strokes with decal fluid. On a dry surface the decal can stick almost instantly, making re-positioning difficult without damaging the decal, so the surface should be wet.

The decals usually need a few minutes to soften in the water, and when ready for application they should slide easily off the backing paper. It's recommended to test the available movement gingerly, since the decal can crack if it has to be forced off the sheet. The decal is lifted with a pair of tweezers while still on the backing paper and transferred to the model with a flat brush. The decal is then positioned carefully according to the instructions. When the decal is in place, more setting solution can be brushed over the decal to further soften it, then it should be left to dry. Depending on the decal brand and type of setting solution, than can take anything from a few minutes to overnight. Any excess fluid can be removed carefully with a dry brush or a soft cloth, making sure not to move the decal out of place.

Many models have an irregular surface, with raised detail or recesses and panel lines, which the decals have difficulty conforming to. If they don't, however, they will look like the old-fashioned 'stickers' they (in a way) are…instead of something that has been painted as on the original machine.

To ensure this, the decal must be softened further and then pressed gently onto the surface with a soft brush, and a fine-pointed brush can push the decal into the panel lines, ensuring there is no air between the surface and the decal.

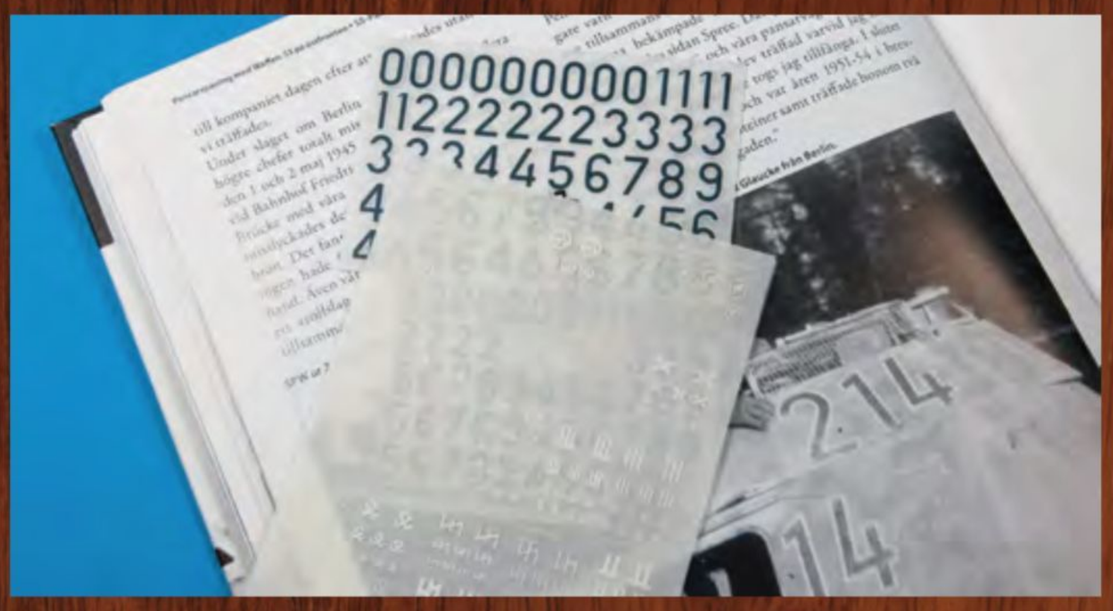
Some decals tend to be rather thick and can cause problems in terms of conforming to the surface. The panel lines of a model can also be deep, making this problem more evident. One solution is to very carefully cut the decal along the panel line (with a fresh hobby knife blade), making the edges of the decal slide in between the panels. A further coat of decal fluid will help this. A word of warning though; this operation must be done with great care as the decal can easily be ruined if the cut is made wrongly.

Clear coat

With the decals set and the surface dry, the results can be evaluated. Most likely, the decals will reflect a different sheen than the painted areas of the model, again risking a 'sticker-like' appearance. To remedy this, and to protect and seal the surface, a coat of clear varnish should be applied. Depending on the modeller's preference this can be a matt or a gloss coat, though most would prefer an initial coat of gloss as this aids the weathering process. Regardless of brand, it's vital that the decal is completely dry before varnish is applied, as the decal itself can curl under the varnish layer.



The final result is a rewarding sight compared to a bare, paint-only model which lacks life.



▲ Dry transfers are often well researched to match specific types of markings. In this photo note how the digits match those in the wartime image.



▲ To ensure correct alignment a piece of masking tape is used as a guide. The dry transfer is then positioned and held in place, also with tape.

No Water Necessary



The surface is rubbed carefully with a graphite pencil, under light pressure.



When the entire area has been rubbed, the backing paper can be removed with fine tweezers.

While decals are available for a great many subjects, the majority are for aircraft or cars. Moreover, decals are often designed to represent a specific aircraft or vehicle; creating a customised marking can prove challenging, and picking decals from different sheets often results in an inharmonious finish. One solution is to use dry transfers. Originally used mainly by PR companies before computers became every-day tools, they were available in many sizes and fonts, but in the 1990s dry transfers for armour and aircraft models emerged. Archer Fine Transfers is the leading name, and offers numerous sets for everything from vehicle code numbering to instrument placards.

Application

Dry transfers are easy to handle and apply as long as it's done carefully. The tricky part can be to apply them on a small area, where they are difficult to hold in place during application.

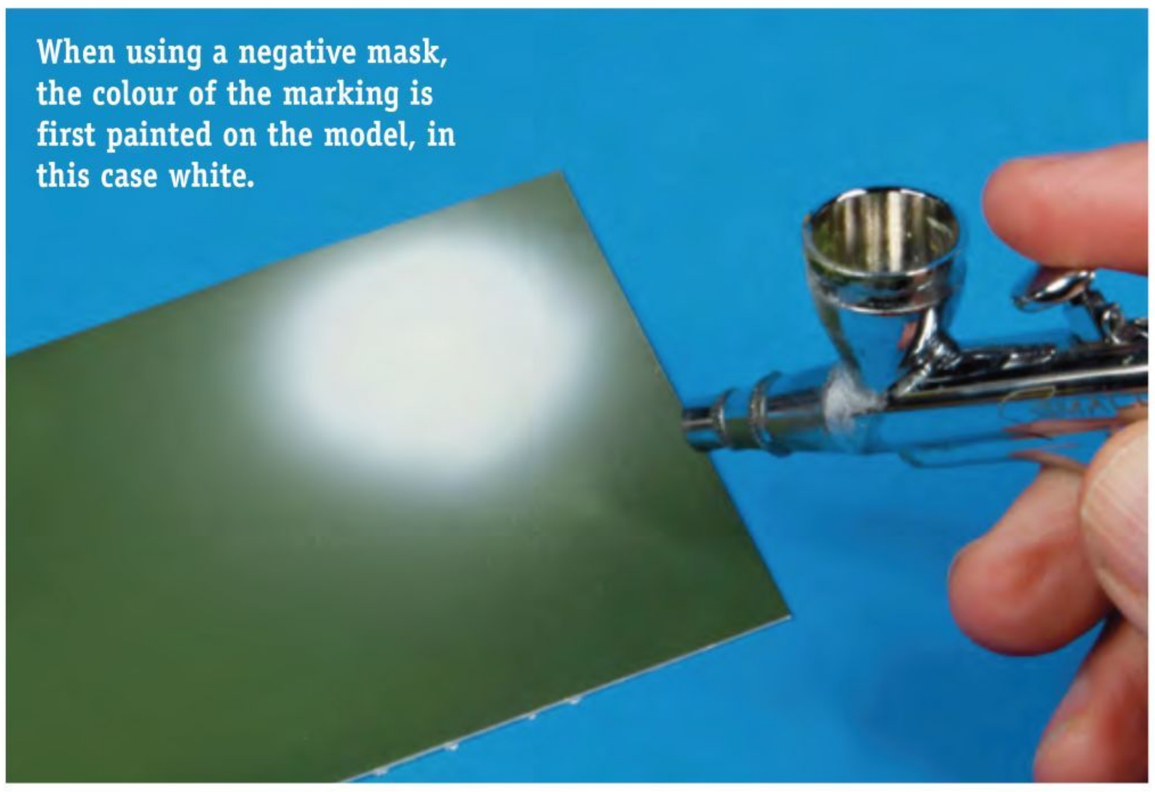
When the desired transfer has been cut from the sheet, the protective paper is removed. Without the paper, the transfer can then stick to the surface. Dry transfers are printed on the rear of the sheet (unlike standard decals) and to apply the transfer, they are first attached to the model with masking tape. A soft graphite pencil is then rubbed over the surface, pressing the transfer's rear face onto the model. This operation should be carried out gently as the transfer can slip out of its position and crack. The backing paper will lift once the transfer has stuck to the model, and the masking tape and paper can be removed carefully with tweezers. If several transfers are applied side by side, such as with a two- or three-digit number, one mustn't allow the masking tape to contact the previously applied transfer, because the tape can tear the transfer when it's unpeeled. The markings should then be sealed with clear varnish.

▼ A perfect result with invisible edges, due to the dry transfer's extremely thin nature.



▼ If several transfers are used, do not allow the tape to touch existing markings otherwise it can remove them when unpeeled.

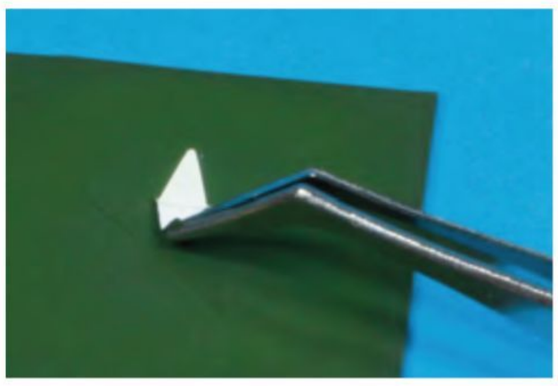



When using a negative mask, the colour of the marking is first painted on the model, in this case white.

Beyond Decals


▲ The template, here in the shape of a star, is then placed on the painted area.


▲ The template is over-sprayed with thin layers of the base shade.


▲ When the colour is dry the template is removed gently.

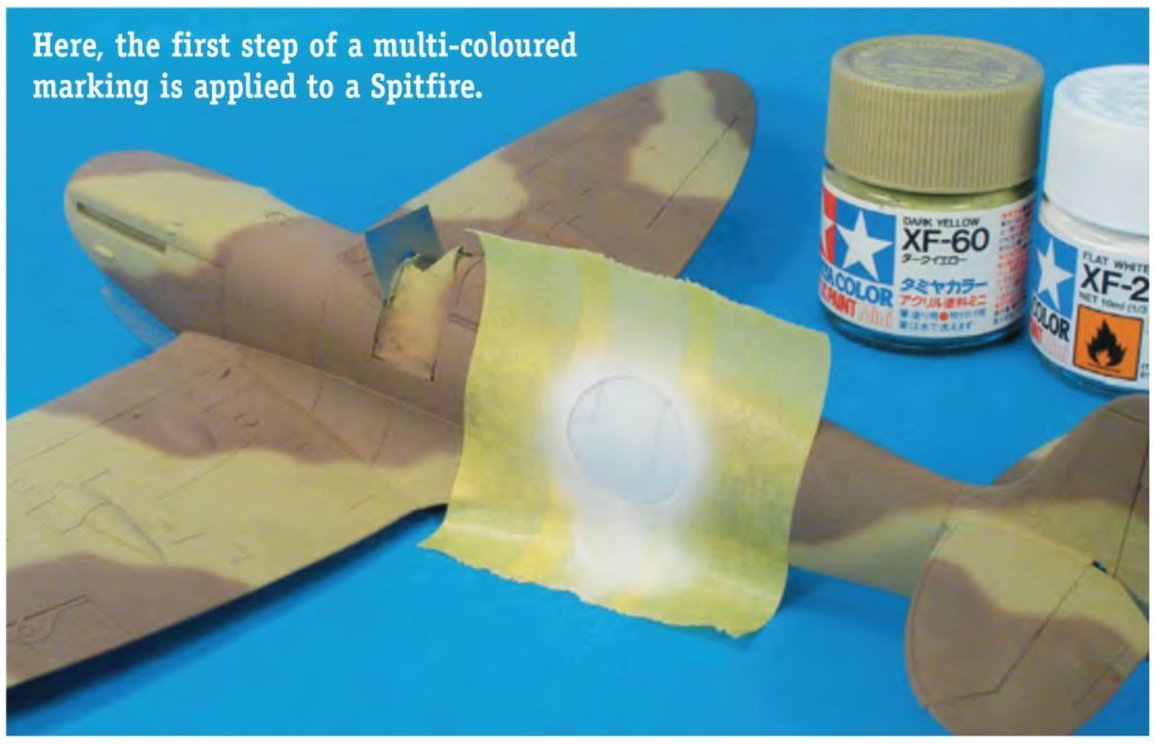

▲ The result is a perfectly shaped star with no visible edges.

Commercial spray templates are a relatively recent alternative for painting markings on models, and are available for simple single-shade markings or more advanced multi-coloured versions. Of course, a spray template can also be created by the modeller at home from masking tape, but commercial products are generally precise and ensure a perfect fit...and save the modeller valuable time. There are also photo-etched (PE) metal templates, which can be used repeatedly after proper cleaning. The difference with using templates instead of decals or dry transfers is the markings are actually painted, so the model wears the same medium all over. This means the markings can be treated just like any other part of the painted surface, not limiting the number of weathering effects which can be carried out on them. **A painted marking also ensures there is no visible seam between the model itself and the marking in question.**

Application

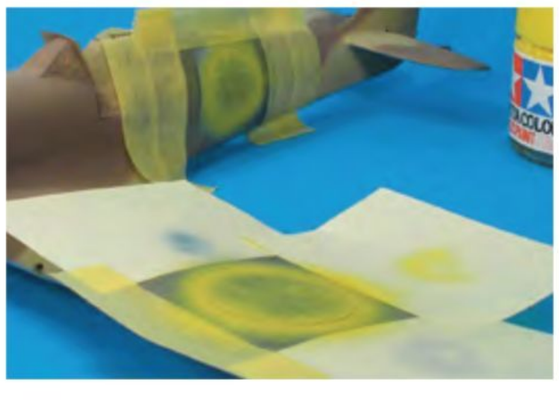
Working with templates requires planning, mainly in terms of deciding which colours to apply first - but one must also consider that there are positive and negative masks. This means that some templates mask an area that needs to be protected, while the surround is painted (negative), and others simply outline an area where the paint is going to be applied.

