# WELDING - DOWN UNDER STYLE...

**Australian suppliers *Welding Down Under* claim their torch - the DHC 2000 - revolutionises the job; *David Landers puts one to the test...***

## The Kit Contents

CMM was sent a moulded plastic case, containing:- DHC 2000 torch; pair of check valves; pair of hose tails; five welding tips; two cutting attachments; one cutting tip; spanner; tip cleaner set; 'cobalt blue' welding spectacles; demonstration DVD; operator's handbook; A4 guidance sheet.

*[Note: the cutting attachments hadn't been adequately packed, and had moved about during transit.]*

## Performance Claims

The Australian suppliers, 'Welding Downunder', say that this special oxy-acetylene torch is able to weld a variety of metals (including aluminium alloys, stainless steel and cast-iron) with a minimum of preparation and often without the need for flux. It is claimed that thin sheet steel can be welded with very little distortion, and that cutting is clean and slag-free. Gas consumption is said to be low.

## Price/ Warranty/ Standards

The kit supplied to CMM costs £240, inclusive of air-freight and insurance. It is assumed that purchasers will already have oxy-acetylene bottles and regulators, but (as explained later) they may need to allow a further £20 or so for new hoses. Although gas consumption couldn't be measured, it does seem likely that this - and therefore running costs - will be lower than for normal oxy equipment.

The torch unit (excluding tips) is guaranteed by the makers, Cobra Torches Inc., of the USA, against defects caused by faulty materials and/or workmanship for the lifetime of the original purchaser.

Cobra Torches say that their product meets American 'UL' (Underwriters Laboratories Inc.) standards.

*[Note: direct comparisons aren't necessarily valid, but a conventional Murex gas-welding/ cutting outfit with a similar range of parts, and manufactured in conformity with European safety standard EN ISO 5712, would be about £200.]*

## DVD/ Instructions

The DVD features various demonstrations of the torch, which show that it is a remarkably accomplished tool.

The 20-page handbook is aimed at the experienced gas welder who is 'converting' to the DHC 2000. It describes how to set up the torch for both welding and cutting, and explains the new work methods that must be adopted. It is clearly illustrated. There's a useful section dealing with the different metals which may be encountered, plus a work-safety guide.

## Overview

Both the DVD and the handbook stress that the DHC 2000 is not the same as a conventional gas torch. Its unique mixing chamber creates a smaller, more intense flame, and new techniques have to be mastered. The nozzle must be held almost perpendicular to the work: 70-degrees rather than the usual 45. The filler rod is held low, to pass under and behind the flame.

The four standard welding tips run from '0' to '3' covering a range from thinnest steel sheet to 12mms thickness. An additional '0.5' intermediate tip is included specifically for welding vehicle bodywork.

The manner in which the torch is adapted for cutting is unusual. On an ordinary gas cutting head, the nozzle has two concentric outlets: an outer ring for the mixed heating gas and a central hole for the extra oxygen. Instead of this, the DHC 2000 retains its normal welding tip, and adds a second (oxygen) tip close beside it. One of the supplied cutting attachments is for use on sheet metal; the other, which has detachable guide wheels, can be used for free-hand or guided cuts in heavier material.

*[Note: the handbook only mentions cutting steel up to 12mms thick (1/2"), but the suppliers told CMM, in an e-mail: "...the torch cuts up to 1 inch."]*

## Initial Impressions

The torch itself appears to be well made and of good quality. It weighs 750gms (1lb 10oz) without welding tip, check valves and hose fittings. A long, wide nozzle runs at right-angles to the handpiece, giving an offset of 12.5cms (5") from centre-line of body to end of welding tip. Compared to a conventional torch, it feels heavy and bulky.

Its pistol-grip handpiece is finished in 'as-cast' alloy, which provides a textured, non-slip surface. I did not find the torch comfortable to hold. In particular, a flanged brass button (for oxygen supply in cutting mode) protrudes from the front of the handpiece, chafing the fingers.

The cutting attachments look like an afterthought; the 'double tip' system clearly won't permit the same flexibility of movement as a normal cutting head.

*[Note: my own torch body weighs about 300gms; the popular Murex Saffire DH-3 is 290gms. Both have a 5cm offset when fitted with a standard welding nozzle.]*

> ***"...On this, my first attempt with the new torch, I didn't produce a particularly neat weld - but that's hardly the point. The fact that the strips stayed in the same relative positions, allowing the weld to be made at all, was quite incredible..."***

## Connections

From a UK perspective the torch comes with non-standard hose threads. To connect up, the hose-tails supplied in the kit must be used. Like me, though, the majority of CMM readers with existing oxy equipment will have one-piece hoses featuring factory-fitted ends - and they probably wouldn't want to cut them in order to fit the foreign tails. So new lengths of plain hose may be required, along with the necessary regulator end-fittings. (Luckily, I was able to scrounge some old hoses for this test.)

