

Process engineering

A chemical stripping and cleaning system that offers real advantages to racecar constructors

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Back in the less stringently regulated days of Touring Car racing, a common trick to remove weight from a car was to acid dip the bodyshell. Unfortunately, the process had a number of flaws, not least the fact that acid residue tended to become trapped in box sections and continue to eat away at a vehicle's structure long after dipping. These days the process is all but extinct, primarily due to the exceptionally environmentally unfriendly nature of acid baths. Taking its place is a new technique, slowly

BY LAWRENCE BUTCHER

gaining popularity amongst racecar constructors, which does not remove metal, yet is able to provide savings in terms of both preparation time and vehicle weight. Pioneered by Surface Processing company based in Birmingham, UK, this process ensures the removal of all organic material from a component without damaging the base metal. The majority of the work undertaken is for OEM manufacturers, stripping and re-coating products that fail quality control due to finishing flaws. However, the company has seen

a steady increase in business from both the classic car and racing industries.

The benefits for the classic car market are immediately apparent: if a vehicle body is dipped, all accumulated rust, body filler and paint can be removed quickly and without the damage that can be caused by over-enthusiastic use of abrasive processes such as media blasting. But for racecar constructors, the advantages are more significant.

CORROSION PROTECTION

The process consists of multiple stages designed to strip all non-ferrous material away,

leaving the remaining bodywork protected from corrosion. To achieve this, the vehicle is secured to a protective cage prior to being subject to a dehydration process to break down any organic coatings such as underseal, filler, anti-vibration materials and adhesives. The body is then immersed in an alkaline hydrocarbon solution to remove any remaining organic compounds. This penetrates box sections and other inaccessible areas, leaving the structure as bare mild steel, free of contaminants. Following this, the body is rinsed with water to remove the alkaline residue



As well as saving weight, bodysells are washed with a preservative that protects the metal and can be welded through with impunity

before being immersed in a dilute solution of inhibited hydrochloric acid. The purpose of this is to remove any corrosion that may be present, with the inhibitor preventing the steel structure itself being attacked. From there, the 'shell' is placed in an alkaline rinse prior to being dipped in an agitated alkaline solution, carefully formulated to ensure complete neutralisation of the metal. Lastly, it is subject to a high pressure manual wash with a preservative solution to protect the bare metal finish.

At this point, the 'shell' can be taken away for welding or fabrication work, or can be

subjected to a second process to coat and protect the bare metalwork, which culminates in the application of an electrophoretic coating. Firstly, the vehicle 'shell' is subject to an eight-stage cleaning and phosphate treatment, consisting of decontamination through a number of alkaline silicate rinses before being dipped in a bath of phosphoric acid containing zinc, manganese and nickel. The body then moves to a PPG paint tank where it is immersed and an electrical current of 320v at 1000A is passed through it. This results in a uniform paint covering of 28µ



thickness through a process of electrophoresis. Finally, the 'shell' is cured at 180degC (356degF), providing a highly corrosion resistant finish, offering in excess of 1000hrs salt spray protection.

WELD INTEGRITY

And if you are thinking that welding a 'shell' that has been chemically coated is not a good idea, Adrian McMurray, managing director of Surface Processing has an explanation: 'In a modern car plant they have all sorts of ways to prevent problems - they heat the area up first and then flush it with nitrogen so that it is clean and oxide free. [But] where traditionally a fabricator would have to spend a large amount of time cleaning up areas prior to welding, a vehicle that has been through the dipping process can be worked on immediately, with great weld integrity.'

While this offers considerable time (and therefore cost) savings, especially for constructors producing batches of cars, the real benefits can be seen in terms of weight savings. The 'shell' of a

modern production saloon, fresh from the production line, is an incredibly complex component. In some places panels can have up to five layers of material, including plastic and foam in-fills. And whereas with media blasting processes, only externally accessible material can be removed, it is in the removal of this hidden material that Surface Processing has found some very impressive weight savings. 'On a typical road-to-racecar project, it works out at an average of about 31kg saved over the stripped 'shell,' states McMurray, although apparently significantly greater savings have been seen on some high-end saloon bodysells.

The racing world has taken notice and a number of top rally constructors and Touring Car teams have already called upon Surface Processing's facilities to give them an extra edge. At a cost of around £2000 (\$3200) for the full process, the cost per kilo saved, combined with the reduced labour requirements, certainly makes it an attractive option.