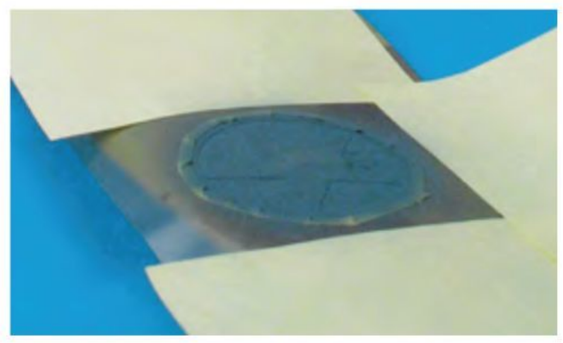
As mentioned previously, light colours can have difficulty in covering dark shades and should therefore be applied first when possible. A single-colour marking is a straightforward operation though. Firstly, the model receives its base coat. Then, a positive mask is applied, for instance the silhouette of a star. The paint the star will carry is then applied in that area. Another way to apply the same marking would be to first paint the area roughly with the star's colour. A protective star-shaped mask is then applied over the painted area, followed by over-spray with the base colour. Multi-coloured markings from templates can be challenging, with the main hurdle being to align the masks correctly. But careful study of the instructions, combined with gentle handling of the masks, will ensure good results. Just as with any masking, it is equally important to apply thin layers when working with templates, to avoid leakage or paint build-up along the mask edges. This is particularly important when working with photo-etched metal masks, because they don't sit as tightly against the surface as tape, resulting in greater risk of leakage. It is also vital to let each colour dry before application of the next, to avoid discolouration or damage to the surface when the mask is removed.


Here, the first step of a multi-coloured marking is applied to a Spitfire.


▲ The white area is masked with the second template...

▼ A third and final colour completes the process, in this case yellow.




▲ ...which is then over-sprayed with blue, in a series of light coats.

▼ The final result is a perfect national insignia in three colours.

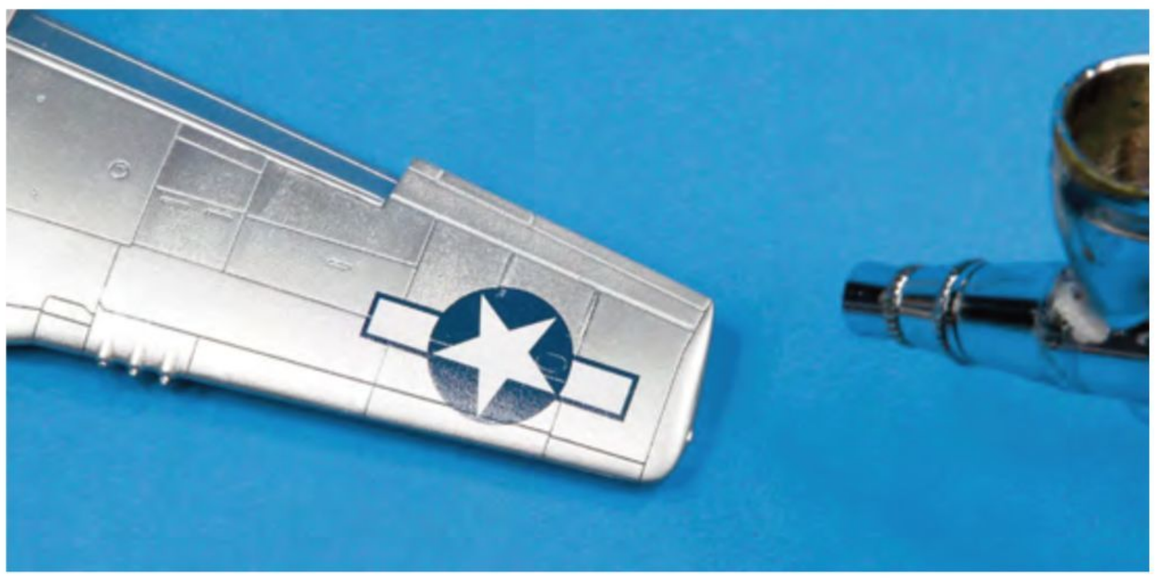




▲ A selection of clear coats: Enamels, acrylics, floor polish and aerosol can... all have their place in modelling.



▲ Thinners that retard the drying time can reduce the risk of frosting effect, which can ruin the final finish.



▲ Decals will also benefit from a layer of clear coat. This will blend them realistically into the model's surface and conceal the decals' edges...and will also protect them.

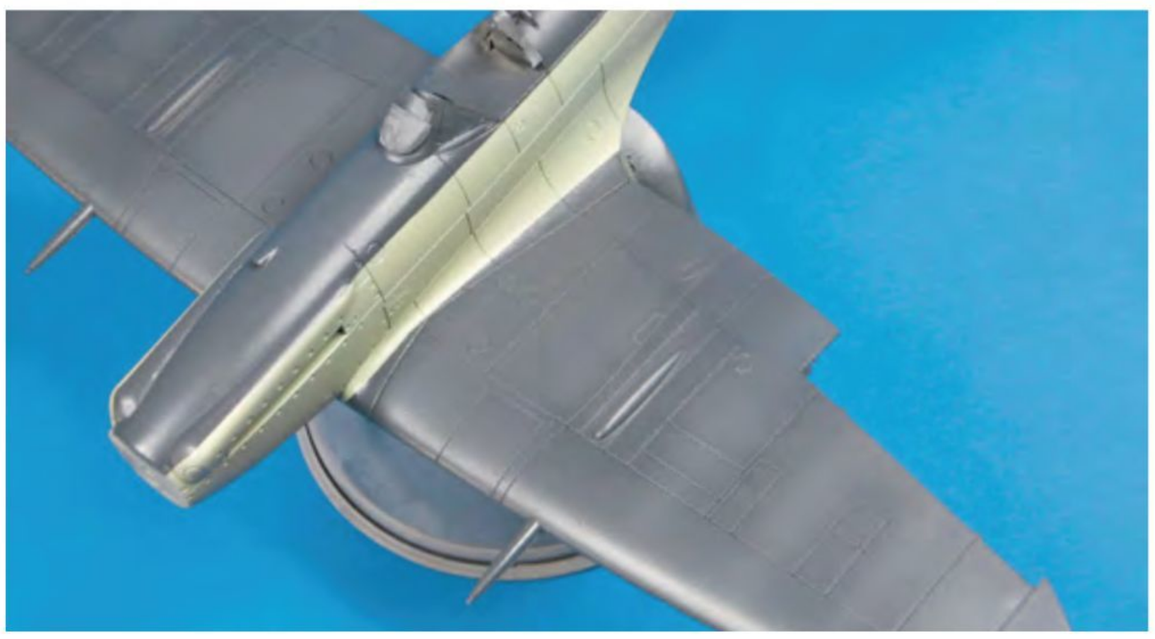
Clear Coat Coaching

The finish of a model's surface is often hotly debated among modellers, and the discussion often surrounds whether a matt or gloss finish is the more realistic. Some prefer, and also claim, that one is better than the other and to some extent it is a matter of preference. While a semi-gloss aircraft may have the correct shine when compared to the original, again the modeller must consider scale effect. And super-glossy models have a tendency to look like toys rather than the real thing. Many believe that only factory-fresh cars should be high gloss. Varnishes have dual purposes, however; the finish being one and the other of a more practical nature, which is to simply protect the model from finishing steps, such as weathering. Decals and transfers are easily damaged by solvents and the clear coat serves as protection for these and the underlying paint. A gloss surface also serves the treatment, as washes perform better and flow more easily on a smooth surface.

There are various types of clear varnish as aforementioned in the paint section. Many modellers fear the clear coating process, as it can sometimes ruin the paint or at least affect it, which is sometimes also the point. However, with careful application, varnishing should be stress-free, and once the modeller has found a formula which works it may be worth sticking to it. Acrylic varnish dries quickly, which to some is a benefit, while others believe they achieve a smoother finish with the longer drying time of enamels.

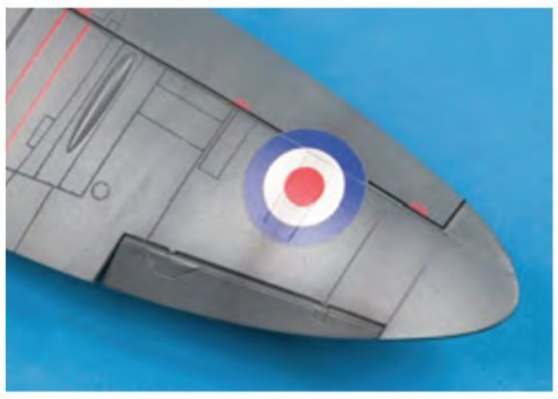
Clear varnish is best applied with an airbrush for a smooth finish, but there are also aerosols which are reliable…although the precision is limited. Regardless of medium it's vital to apply varnish in thin layers to avoid build-up or frosting, which is the modeller's worst nightmare. Frosting can appear when the varnish is applied too heavily and from too great a distance from the model (creating a slightly white surface, hence the name frosting). There are also thinners for acrylics which increase the drying time and thereby minimising the risk of this effect.

▼ A clear gloss coat is of great benefit when applying decals, as they conform much more easily to a smooth surface and this lessens the possibility of 'silvering' of the carrier film.

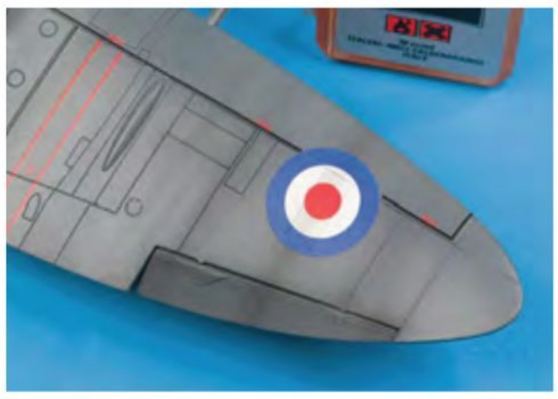


▼ Here the chassis and hull of a tank has been varnished, while the turret still wears just its base coat. Note the difference in shine and colour...gloss surfaces make the paint look darker.





▲ This model has been varnished before and after decals, but its surface is slightly too glossy.



▲ The remedy is a thin layer of matt varnish, in this case enamel. Note the different appearance once applied.

▼ Dry transfers can lift during weathering, but a solid layer of varnish will prevent this happening.



▼ Aerosol clear coats should be applied to the model quickly, to avoid excess and 'runs'.



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▲ Oils and enamels are the most common paint medium for washes and come in a great variety of colours; the finer the grain the better result.



▲ Commercially available pre-mixed washes and filters have become increasingly popular.



▲ Panel line washes and ceramic washes are frequently used by aircraft modellers, due to their easy handling.

Wear and Tear

Although many effects can be achieved with airbrushed shading and highlighting, the model will still look unfinished... at least if a more worn result is the goal.

Objects exposed to nature display great variety in their appearance, and one way to render this kind of surface is to apply washes and filters. These are mixes of highly diluted paint, which are brushed onto the model.

Washes

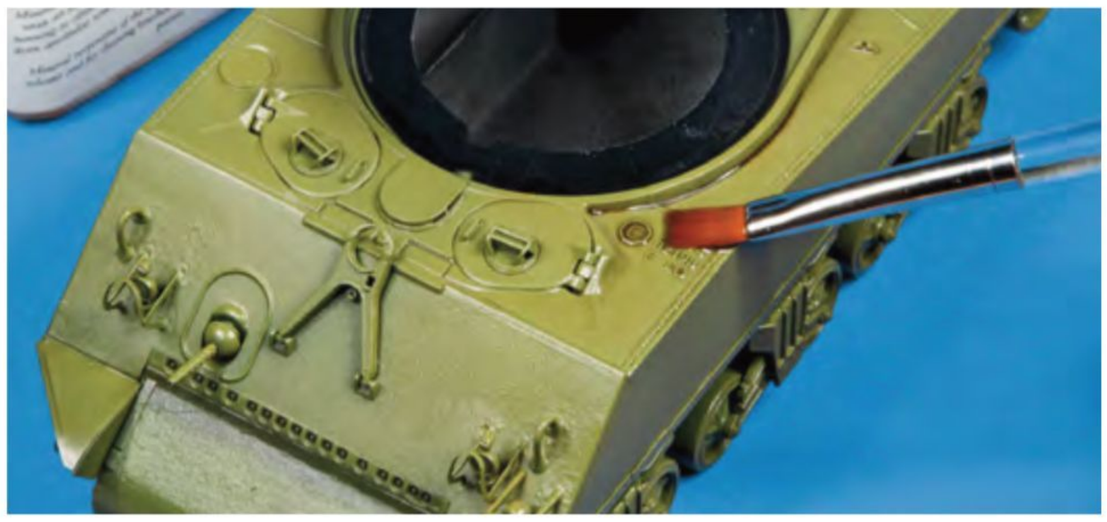
The main purpose of applying a wash is to emphasise an irregular surface on a model, to make it stand out. Most modellers prefer to work with oils or enamels as they offer a long drying time and can easily be wiped away if applied incorrectly. Acrylics, though, 'grab' the surface much more quickly and tend to give a slightly more stark impression, although some modellers can control the use of acrylic washes to perfection.

Washes are available as ready-to-use mixes, which have become increasingly popular in the past five years, with the introduction of new brands such as AMMO of MIG and AK Interactive. The most common practice, however, is to create the mix from oils and enamels, diluted with white spirit or turpentine. A small amount of paint is placed in a cup then mixed with thinner until it resembles dirty water.

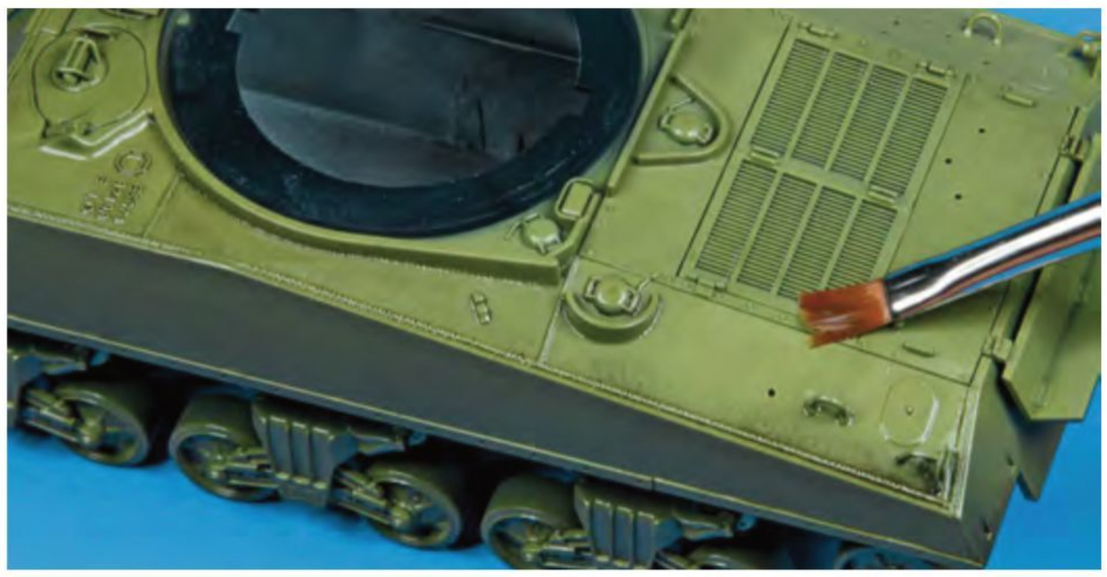
There are also ceramic washes, commonly used by aircraft modellers. This is a mix of extremely fine-grained clay mixed with water. A ceramic



▲ The first step when applying a wash is to dampen the surface with thinner, which will help the flow of the wash.