## Lighting Up

For all welding, irrespective of tip size, both oxygen and acetylene pressure must be set to 4psi. Correct pressure is vital for proper operation of the torch, and the regulator gauges on the gas cylinders are not considered accurate enough for this purpose. So a special lighting-up procedure is required in order to determine the true gas pressures.

This is quite fiddly - and involves huge sheets of flame - but it only needs to be done once. The advice given in the DVD is to mark the exact needle positions on the gauges (which in my case, as predicted, were not at an indicated 4psi). Thereafter, these markers can be used to set gas pressures when commencing each new session.

## Test One - Distortion

For the classic car owner/ restorer, perhaps the most interesting aspect of the DHC 2000 is the promise of distortion-free panel welding. I tested this by welding together two strips of steel from a scrap door skin. These were clamped at one end only, and no tack welds were made. With the '0.5' tip, I started welding at the clamped end, using a normal filler rod. The strips hardly moved, and stayed close enough together to allow welding to continue through to the other end (roughly 15cms).

On this, my first attempt with the new torch, I didn't produce a particularly neat weld - but that's hardly the point. The fact that the strips stayed in the same relative positions, allowing the weld to be made at all, was quite incredible.

Because the metal was painted, the heat affected zone showed up clearly - it was less than one centimetre wide. Also, the work was cool enough to be picked up soon afterwards, suggesting that the overall heat input was low. The weld had good penetration, and proved strong when bent to-and-fro in a vice.

I duplicated the test with my usual gas torch, this time clamping the strips at both ends and making several tack welds. Even so, this second pair of strips distorted, and the weld had to be hammered to flatten the metal. The heat affected zone was much wider and the work took longer to cool.

## Test Two - Other Metals

The special characteristics of the DHC 2000's flame mean that flux is rarely required - and it isn't too fussy about filler materials, either. I managed to lay a weld bead on to some aluminium scrap using an old length of extruded aluminium as the filler, then made a respectable repair to a light-alloy casting using proper filler rod (5% silicon). I found that a small amount of flux was helpful in both cases.

Non-structural cast-iron (eg. manifolds etc.) can be welded by the torch with very little pre-heating. The DVD suggests old piston rings as a filler, but I used a cast-iron electrode intended for an arc-welder, having first broken away the coating. The test piece was a cracked shelf-bracket, and I was very pleased with the result as I've not had much success with cast-iron before. (No flux, other than any powdery remains from the original coating.)

The torch was also good at brazing and (more particularly) silver-soldering, where the smallest tip gave a nicely controlled flame. The DHC 2000's flame is exceptionally stable - this became evident while experimenting with tip sizes and torch settings for non-ferrous metals. The torch valves could be turned up really high without the flame snapping out (as would inevitably happen with a normal blowpipe). There was never any 'popping back', either.

## Test Three - Cutting

I tried both cutting attachments, on two different thicknesses of steel: panel gauge and heavy plate (about 6mms). I had to persevere to get clean cuts: oxygen pressure, tip size and the distance of the tip from the work turned out to be crucial factors. On thin sheet (only), the cutting tip can actually be dragged along the surface.

Slag-free cuts were trickier on the thick steel. The extension wheels proved useful here - once set to the optimum height, there was one thing less to worry about. And with a length of angle-iron clamped on to the work, the wheels could follow this to give a dead straight cut.

Because of the double tip arrangement, cutting round curves meant that the torch body had to be swivelled, which resulted in a deviation from the intended line. (You have to learn to watch the oxygen tip, not the flame.) Cutting a circle without lifting off would only be possible if either the work piece could be rotated while cutting or the operator could walk right around it.

The results I finally achieved were definitely better than you'd expect from an ordinary cutting torch. Although I never got the 'knife-edge' quality seen on the DVD demos, this was probably due to lack of familiarity. But the attachments aren't terribly robust, and I did wonder if their tip positions might have been affected by rattling about in the case.

*[Note: the cutting instructions state: "It is recommended that the heat shield be used." No heat shield was included in the kit - the suppliers say that it is inconvenient and unnecessary.]*

## Test Four - On The Car

A job that needed doing on my Saab provided an ideal opportunity to test the new torch in a 'real life' situation. Corroded seat-belt mounting points in the floor-pan had to be reinforced on both sides of the car - I decided to do one side with my usual torch, the other with the DHC 2000. *(These mounts are located just inboard of the cills, in front of a bulkhead. The Saab's floor-pan is flat underneath, with the boxed cills etc. raised inside the passenger compartment.)*

As far as the test was concerned, the job consisted of three elements:-

1) In-situ cutting (removing the weakened metal, working from above).