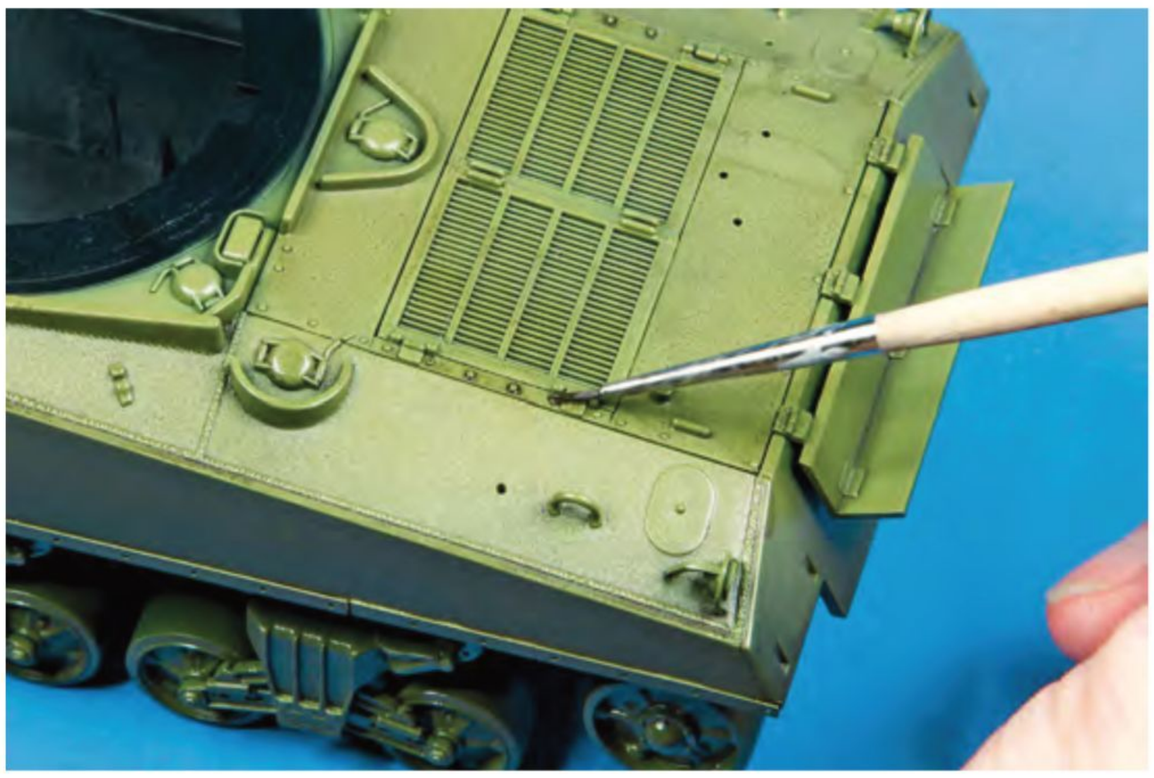
▲ A thin mix is applied as a first layer over the entire model, to break up the surface.



▲ The wash accumulates quickly in corners, to create depth and variety. Note the wash along the weld seam at bottom right.

▼ The left-hand side has received the first wash and immediately looks more interesting than the right.





▲▼ Small surface detail is further enhanced by a pin wash, which is a more concentrated mix. The difference is immediately obvious.



▼ A cotton bud is a perfect tool for removing excess wash, or simply to grind the wash into the surface, to create a filter layer.



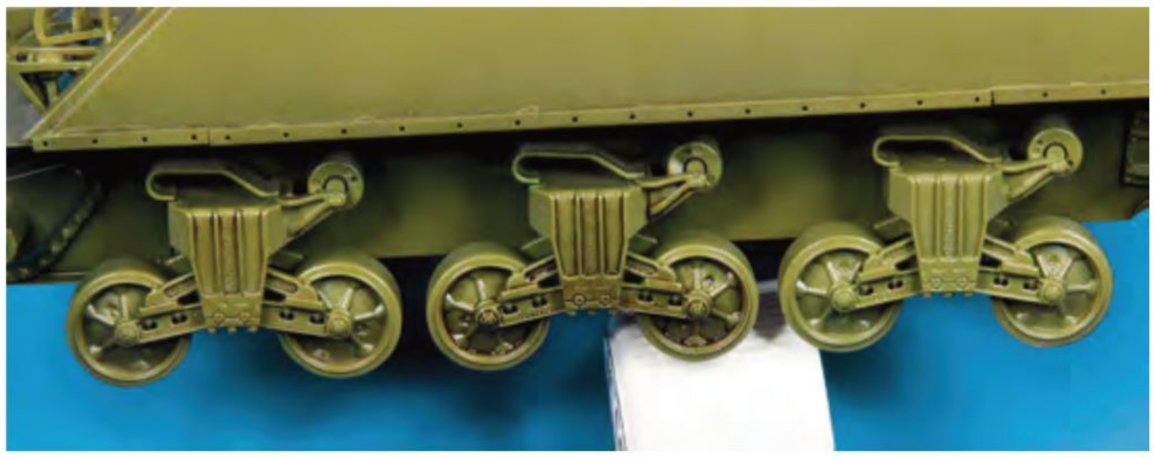
▼ Filters are used to discolour a surface, or to increase variation. Here, ochre has been applied to a hull plate to make it stand out from the rest of the model.





▲ If applied too heavily, the wash can bleed outside the surface detail and may produce unwanted effects. Excess can be removed easily, though, thanks to the relatively long drying time of oils and enamels.

▼ These three-wheel bogies show the difference between a non-washed area (right), a first wash (left) and a heavy pin wash (centre). The effect will be less stark when the wash has dried.





▲ Filters do not necessarily have to be dark. Light washes can bring out surface detail on a dark base paint, to give a dusty appearance.

▼ The same procedure repeated with a warmer umber colour; applying filters such as these can break up an otherwise monotone surface, especially on larger models.



Airfix 1/48 Supermarine Seafire Mk. XVII. (Model by Toni Canfora)

wash is applied lavishly and set to dry for approximately ten to 20 minutes, but can be wiped away easily with a wet cloth long after application, and should be sealed after application.

Before the addition of washes, the model should be given a layer of clear gloss which will help the wash to flow over the surface, as it is supposed to collect around the finer details. This is also further helped if the surface is first brushed with clean thinner.

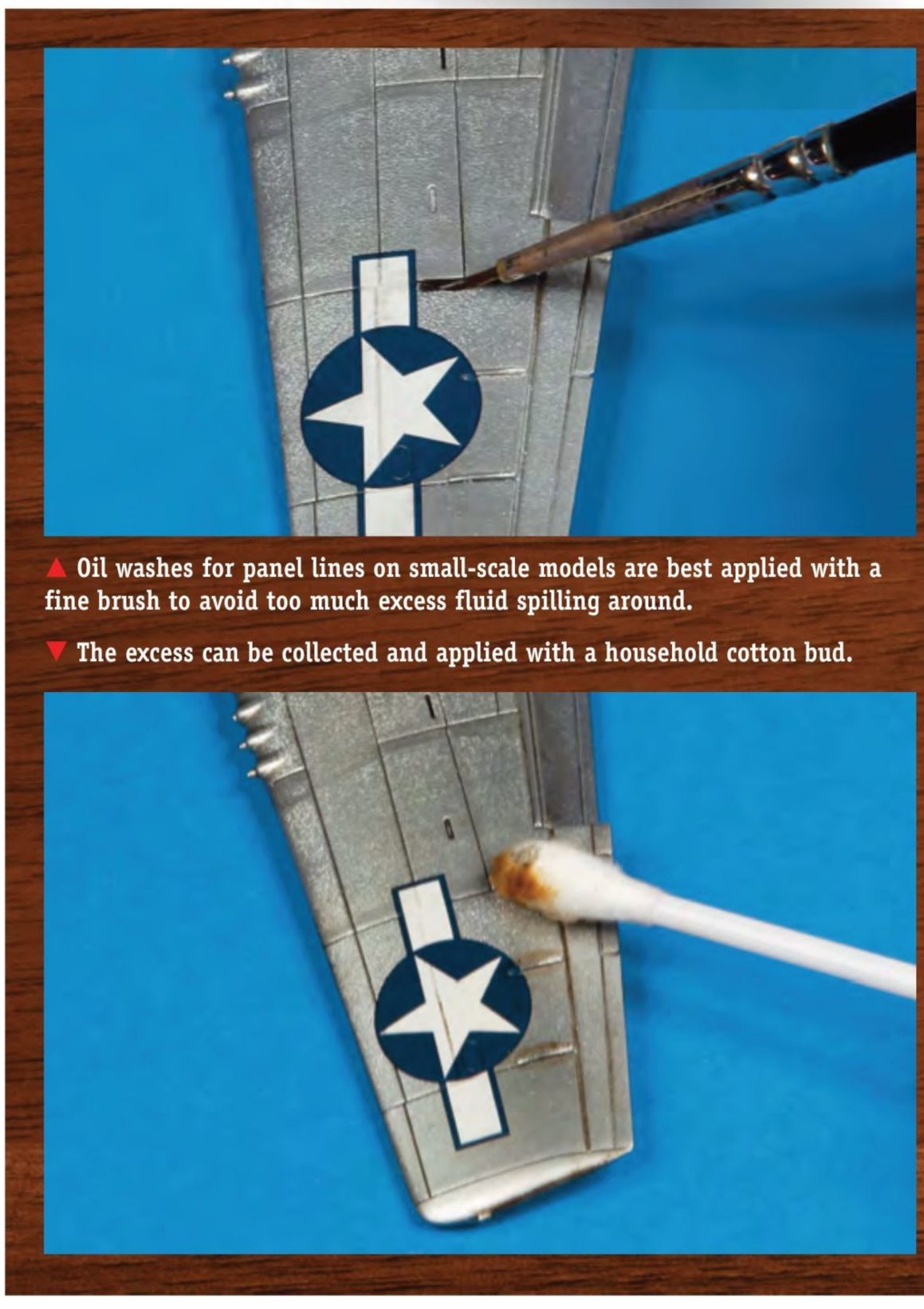
An initial thin wash can be applied to the entire model with a wide brush, to create a general impression of a dirty surface. The excess is brushed away easily or collected with a cloth or cotton buds, leaving the wash in the recesses alone - or it can be left to dry on the model. This depends on if just the shadow effect is desired or if the model should look dirty.

After the first layer, more concentrated washes can be applied subsequently around bolts, rivets, panel lines and the like, all to emphasise them further. Patience is the key here as the wash always looks stronger while it's still wet, so it should be allowed to dry between layers.

Washes are usually black or dark brown, as these colours

▼ Interiors also benefit from accentuating the details with a wash. The side panels on this 1/72 Mustang display more depth, and look worn.





▲ Oil washes for panel lines on small-scale models are best applied with a fine brush to avoid too much excess fluid spilling around.

▼ The excess can be collected and applied with a household cotton bud.

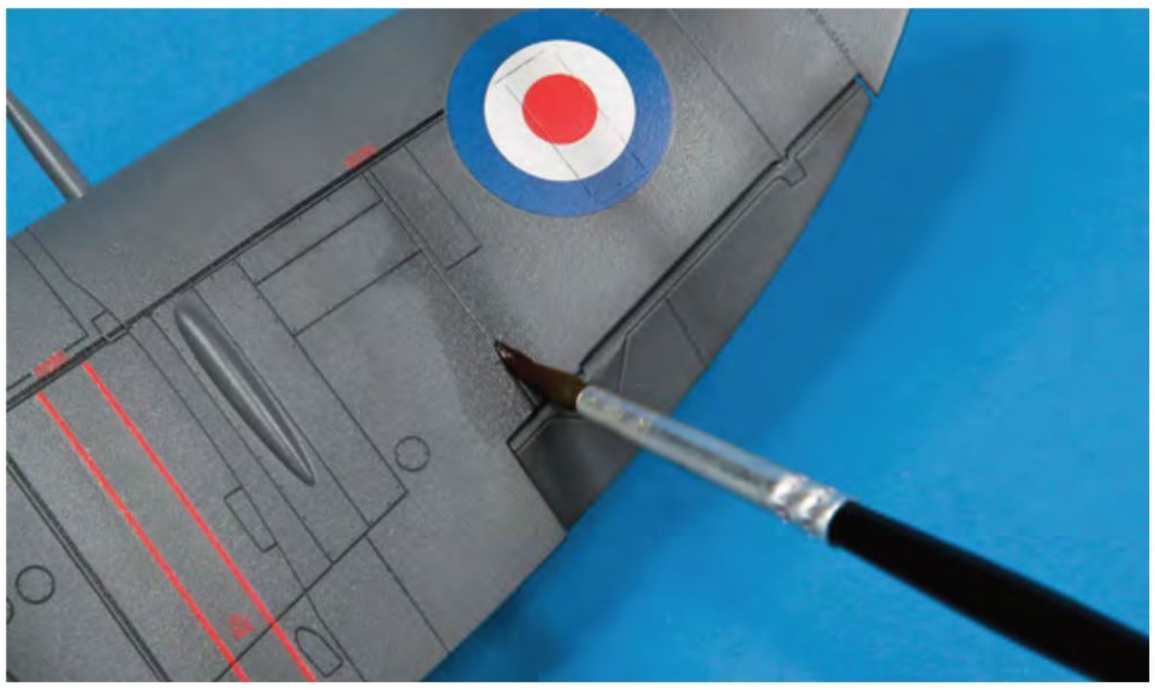


will darken the area around an object or a panel line to represent accumulated dirt. However, washes can also be applied with lighter colours, which can be effective on dark surfaces, Here the modeller must consider what looks realistic though; the most common use of light washes is to simulate dust.

Filters

While washes mainly affect the surface detail, larger, flat areas can look rather monotone without any effects other than regular paint, but various diluted coloured layers, called filters will help create more variety and a worn appearance. When studying war service vehicles and aircraft it quickly becomes clear that they display many variations of their base colours. Areas near the ground will probably have a tint of brown as a result of dirt accumulation. Panels or hatches near the engine will be discoloured from the heat of the engine, to creating other nuances. So, in reality, the object displays many variations of the same colour.

Filters can be as thin as washes, or more concentrated, which will create a greater effect. The key when using filters is to be bold and to use colours which may seem odd at first, for instance, blue on a green surface… but this filter would make the surface look colder while the use of a burnt umber shade would create a warmer impression. Another alternative to filters is to use concentrated oils, applied randomly over the surface. These are then worked into the surface with a damp brush to creating a myriad of minor variations.



▲ **On dark areas it's necessary to use black washes to create enough visible contrast.**

▼ **For light surfaces, though, a less strong wash will do the job. Note the washed panel line in comparison to the one to the left of it, which has just been pre-shaded.**





▲ **Note how the wash accentuates the panel lines on the white area of the decal.**

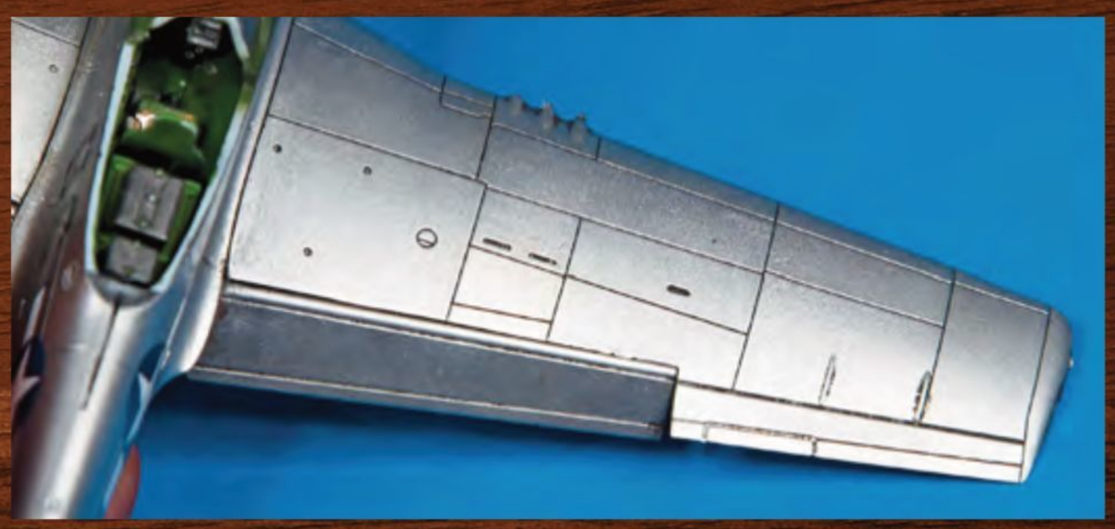
▼ **Ceramic washes require a different approach. They are brushed liberally onto the surface and allowed to dry for approximately 20 minutes.**



▲ **The excess is then wiped off with paper tissue or cloth. The damper the cloth and the harder the pressure, the more wash will be removed.**

▼ **The wash stays in the panel lines to offer a grimy and three-dimensional look.**





Battle Scars



A fine-tipped brush and a piece of fine sponge will help to create delicate paint chips. Whether acrylics or enamels are used, is mainly a matter of the modeller's preference.



▲ The paint chips should be applied on exposed areas such as edges. The aim is to re-create a random and irregular pattern.

▼ Small scratches can also be painted on with a fine brush. This requires some practice and a perfect consistency of paint.



All equipment in service for a long period of time will soon start to show signs of damage and wear. This can be caused in many ways, the most common occurrence for an aircraft or tank would be the crew climbing on it, or from direct contact with the surrounding environment, such as branches or rocks causing scratches to the surface.

Studying vehicles at a construction site is a good source of inspiration and offers close-up study of the effects mentioned already. When re-created convincingly, paint chips and scratches will make a model look much more realistic, and mimic the real subject very well. If it's over-done however, or the chipping is incorrectly positioned, the effects will break, rather than make, the model.

▼ Exposed aluminium is best replicated with metallic colours. In this case silver ink was applied carefully with a fine brush, simulating the wear caused by pilots and groundcrew climbing on the wing root.



▼ Careful chipping around panels and service access hatches creates a detailed and realistic appearance. Throughout this stage, a constant check of references will ensure an authentic 'operational' look.

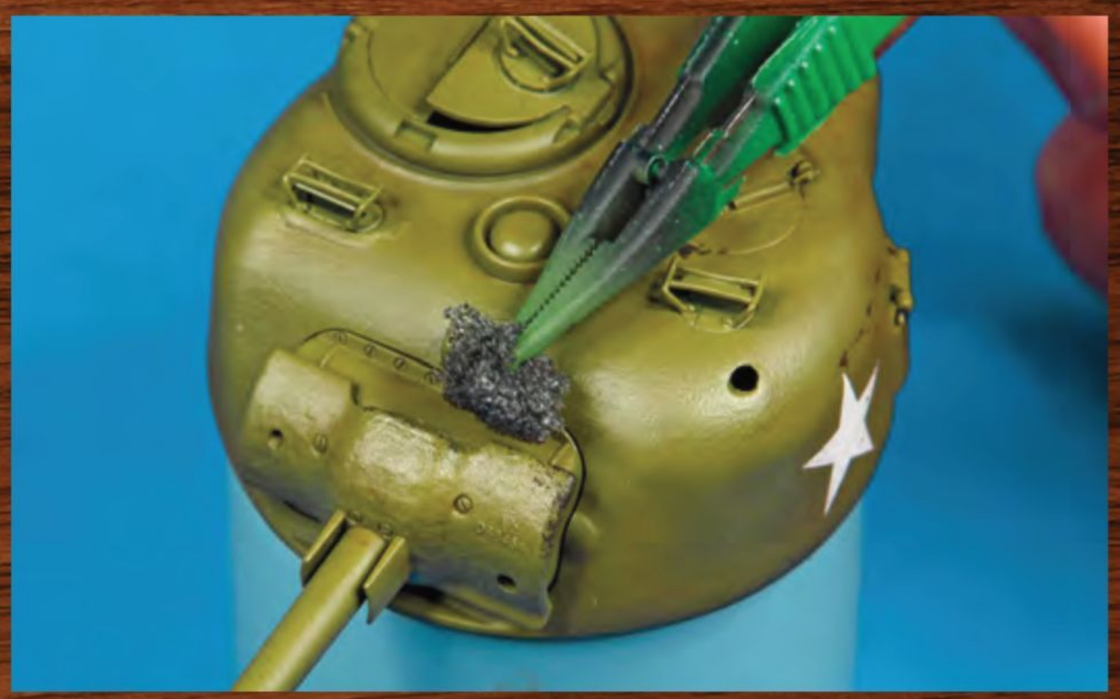




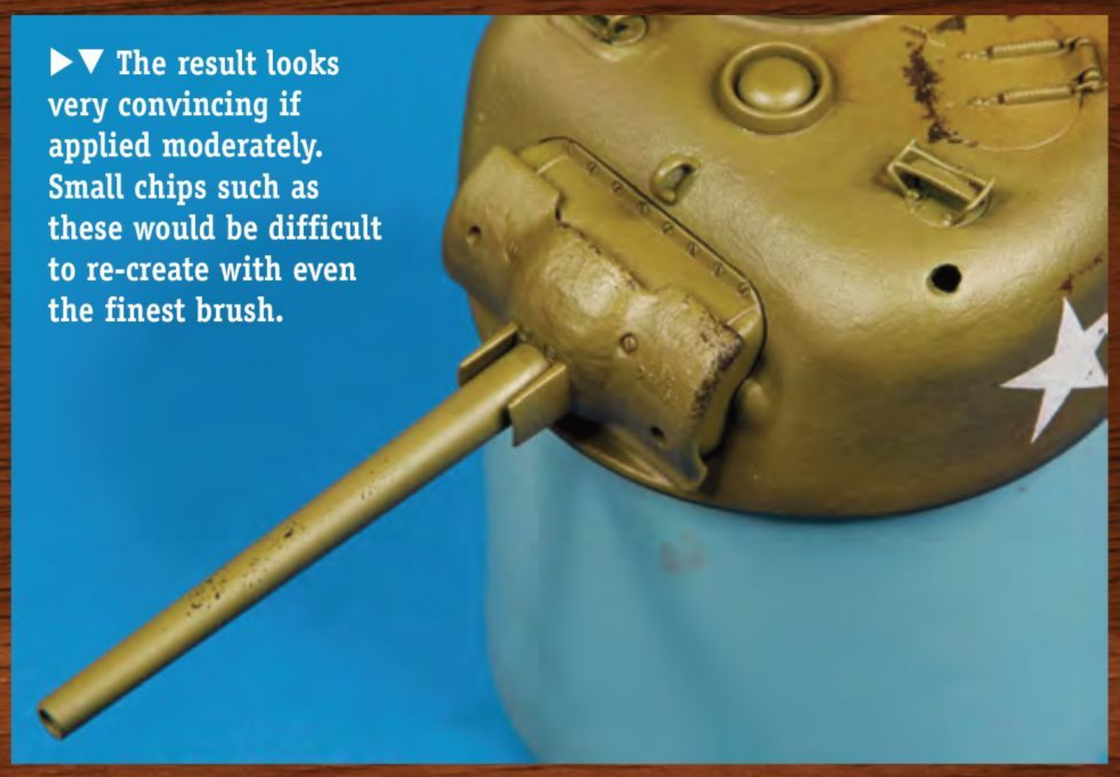
▲ To simulate deep scratches, a highlight can be placed under the scratch itself for even further accuracy and detail.

▼ For super-fine chips it's best to use sponge. This piece was sourced from packing material for electrical equipment and there is no need to buy sponges in art supply stores. A test is first conducted on a piece of paper.





▲ Dab the sponge against the surface, concentrating on edges and corners where it's more likely that wear and tear would occur.



▶▼ The result looks very convincing if applied moderately. Small chips such as these would be difficult to re-create with even the finest brush.

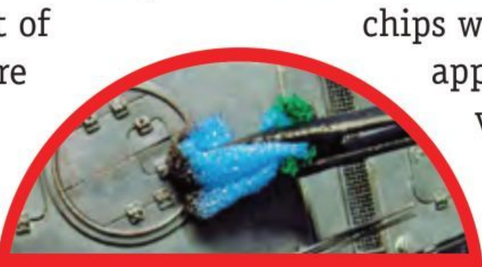
Application

Paint chips are applied usually with a fine-tipped brush, but a very fine sponge can also be useful when creating really small chips, or when working in a small scale. Which paint medium to use is a matter of preference, but acrylics are the most widely employed. The benefit of acrylics is that they are easier to mix to a perfect consistency, which is vital when creating such delicate features as paint chips. Secondly, their short drying time allows the modeller to move quickly to the next step in the weathering process. The down-side of the short drying time is, though, that any mistake will be more difficult to correct when compared to enamel, which can simply be removed with a soft brush dampened with thinner.

A chipping method sometimes used by aircraft modellers is to simply peel off the colour with the tip of a hobby knife blade, to reveal the underlying metal coat. In order to do this the metallic coat should be sealed thoroughly with clear varnish, to avoid removing it with the top layer.

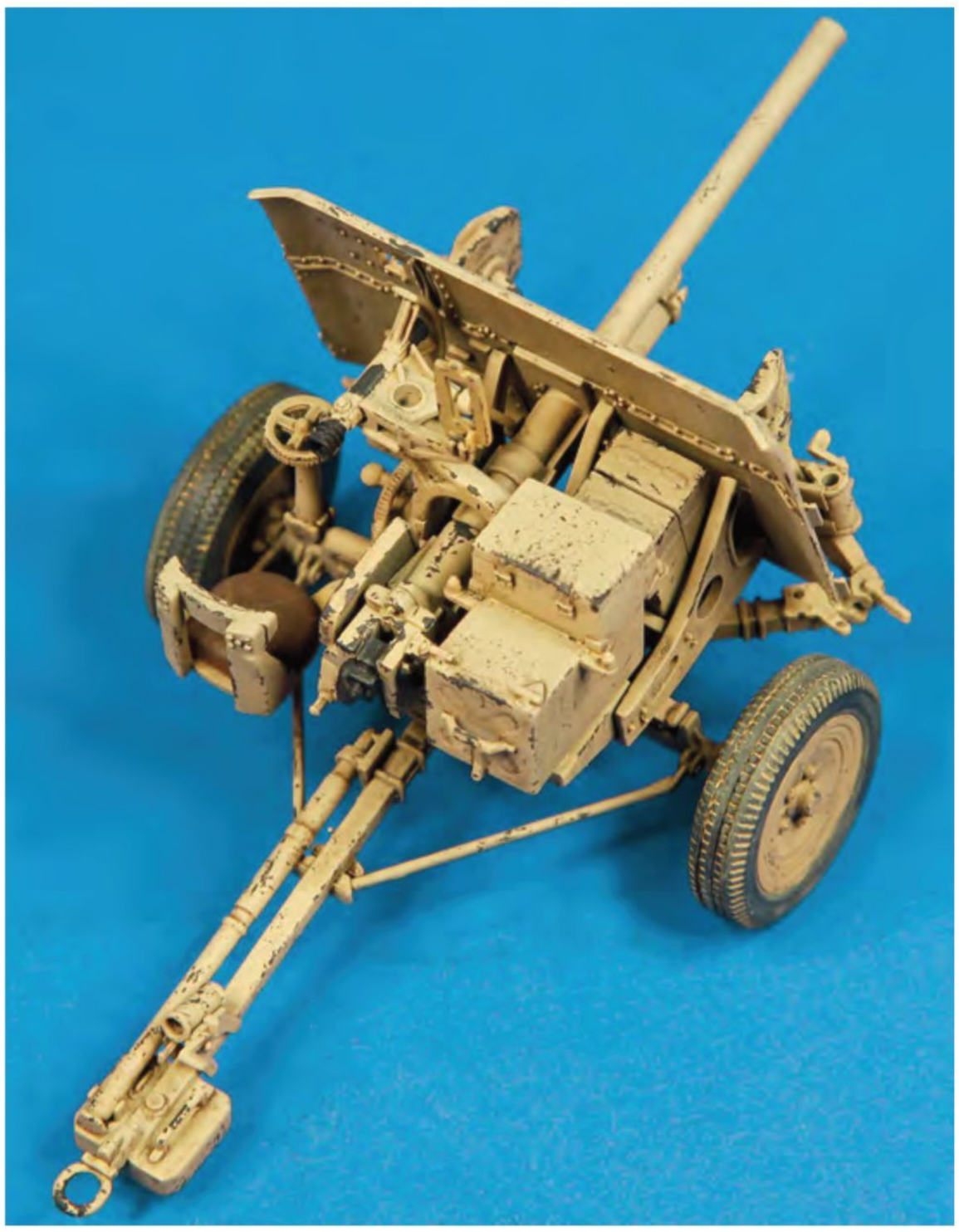
Before application, the modeller should consider where the paint chips would most likely appear on a real vehicle or aircraft. Reference books are of great help here, as well as the work of talented modellers. It should be noted, though, that it's not always what's most realistic that will look best on a model.