2) Bench welding (welding the salvaged mounting block on to a pre-prepared plate).

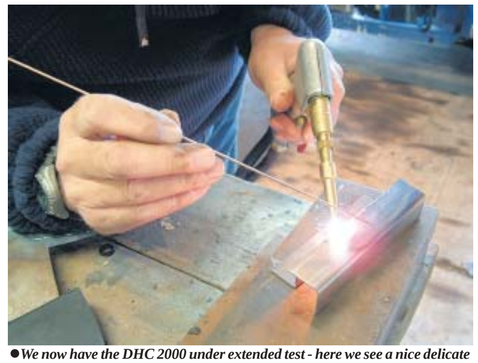
3) In-situ welding (welding the plate on to the floor-pan, working from below).

The first side, using the conventional torch, was straightforward. With the gas-mix adjusted to give an oxidising flame, I cut out the old metal using the welding blowpipe. This short-cut would be frowned upon in some circles, but I've never had any qualms about cutting thin steel in this way. It does produce a messy edge, though, and I had to grind the underside. The rest of the job went smoothly.

For the second side, I fitted the sheet metal cutting attachment to the DHC 2000, and immediately hit a snag. Or, to be more accurate, I hit both the cill and the bulkhead... the directional nature of the device made it impossible to run the tips along the cut lines. However, according to the instructions it is permissible to use just a welding tip for light cutting - ie, the same as I'd done on the other side. Access was still very tight, but it worked okay. Some grinding was needed, as before.

Bench welding: the task here was to weld the threaded seat-belt mounting block (about 10mms thick) on to a piece of 1.5mm galvanised steel. The DHC 2000 was very good at dealing with the two different metal thicknesses, and didn't produce such acrid fumes from the burnt zinc coating. It could be seen afterwards that, compared to the other side, much less of the galvanising had been lost from around the weld.

Welding the plate to the floor-pan was a different story, sadly. On axle stands, there wasn't really enough room under the car for the torch's long nozzle. It was possible to get it into position (just), but then I couldn't see what I was doing. And holding the heavy torch at the prescribed angle made my wrist ache. What had been an easy job on the other side of the car became immensely frustrating. I eventually gave up, and finished off with my normal torch.



● *We now have the DHC 2000 under extended test - here we see a nice delicate weld and below, our man sets up.*

## Conclusions

The welding techniques that are required seem strange at first, and it takes a while to 'unlearn' decades of past experience. I can't be sure that I got the very best out of the DHC 2000 in the time available - but, nevertheless, even on a short acquaintance I can vouch for the fact that the claims made for it are fully justified.

The distortion-free welding of thin sheet steel is truly astonishing. This feature alone would be extremely useful to restorers, and the results obtained on aluminium and cast-iron were equally convincing. If the cutting performance was slightly less impressive, then it must be said that this would doubtless have improved with further practice.

Although I was delighted by its welding abilities, in my opinion the DHC 2000 has a fundamental flaw. Its narrow flame - the key to its success - demands precise manipulation on the part of the operator. Yet the clumsiness of the torch makes that precision more difficult to achieve.

This problem is most apparent when working in confined spaces. Moreover, because of its size and shape the DHC 2000 is unable to tackle the full range of typical bodyshell repairs. Therefore, it can't really be recommended as an everyday replacement for standard welding equipment - whether that's gas or MIG. It's a different matter, though, whenever there's the luxury of unimpeded access.

The torch comes into its own on more specialised duties (usually carried out away from the vehicle), so is probably best thought of as an alternative to a TIG welder. For those who need that facility, and who already have oxy-acetylene gear, the DHC 2000 would make a very attractive (and cost-effective) purchase.

On certain welding jobs it might conceivably outperform a TIG - and, of course, it's far more versatile.

*We've got the DHC 2000 on extended test; we'll come back to you with an update in a few months.*

*For more information, visit www.welddownunder*

~~DKW had already become the world's largest motorcycle manufacturer in the late 1920s, and then in the 1930s laid claim as the first company to mass-produce vehicles with front-wheel drive. DKW produced the pre-war period's answer to Volkswagen, the F-series small cars, in astonishing numbers. Audi Tradition marked the anniversary of the brand by entering DKW classic cars in a whole host of prestigious events.~~

~~In 1907 the Dane Jørgen Skafte Rasmussen set up a small metal goods factory in Zschopau in the Ore Mountains. After initially manufacturing exhaust-steam oil separators, steam-engine equipment and other metal goods, he started to experiment with steam-~~