Paint gets chipped in exposed areas, such as on edges of hatches, service access panels or where stowage is lifted on and off a vehicle, causing wear to the surface. When re-creating these it must be considered what material the exposed area ▶



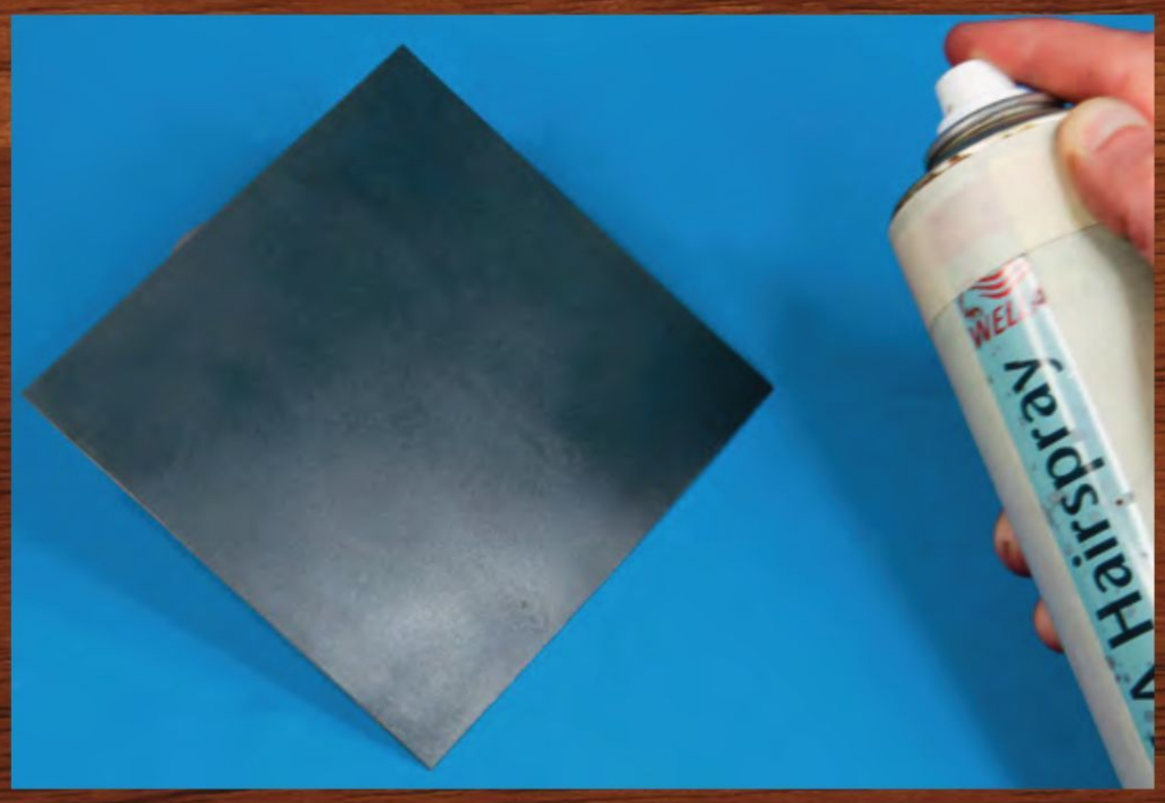
TOP TIP

Use tweezers to hold the sponge when applying paint chips to the model.

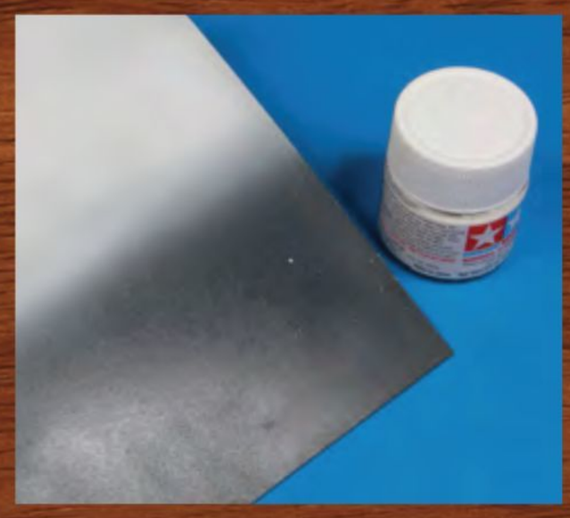




▲ The hairspray technique: Firstly, the surface gets its base coat, in this case grey, which is sealed with one's choice of clear varnish.



▶ Next, hairspray is applied to serve as a barrier for the following layer of paint.



▲ A coat of white to simulate winter camouflage is then airbrushed on top of the hairspray layer.

▼▶ By adding more water and applying more pressure on the brush, larger flakes will come off.

▼ A brush is dipped in water and rubbed gently against the surface. The water will start to dissolve the hairspray and take the paint with it.



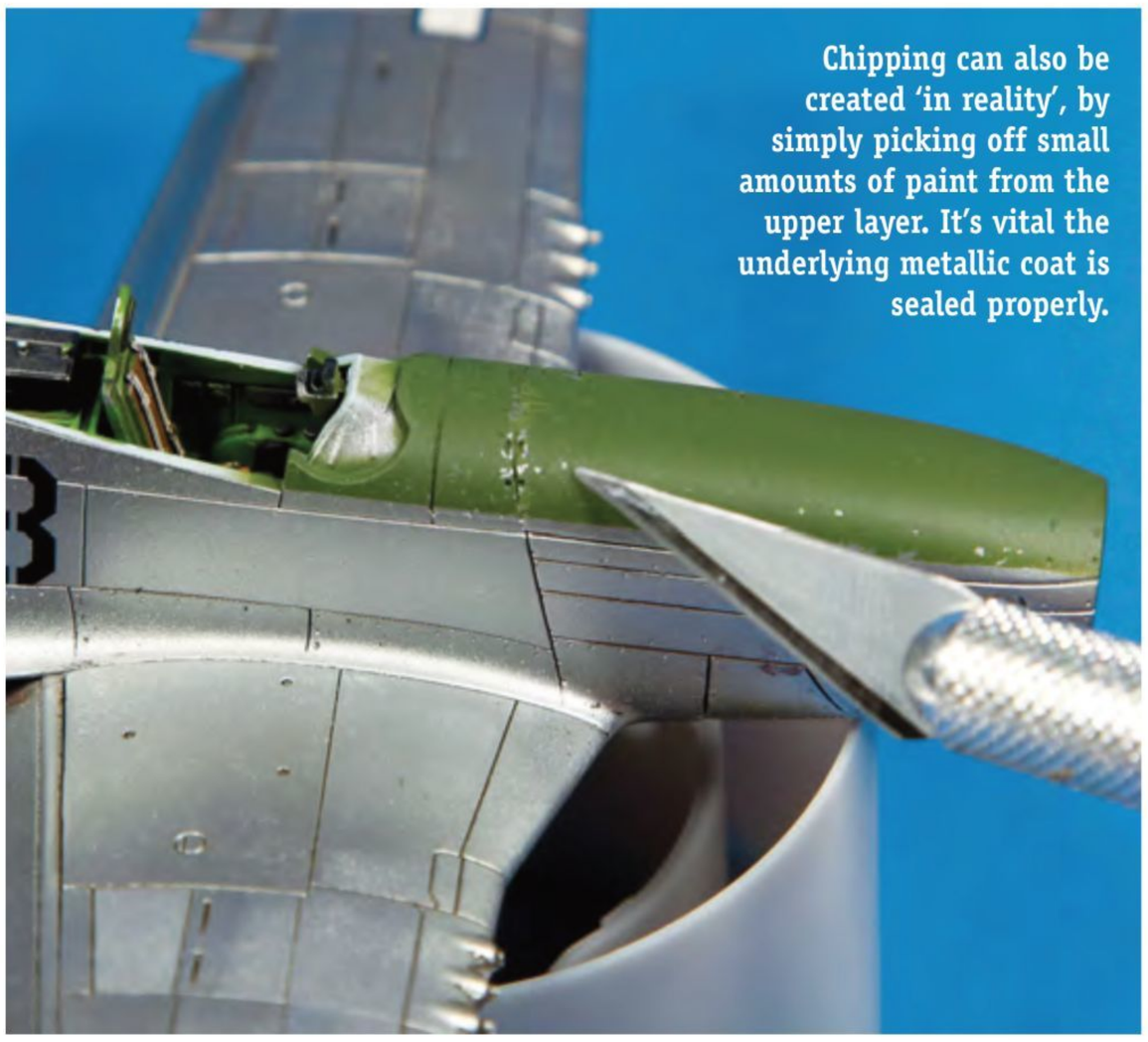
▼ At first just small amounts of paint will come off with use of the brush. Ensure merely a light amount of pressure is applied at this stage.





would show. On an aircraft, the chipping would create exposed metallic areas, looking like silver or grimy metal (or to a lesser effect, some primer). On a tank, the chipping would expose either a corrosion primer or bare metal, depending on how much of the paint has been removed.

When applying paint chips it's vital to work on one section of the model at a time, or it's easy to get carried away and just randomly lace the chips over the model, which will look unrealistic. Modellers should consider what would be likely wear for each section, and start with small chips and stop regularly for a while to observe the model from a distance. What looks good from 8in (20cm) distance will look different from further away. It's also easy to get carried away when applying paint chips, forgetting that even if they are well-applied they can easily be over-done.



Chipping can also be created 'in reality', by simply picking off small amounts of paint from the upper layer. It's vital the underlying metallic coat is sealed properly.

Hairspray technique

An alternative to using a brush or sponge on heavily chipped areas is the now commonly known 'hairspray technique', which was made popular by UK modeller Phil Stutcinkas when he won Best of Show at Euromilitaire a few years ago. This technique is perfect for rust effects or when re-creating worn winter camouflage…or any other much-worn surface.

The technique is rather straightforward. Initially, the base colour is painted, for example German Panzer Grey. This coat is then sealed with clear gloss varnish to protect it. It is followed by a layer of hairspray, applied directly onto the model, which will make it work as a barrier between the base coat and the top coat. Next, a camouflage colour is applied, for instance white, and this is allowed to dry for approximately five to ten minutes. A brush is then soaked with water and rubbed gently against the white top coat. The water will dissolve the hairspray, and the white colour is removed with it. The more water and harder pressure on the surface, the bigger the chips will be. This technique can produce amazing results and works with any colour combination, though two contrasting colours will have the biggest effect.



▼ Results of the hairspray technique displayed on a Russian JSU-152; the realistic effect is striking. Extensive use of washes is also evident around rivets and other surface details. (Model by Andreas Grewin)





▲▼ Here are two examples of perfectly rendered paint chips. Edges and corners have been carefully picked out to simulate wear and tear. (Models by Andreas Grewin)

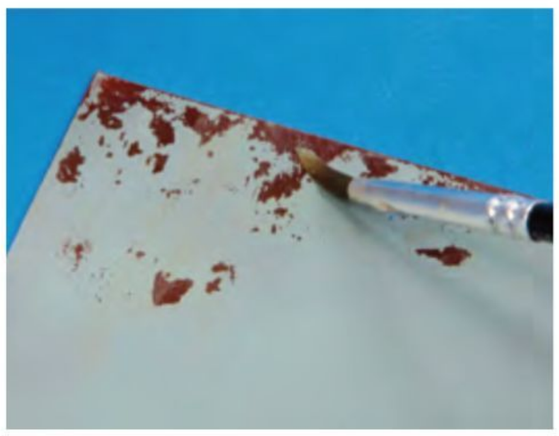




◥ Dragon 1/35 US Army M7 Priest. (Model by Steve Palffy)



▲ The hairspray technique is useful for heavy rusting. Here, rust red has been applied, then hairspray.



▲ After a top coat of blue, the chipping begins. A wet brush is used to scrape the paint carefully.



▲ Pastels and pigments are splendid options for simulating surface dust. Vallejo offers a great range of shades.



▼ The finished result convincingly represents a heavily-rusted piece of metal...great for vehicle finishing!



Convincing Corrosion

Rust can be divided into two categories... surface corrosion and deep oxidisation.

The first can be seen on rather new vehicles and other objects, because it occurs quickly when a piece of the paint has been chipped. The second type forms over a longer time period, but can be found on any old metallic object that has been exposed to nature's elements.

Re-creating rusty surfaces in modelling is not a very complicated process and there is no need for a large selection of special tools or colours. Some basic shades, be they enamels or acrylics, when combined with oils will go a long way. Dry pastel chalk or pigment powder is also a great addition. Rust has a colour scale from red-brown to yellow, so brown, red and yellow materials should be at hand. Some manufacturers offer special purpose 'rust kits' which contain all the modeller needs, if painting in a certain method recommended by that particular brand.

Surface rust

Rust is likely to appear where paint has come off the surface, creating a small chip. These areas can be highlighted in rust colours, with a fine-tipped brush or a sponge. Streaking caused by

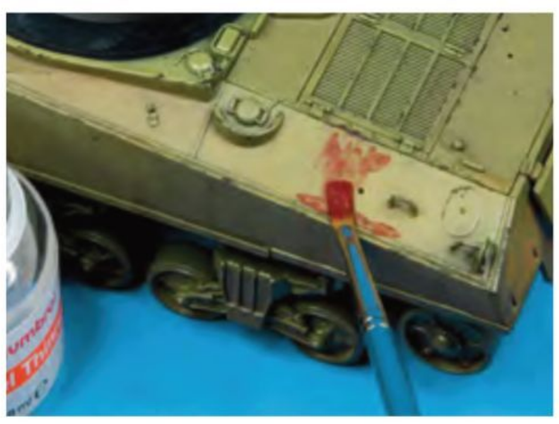




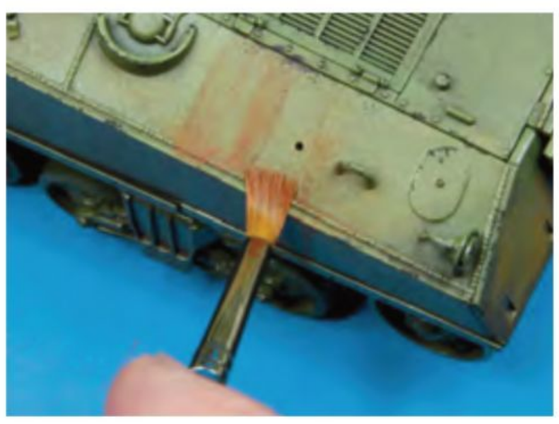
▼ For heavier rust streaks less thinner, but more oil paint, should be added.



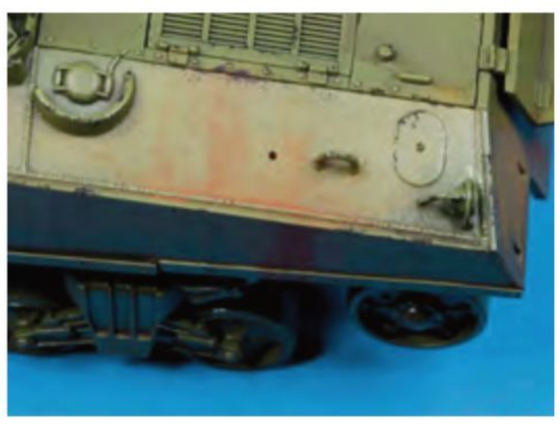
▼ Mixed with thinner, the powder is then brushed on the model like a wash.



▼ The mix is brushed downwards to create accumulation at the edge of the armour plate.



▼ The finished result, which displays a dust-like red surface...it adds pleasing contrast and realism.





▲ To simulate heavy corrosion on plastic, a motor tool is used to thin the plastic from the inside.



▲ When the plastic is almost worn through, a hobby knife is used to pick small holes in the surface.

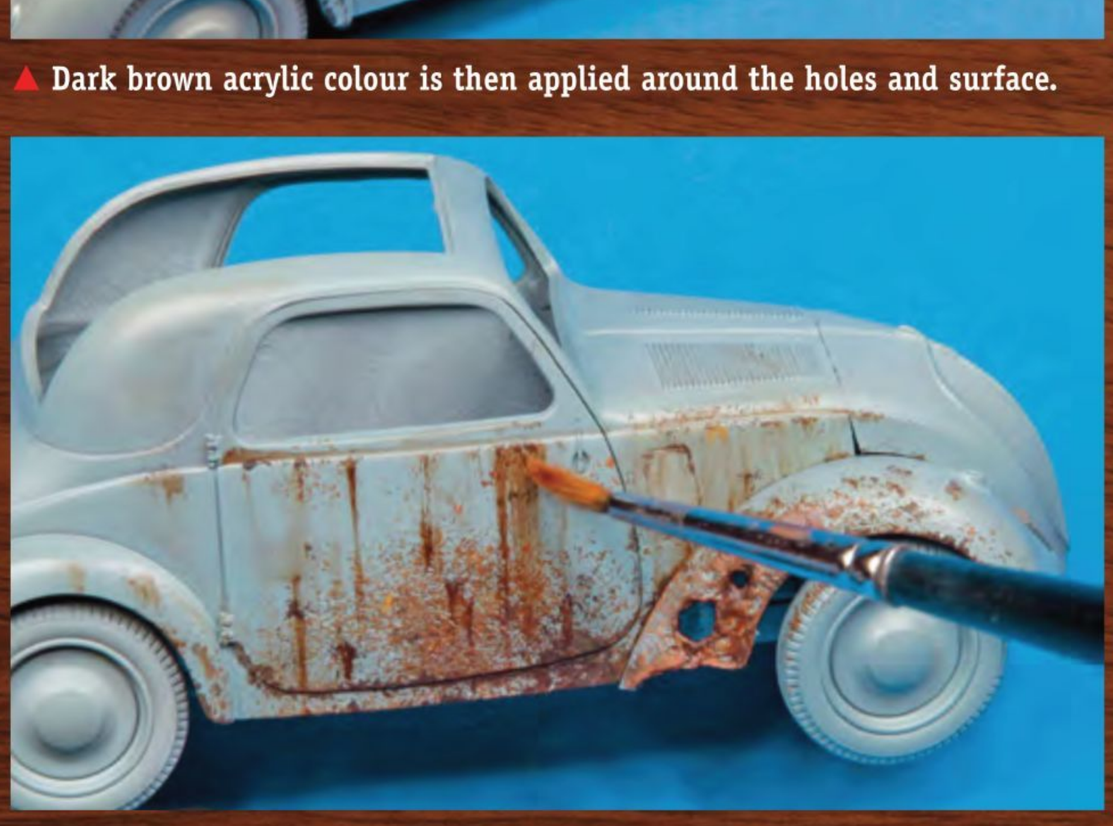


▲▶ Liquid cement melts the surface, which then allows it to be textured with a stiff brush.





▲ Dark brown acrylic colour is then applied around the holes and surface.



▲ Next, the red-brown oils come into action...this time in a heavy application.



▲ The model now displays a heavily corroded wheel arch, and is then to be painted in its blue base coat.



▲ This is followed by several rusty red nuances, applied with a sponge.



▲ The finished result is a much-corroded car with rust holes and streaks.

rust is best replicated with burnt sienna oil paint. Initially, a small portion of oil colour is placed in the chipped area. A brush is then moistened slightly with thinner and used to streak the oil in a vertical direction. This can be repeated until the desired result is achieved, by using more oils for a greater effect, and more thinner to tone it down.

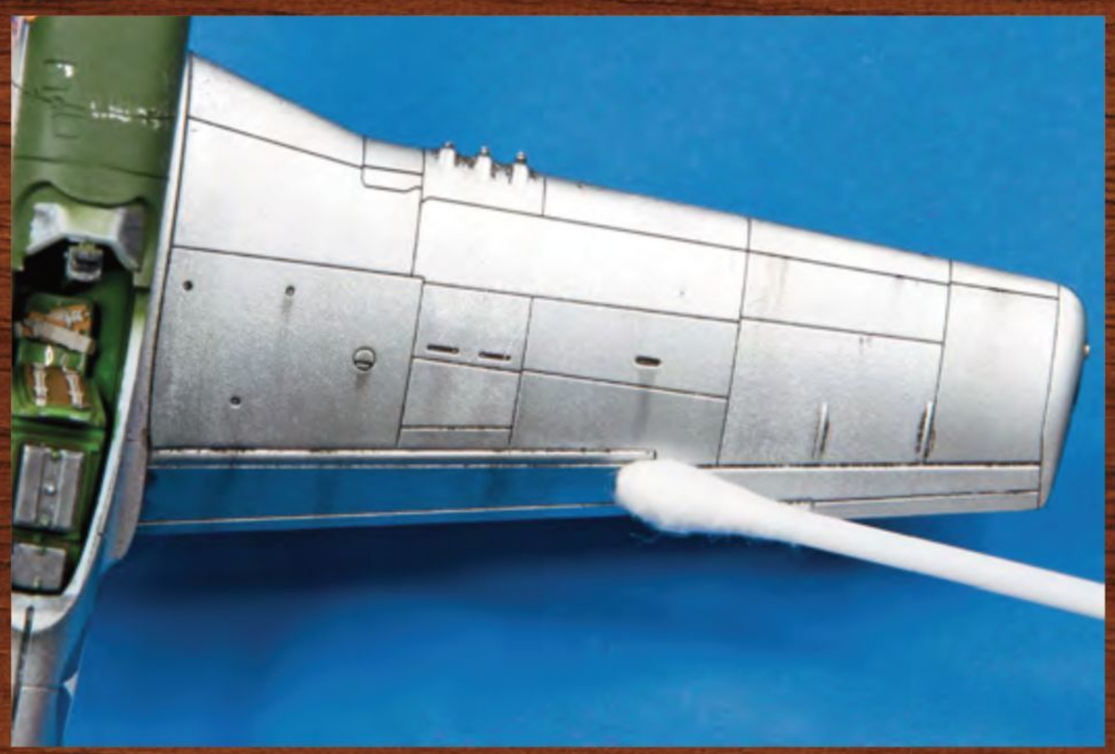
The hairspray technique described on pages 80-81 can also be used to replicate areas where thick chips have been removed, and the uncovered surface has begun to corrode. Large flat areas that become rusty can display a surface which looks like red dust. This can be imitated by applying ground pastel chalk or pigment powder, either by brushing it on dry, or first mixing it with thinner.

Deep corrosion

The corrosion process will, over time, eat through metal and cause holes to appear. This can be a very cool effect on a model and is fairly easy to mimic. The plastic is first thinned from the inside, preferably with a motor tool. When the tool is almost through the plastic, the tip of a hobby knife is employed to pic small holes in it. The area surrounding the holes is then brushed with liquid glue and left to melt the plastic for a few minutes. A stiff brush is then stabbed onto the surface, creating an uneven finish resembling surface rust where the corrosion is still working on the metal. The area can now be painted in the desired rust colours after the model has received its base colour.



▲ Black oil paint is applied with a very fine brush to the upper wing panel lines of this 1/72 Airfix Mustang.



▲ Cotton buds are used to form streaks. Thanks to the long drying time, this can be reversed if too stark, or repeated if a stronger result is desired.

Nature and Pressure

Previous sections in this book have described how to break up the monotone surface of a model by using highlights and shadows, as well as washes and filters, to ensure interest and realism.

Although these effects increase the three-dimensional look of the subject, there are still other ways to impart the rigours of real life, and this is through streaks and rain marks caused by oil, exhausts and dirt to mention a few examples.

Rain marks are simply a streaky pattern created when a dirty surface gets wet, and the water takes the dirt with



◀ Various oil colours are used to simulate streaks. Odd shades can be very effective if subtly used...only a hint of them should be traceable.

▼ Dots of oil colours are placed randomly over the surface, with a fine brush or a cocktail stick.



▼ The effect is very clear in this photo, immediately giving the model a more worn, but certainly interesting finish.



▲ A damp brush creates the streaks. This operation is repeated until the desired amount of the oil is visible on the model.

▼ Light colours can be used to simulate dust streaks, and they form a welcome contrast to the original olive drab background.







▲ These oil streaks were also rendered with black oil paint. Some areas have already received a thin application, blended with a cotton bud.



▲ Exhaust streaks can be created with an airbrush. Here it's vital to use a thin mix and low pressure, not to mention a steady hand!

it along the surface, creating effects mainly on vertical or angled surfaces. A quick look at any regular civilian car on a rainy day will reveal this effect, and the more dirty the surface, the stronger the effect. Streaks are usually created by oil or fuel spills and are usually found on military aircraft or vehicles, even after a short period of service. They are powerful machines, driven hard, which results in extreme pressure...leakage would be inevitable. For the modeller, these effects are a gold mine, as they present the opportunity to really take the model one step further in terms of reality, and the effects are great fun. Although streaks and rain marks are re-created in a similar way there are a few things which are conducted differently.

Rain marks

Just as with washes and filters, enamels and oils give the modeller an opportunity to work with the colours for quite a while before they dry. This is what makes them suitable for creating streaks, and instead of the rain on a real object, a soft brush and some thinner will create the streaky pattern. First, a number of oil colours are selected. It should be one or two earth tones as well as contrasting colours such as blue, black or white. The latter are not used to create stark rain marks in that particular colour, but rather to add a hint of barely-visible variety to the surface. To minimise the shiny appearance of the oils, a small portion is placed on a piece of cardboard ▶

◥ **Airfix 1/72 Douglas A-4 Skyhawk. (Model by Toni Canfora)**

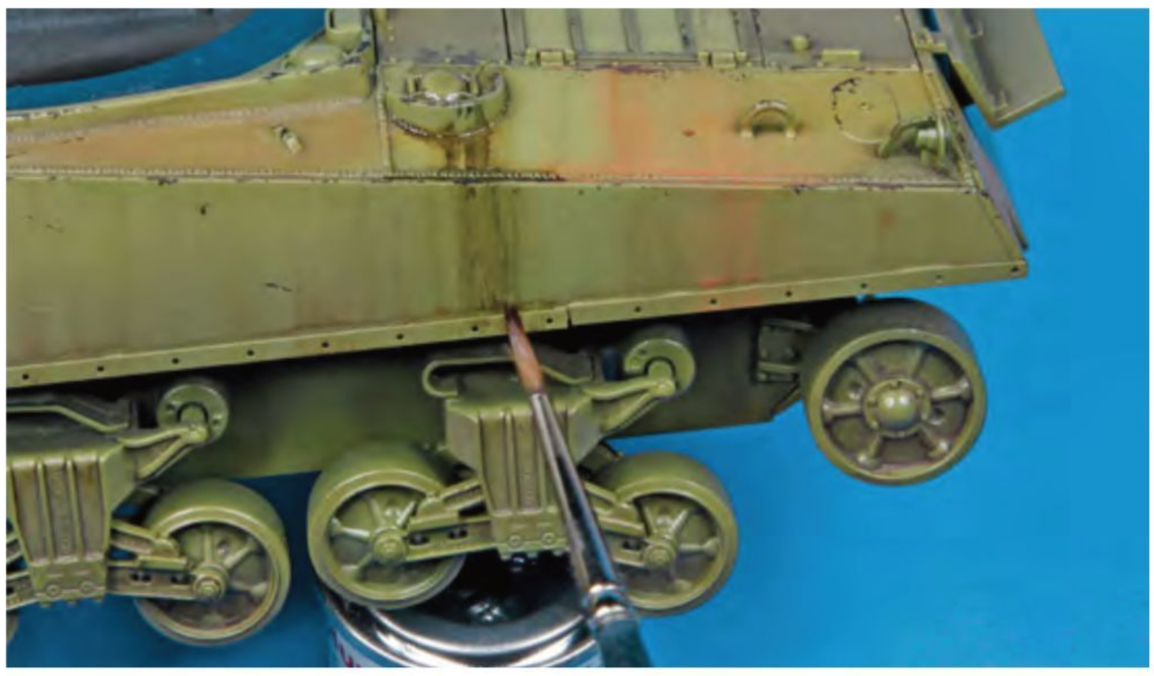
05 STREAKS & RAIN MARKS

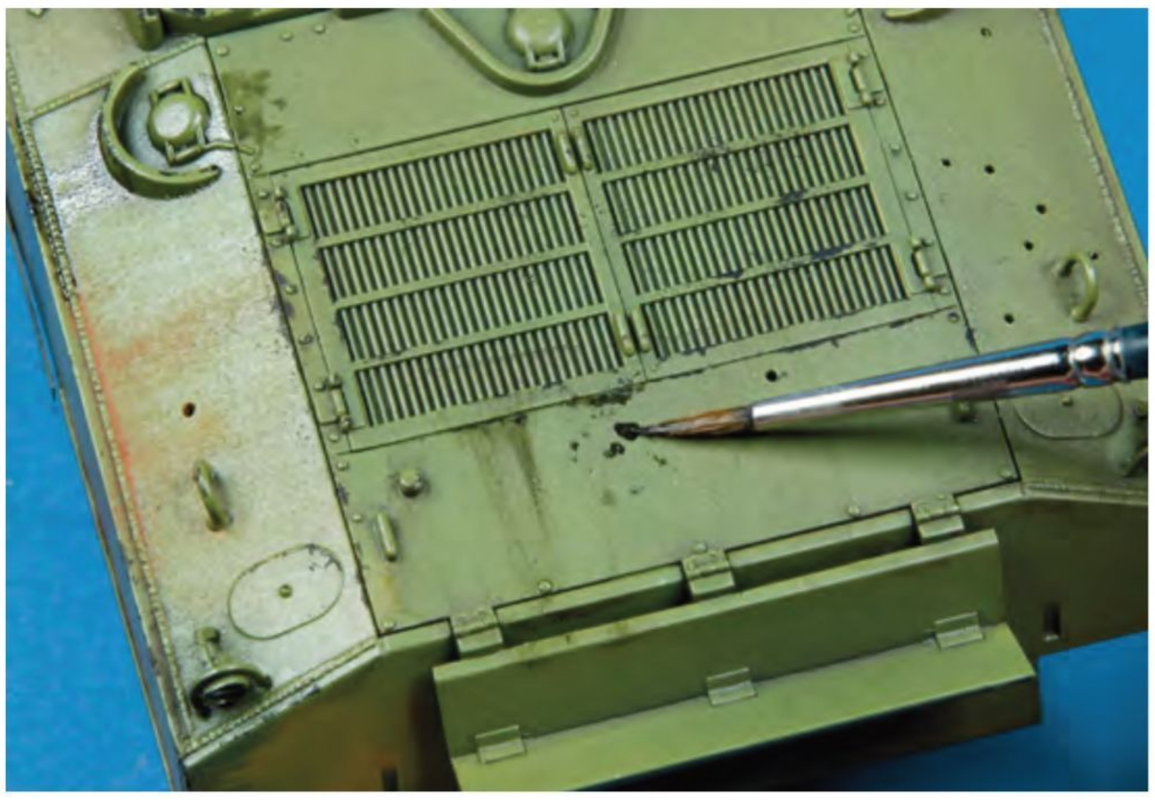


◀ A mix of black oil colour and clear gloss makes a convincing simulation of real oil or fuel.

▶ By adding more clear gloss varnish, the look of a fuel spill is simulated realistically.

◢ Fuel spills and dots of oil are re-created with the same mix. Note the prominent spillage around the fuel cap.







or thick paper and left to dry for a few hours, to make them slightly less oily. Small dots of the oils are then placed randomly over the surface with a fine brush or a cocktail stick. A wide, soft brush is then moistened sparingly with thinner, before being moved vertically over the surface to streak the oil dots. At first the oils will still look very prominent but when the process is repeated, less and less will be left until very subtle streaks are all that remain. For a dustier look, the employment of earth colours can be increased and use of the other shades lessened.

Streaks

Streaks can be described as a more concentrated form of rain mark, being more prominent as they often consist of oil and fuel, rather than dirt from the environment. Streaks are re-created in a similar way to rain marks but with a stronger effect, since oil streaks are mostly black and slightly shiny. Again, oil colours are the main medium, although enamels are also used as an alternative, as well as artists' pencils.

For the most common streaks such as oil leakage, oil paint is an obvious choice. A small streak is applied carefully with a very fine brush, in the direction the leakage would have run. If the impression is too strong the colour can be wiped off with a clean brush or a cloth.

Fuel stains are also a useful effect on a model, and when studying wartime photos one can wonder if any of the fuel actually got into the fuel tank at all! It was common that a large portion of the side of a vehicle was soaked in fuel, to produce a dark and shiny, but semi-transparent look. To re-create this, black oil or enamel mixed with clear gloss can be applied with a fine brush. This is repeated until a varied layer is achieved, with some areas being semi-transparent, and others almost all black. The shine of the mix can be a pleasing contrast on an otherwise matt model. There are a number of commercial products for streaks and rain marks, mainly enamel or oil-based. This is an easy solution and perfect for new modellers who perhaps lack the knowledge of mixing their own colours, or for anyone who just wants to save some time and dislikes the sometimes messy nature of home-made mixes.

▼ Fuel spills and dust streaks are represented perfectly on this excellent Pacific theatre Sherman. (Model by Andreas Grewin)



▼ This overall shot of the same Sherman displays extensive use of streaks and rain marks. Note the great variety of colours along the side of the hull.





▲ As with many other techniques, oils and enamels are great mediums for simulating dust.



▲ The mix is flicked onto the surface to form an irregular pattern, just as dust would do on a real vehicle.



▼ The same mix can also be splattered onto the model's surface to mimic stains, in a flicking motion with the brush bristles.



▲▼ A heavy wash is applied around the edges of the surface detail, using two or three differing earth tones for variety.



The Earth's Crust

The final step in weathering a model is to add the effects which set it in a context, confirming the environment in which the real thing operated

This can lift a model to new levels and really make it a perfect replica of the real thing. It may sound ambitious to state that there are different kinds of mud or dirt, but a closer look at vehicles from different parts of the world would confirm this, and one of the most intriguing challenges for the modeller is to catch that specific appearance. For instance, a model depicting a vehicle from the desert will have a heavy dust coat, while another operating in parts of Africa or Asia would typically sport a red-toned patina. And mud probably will not look the same in Northern Europe as it does in the Pacific, due to the different earth tones.

Dust

There are a number of ways to simulate dust on a model. The simplest is to just add diluted paint in the desired colour. Just as with washes, oils and enamels are easy to work with in this case and they would be applied just like a wash, but with earth tones instead of dark colours. The wash should also be slightly more concentrated and applied anywhere on the model where the dust would collect, such as around hatches, on the engine deck and along the side of the hull, but generally the wash can be applied over the entire model. It can then be wiped away with a clean brush, leaving it sitting in just selected spots. The washes should be applied in several layers to build the effect gradually.

For an overall dust layer, and to blend washes into the model, an airbrush is a good choice. A very thin mix is simply sprayed over the model, or in selected areas such as the lower part of the hull or chassis. It's important to do this with care, though, as a layer of dust can easily 'kill' the model and make it look flat. A pleasing effect when using an airbrush is to mask the area for window wipers when the dust is applied, to leaving a realistic look of the wipers having cleaned off the dust.

Mud

For a heavier dust or muddy look, the wash mix can be more concentrated and a small amount of plaster (or even real sand) can be added to ensure texture. To simulate mud the mix is then applied in a stabbing motion so that it forms small peaks, just as mud structure looks in real life. If adding

▼ To add texture, plaster can be mixed with pigments, enamels and thinners.







▲▼ The effect looks very convincing and is a realistic addition to the model. The same procedure was repeated for the front window.

▲ This technique works equally well on civilian subjects, such as this Airfix Mini Cooper.

▼ A layer of dust can be replicated easily with an airbrush, via a very thin mix. Here a piece of paper in the shape of a wiper track is being held in front of the window.





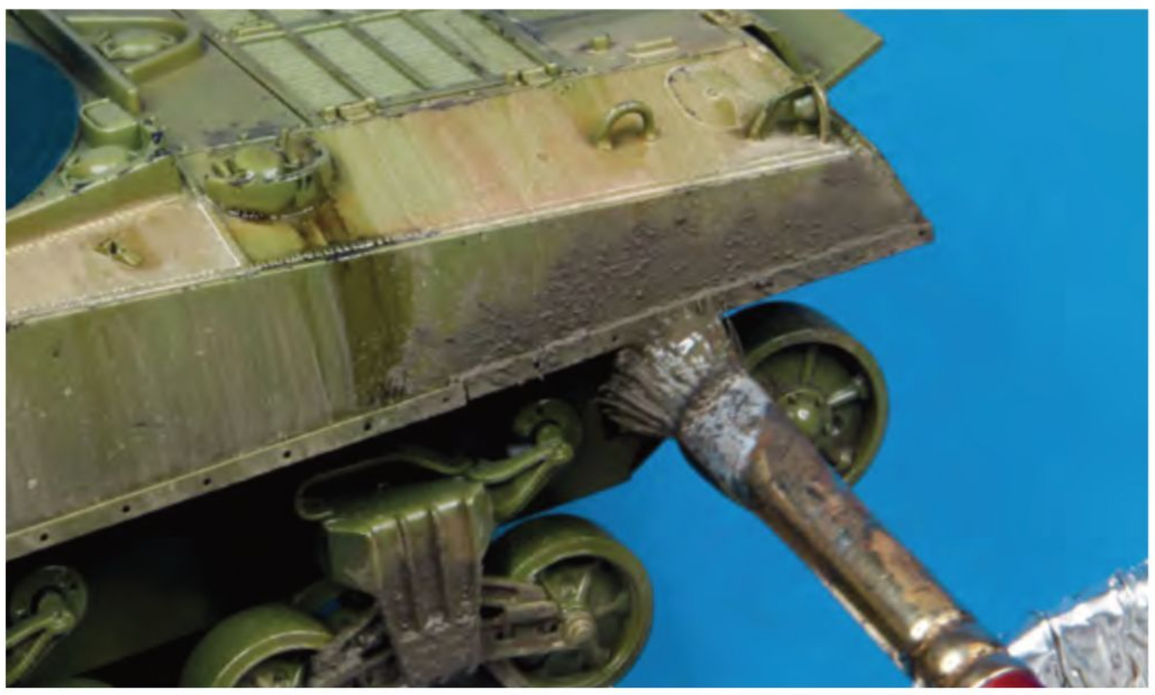
plaster it's necessary to introduce a darker colour as the plaster is white and will make the mix lighter. Alternatively it can be painted with darker colours once dry on the model. For a wet mud effect, clear gloss varnish can also be added, and applied gradually from the bottom and upward, as mud tends to dry in the opposite direction due to gravity.

Mud mixes can sometimes be tricky to apply on a fully-assembled model, especially if it has complicated running gear. Therefore it can sometimes be a good idea to leave parts of said equipment off the model until the mud has been applied, to ensure the mix reaches corners and other hard-to-reach areas.

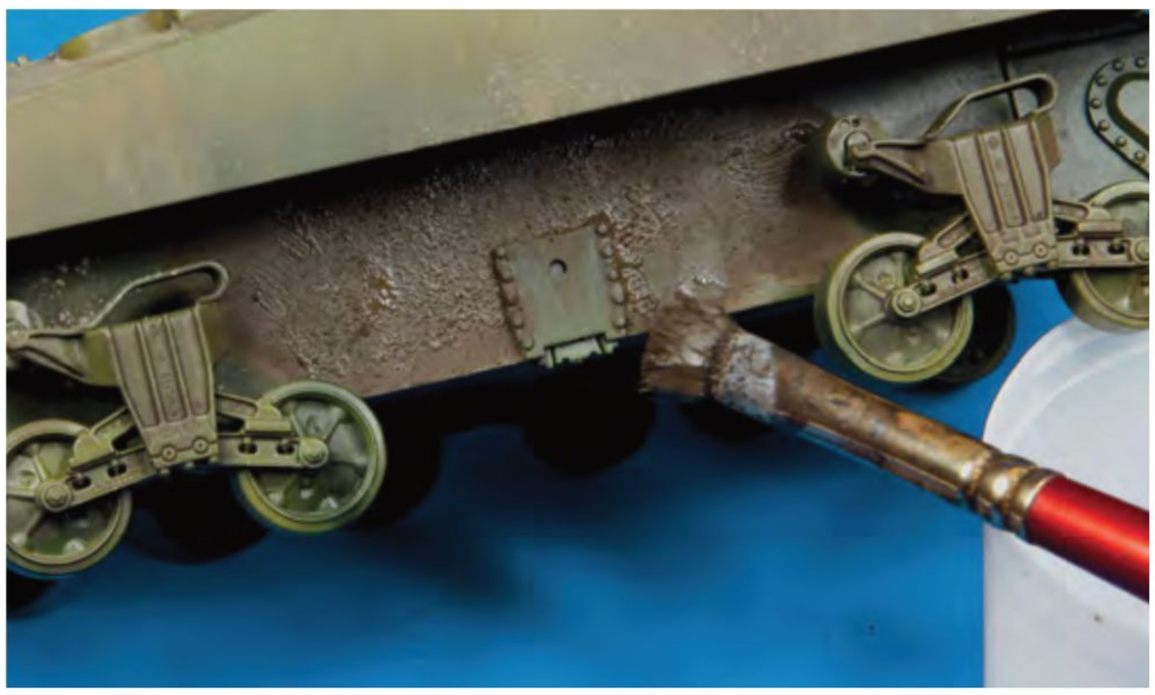
Pastel chalks or pigment powder will also simulate sand and dirt in a realistic way, and are easy to handle with practice. The powder can either be applied dry with a soft, wide brush to simulate a thin layer of dust, or it can be mixed with thinner and used more like a wash, but with the benefit of creating structure. As with the wash mix, plaster can also be added to pastels and pigments. Pigment powder is very effective when painting track links, where it is initially mixed with thinner, then applied liberally over the tracks and left to dry. With a soft brush, the excess powder can then be removed speedily to leave the powder in recesses, simulating accumulated mud and dust.



◥ Airfix 1/32 BMW MINI Cooper S. (Model by Toni Canfora)



▲ A stiff brush is used to apply the mud to the model. By repeating the process, heavier layers can be created at the bottom of the fenders, as on a real vehicle.



▲ For better access, it may sometimes be a good idea to leave one (or several) parts of the running gear off the model until the mud is applied.



▲ Since the plaster makes the mix lighter it will need to be painted after it has dried. Wet mud can be replicated by adding clear gloss to the paint, and using a darker mix at the edges.



▲ This chassis of a Leopard tank shows the effect of a heavy mud layer with plaster and enamel paint. Simple materials such as these are cheap and plentiful, and often negate the use of commercial, pre-mixed alternatives.





◀◀ A fast and easy way to create dust layers is the use of pastel chalk powder. Here, the powder has been placed on the bogie.

◀ Thinner is then used to fix the powder and make it sink into the recesses...

▶...and the result when dry is very convincing. Simple!







▲◥ Track links collect much dust and dirt. Here they have received a first coat of black and silver to replicate their metal surface. This can work for vinyl tracks as well as styrene or metal examples.



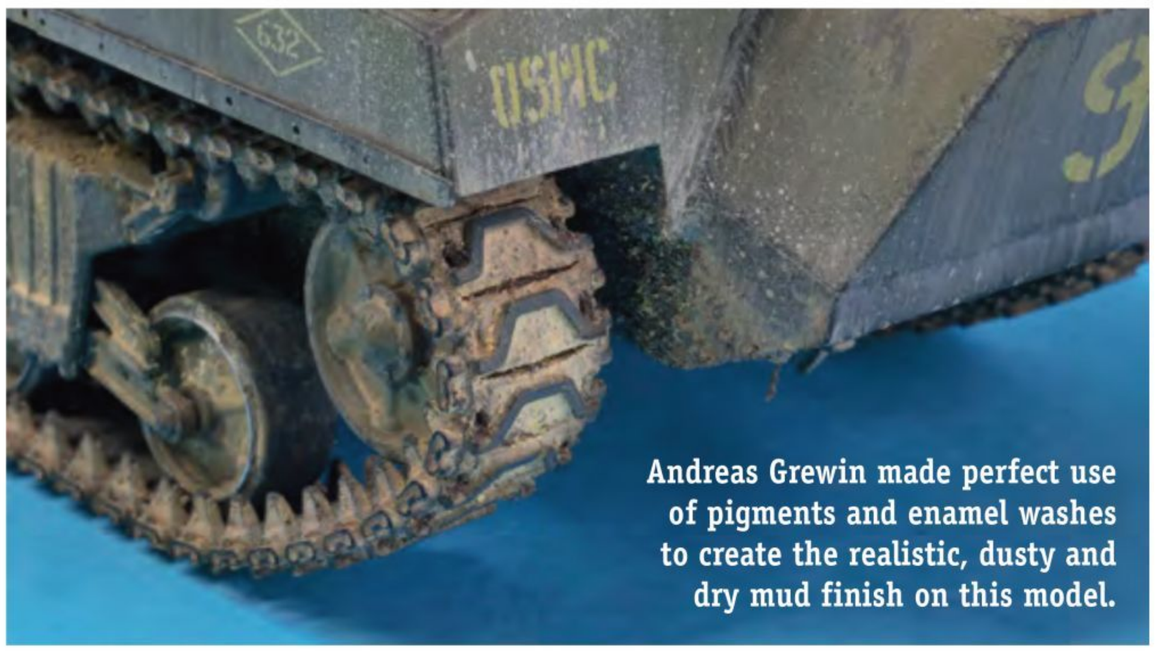
▲ A heavy mix of pigment and thinner is then applied liberally over the tracks.



▲ When dry, a cotton bud or a soft brush can be used to wipe away the excess dried pigment.



Pigments can also be brushed onto the model in dry form. However, once applied they are difficult to wipe off if rendered too heavily.



Andreas Grewin made perfect use of pigments and enamel washes to create the realistic, dusty and dry mud finish on this model.

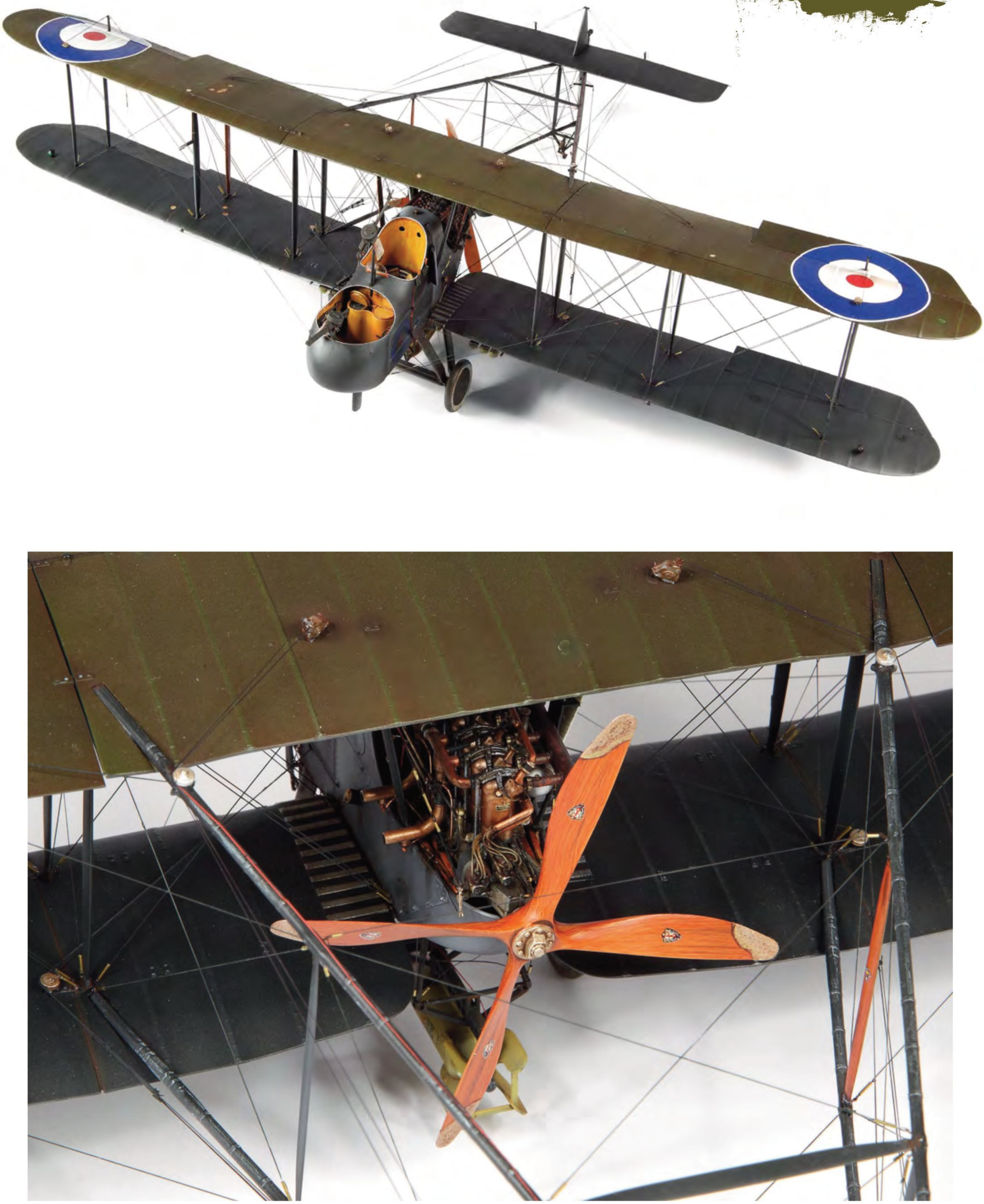
Dragon 1/35 M4A3,
by Andreas Grewin

Tamiya 1/48 Spitfire Vb,
by Anders Isaksson

Wingnut Wings 1/32 LVG C.VI, by Mikael Terfors

AFV Club 1/35 Churchill Mk.III, by Johan Augustsson

Wingnut Wings 1/32
Fe.2b, by Mikael Terfors



Tamiya 1/48 Messerschmitt Bf 109E-4, by Anders Isaksson



AMT 1/25 Chevrolet Chevelle, by Anders Isaksson



Dragon 1/35 Sd.Kfz.234/1,
by Jan Abrahamsson

Tamiya 1/35 Char Bis, by Andreas Grewin



Hasegawa 1/48 SAAB J35 Draken, by Axel Örtenblad





Bronco 1/35 Fi-103 (V-1), by Toni Canfora

Tamiya 1/35 Citroen Traction 11CV, by Toni Canfora



Tamiya 1/48 Sherman Firefly Ic, by Toni Canfora

Special Hobby 1/48 Vought V-173 'Flying Pancake', by Toni Canfora



Useful Contacts

The following lists offer a glimpse into just what's available from the modelling industry, in terms of kit makers and aftermarket producers, decal companies, book publishers and more. Given the recent explosion of new companies, this isn't an exhaustive list, so we recommend further investigation to suit one's needs. All website addresses were correct at time of printing.

KIT MANUFACTURERS

Airfix: www.hornby.com
Academy: www.academyhobby.com
AFV Club: www.afvclub.com
Avantgarde Model Kits: www.amkhobby.com
AZ Model: www.azmodel.cz
Bronco: www.bronco-model.com
Copper State Models: www.copperstatemodels.com
Dodo Models: www.dodo-models.com
Dragon/Cyber-hobby: www.dragon-models.com
Eduard: www.eduard.com
Fantastic Plastic: www.fantastic-plastic.com
Flyhawk Model: www.flyhawkmodel.com
Fly Models: www.fly814.cz
Fujimi: www.fujimimokei.com
GasPatch Models: www.gaspatchmodels.com
Great Wall Hobby: www.lionroar.net
Hasegawa: www.hasegawa-model.co.jp
Heller: www.heller.fr/en
High Planes: www.hpmhobbies.com
Hobby Boss: www.hobbyboss.com
HR Model: www.hrmodel.cz
IBG Models: www.ibg.com.pl
ICM: www.icm.com.ua
Italeri: www.italeri.com
Kinetic: www.kineticmodel.com
KP Models: www.kovozavody.cz
Masterbox: www.mbltd.info
MiniArt: www.miniart-models.com
Mirage Hobby: www.mirage-hobby.com.pl
ModelCollect: www.modelcollect.com
Moebius Models: www.moebiusmodels.com
Monogram: www.revell.com
OKB-Grigorov: www.okbgrigorov.com
Pegasus Hobbies: www.pegasushobbies.net
Polar Lights: www.round2corp.com
ResiCAST: www.resicast.com
Revell: www.revell.de/en
Roden: www.roden.eu
RS Models: www.rsmodels.cz
S+M Models: www.sandmmodels.co.uk
Special Hobby: www.specialhobby.eu
Starling Models: www.starling-models.co.uk
Sword: www.swordmodels.cz
Takom: www.takom-world.com
Tamiya: www.tamiya.com
Trumpeter: www.trumpeter-china.com
Whirlybird: www.whirlybirdmodels.com
Wingnut Wings: www.wingnutwings.com
Zoukei-Mura: www.zoukei-mura.co.jp
Zvezda: www.zvezda.org.ru/en

ACCESSORIES

Aber: www.aber.net.pl
AIMS Models: www.aimsmodels.co.uk
Aires: www.aires.cz
AlleyCat Models: www.alleycatmodels.co.uk
Armycast M&M: www.armycast.cz
Atlantic Models: www.atlanticmodels.net
Barracudacast: www.barracudacast.com
Brengun: www.brengun.cz
CMK: www.cmkkits.com
Dan Taylor Modelworks: www.dantaylormodelworks.com
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Evergreen: www.evergreenscalemodels.com
Flightpath: www.djparkins.com
Freightdog Models: www.freightdogmodels.co.uk
GasPatch Models: www.gaspatchmodels.com
GreenStrawberry: www.greenstrawberry.cz
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Inside the Armour: www.insidethearmour.com
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Legend Productions: www-legend.co.kr
Lion Roar: www.lionroar.net
LVM Studios: www.lvm-studios.com
Maestro Models: www.maestromodels.com
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OzMods: www.ozmods-kits.com
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Tom's Modelworks: www.tomsmodelworks.com
True Details: www.squadron.com
Werner's Wings: www.wernerswings.com
Whirlybird: www.whirlybirdmodels.com
White Ensign Models: www.whiteensignmodels.com
Yahu Models: www.yahumodels.siemianowice.com

DECALS

AIMS Models: www.aimsmodels.co.uk
Authentic Decals: www.olimpmodelsgroup.com
Aviaeology: www.aviaeology.com
Aztec Models: www.aztecmodels.com
BarracudaCals: www.barracudacals.com
Bullseye Model Aviation: www.spruebrothers.com
Caracal Models: www.caracalmodels.com
Combat Decals: www.model-craft.co.uk
Custom Aeronautical Miniatures: www.camdecals.com
DACO: www.dacoproducts.com
Dutch Decal: www.dutchdecal.nl
EagleCals: www.eagle-editions.com
Echelon Fine Details: www.echelonfd.com
F-4DableModels: www.F-4dablemodels.com
Fantasy Printshop: www.fantasyprintshop.co.uk
Fightertown Decals: www.fightertowndecals.com
Flying Leathernecks: www.flyingleathernecksmodels.com
Foxbot: www.foxbot.com.ua
fündekals :) www.fundekals.com
Furball Aero-Design: www.furballaero-design.com
Iliad Design: www.iliad-design.com
IsraDecal: www.isradecal.com
Kits World: www.kitsworld.com
Linden Hill Imports: www.lindenhillimports.com
Mike Grant Decals: www.mikegrantdecals.com
Peddinghaus Decals: www.peddinghaus-decals.de
Pheon Models: www.pheondecals.com
Print Scale: www.printscale.org
Rising Decals: www.risingdecals.com
SBS Model: www.sbsbmodel.com
Superscale: www.squadron.com
Syhart: www.syhartdecal.fr
TwoBobs: www.twobobs.net
Vingtor: www.vingtor.net
Wolfpak Decals: www.millcreekconsultants.com
Xtradecal: www.hannants.co.uk
Yellow Wings Decals: www.yellow-wingsdecals.com
Zotz: www.zotzdecals.net

TOOLS AND SUNDRIES

Airbrush Company, The: www.airbrushes.com
Albion Alloys: www.albionhobbies.com
Badger Air-Brush Co: www.badgerairbrush.com
Deluxe Materials: www.deluxematerials.com
Graphic Air: www.graphicair.co.uk
Harder & Steenbeck: www.harder-airbrush.eu/en
Iwata: www.iwata-medea.com
Little Cars: www.modellingtools.co.uk
MDC: www.modeldesignconstruction.com
Sylmasta: www.sylmasta.com
Swann-Morton: www.swann-morton.com
X-Acto: www.xacto.com
Xuron: www.xuron.com

PAINT/VARNISH

AKAN: www.coastalcraftmodelsuk.com
Colourcoats: www.sovereignhobbies.co.uk
Drooling Bulldog: www.droolingbulldog.com
Hataka: www.hataka-hobby.com
Humbrol: www.humbrol.com
Lifecolor: www.astromodel.it
Mission Models: www.missionmodelsus.com
Mr. Hobby: www.mr-hobby.com/eu
Mr Paint: www.mrpaint.sk
Tamiya: www.tamiya.com
Testors: www.testors.com
Vallejo: www.acrylicosvallejo.com
Winsor & Newton: www.winsornewton.com
Xtracolor: www.hannants.co.uk
Zero Paints: www.hiroboy.com

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4+ / Mark 1: www.4pluspublications.com
AirDOC: www.airdoc.eu
AIRfile: www.guidelinepublications.co.uk
Albatros Productions: www.windsockdatafilespecials.co.uk
Canfora Publishing: www.canfora.se
Crecy Publishing: www.crecy.co.uk
Desert Eagle Publishing: www.deserteagle-publishing.com
Detail & Scale: www.detailandscale.com
Haynes: www.haynes.co.uk
Histoire & Collections: www.histoireetcollections.com
IsraDecal: www.isradecal.com
Kagero: www.kagero.pl
Key Publishing Ltd: www.keypublishing.com
Luftfahrtverlag-Start: www.luftfahrtverlag-start.de
Mushroom Model Publications: www.mmpbooks.biz
Osprey Publishing: www.ospreypublishing.com
Pen & Sword Publishing: www.pen-and-sword.co.uk
Sabot Publications: www.sabotpub.com
Specialty Press: www.specialtypress.com
Squadron-Signal: www.squadron.com
Valiant Wings Publishing: www.valiant-wings.co.uk
Ventura: www.venturapublications.com

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Creative Models: www.creativemodels.co.uk
E-Models: www.emodels.co.uk
Halifax Modellers World: www.halifaxmodellersworld.co.uk
Hannants: www.hannants.co.uk
Historex: www.historexagents.com
Hobby Link Japan: www.hlj.com
Jadlam Racing Models: www.jadlamracingmodels.co.uk
King Kit: www.kingkit.co.uk
Kit Krazy: www.kitkrazy.com
Lucky Model: www.luckymodel.com
Mega Hobby: www.megahobby.com
MisterKit: www.misterkit.com
Models2U: www.models2u.co.uk
Model Hobbies: www.modehobbies.co.uk
Models for Sale: www.modelsforsale.com
Rebell Hobby: www.rebell.com
ScaleModelShop: www.scalemodelshop.co.uk
Sprue Brothers: www.spruebrothers.com
Squadron: www.squadron.com
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