

A NEW APPROACH?

Two approaches towards automotive coating and finishing are emerging:

- **'Incremental improvement'**: using conventional systems, working towards a reduction of colour change-over time, batch size, emissions & waste and improving overall system reliability. This will be strongly assisted by the introduction of technologies such as automated sanding and spectrophotometry and the adoption of universal paint finishing standards and benchmarking across the industry. However, movement to water borne and powder paint, encouraged by environmental legislation, will make such improvements more difficult to achieve.
- **'New Technology'**: representing a step change away from conventional painting and production methods. This would utilise vehicle body frames that require minimal treatment in a paint shop and the use of thermoplastic body panels. These would be coloured during moulding and attached to the body frame on the vehicle assembly track. Significant production leadtime reduction in relation to retail orders would be expected should this method be adopted.

The Paint Shop has always been viewed as part and parcel of the core vehicle production activity and currently represents around a quarter of the cost of the total facility. New developments are

emerging in body construction that break the dependence on conventional line based, high-volume, 'buffered' painting methods and these will undoubtedly be introduced over time to the benefit of the achievement of a 3DayCar. However, the sheer level of capital investment already sunk into European plants will ensure that rapid, radical change to the industry as a whole is unlikely.

THE FUTURE

The emergence of new technology in the form of spaceframes and coloured thermo-plastic painted panels offers a major opportunity to the achievement of the 3DayCar because they would render the conventional Body and Paint shops basically redundant. The order lead-time in production could be significantly reduced and the reliability of sequencing much increased. While conventional means of production will remain with us for many years, these new technologies in vehicle assembly are considered to be the way forward within the 3DayCar.

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EXECUTIVE BRIEFING

The 3DayCar Paint Shop Survey

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The objective of the Paint Shop Survey was to establish whether conventional Paint represents a bottleneck to current automotive production in terms of lead-time and sequence reliability.

This report examines the current state of automotive painting and the implications for the 3DayCar.

WHY PAINT?

One of the key requisites of the 3DayCar is to minimise production lead-time, from the time a customer order is identified with a vehicle, until its completion in assembly. Another is to ensure that the planned production sequence of individual orders is reliably achieved. Since all sponsor manufacturers identify an order with a vehicle prior to the paint shop, the efficiency of this area of production is vital.

PAINT SHOP PERFORMANCE

The Paint Shop survey carried out across 6 Vehicle Manufacturer Sponsors found that:

- 40% of orders are held in Paint and 22% in the Painted Body Store in relation to the average total number of bodies held throughout a plant, from Body Framing to Final Inspection
- The average lead-time of the painting process is approximately 7 hours: one third of the total production lead-time
- The average colour changeover lead-time is 37 seconds and the average batch size of the same colour is 12
- On average, 28% of all vehicle bodies are re-worked in some way, and 4% of painted bodies are recycled through at least a part of the Paint Shop

- Two thirds of all problems in the Paint Shop are considered by managers to be related to paint finish.
- Due to the absence of any universally recognised standards amongst Vehicle Manufacturers, it is difficult to quantify precisely what level of waste the Paint Shop represents to the industry as a whole.

Maintaining the optimum body sequence throughout production is vital in order to achieve required productivity levels. VM's currently adopt two basic approaches: creating an individual sequence at each stage of the production process, or creating one sequence and then re-sequencing where necessary at Paint and Assembly.

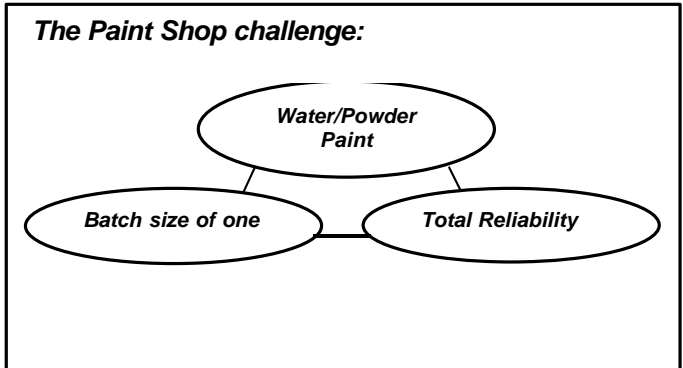
However, typically only 60 to 70% of the planned daily build schedule is achieved in terms of individual orders originally scheduled for that day.

The reliability of Paint and its supply to the Painted Body Store performs the critical role in current production of maintaining the right body mix in order to sustain the sequence in Final Assembly.

3DAYCAR REQUIREMENTS

It is suggested that the key requirements for a 3DayCar compliant Paint Shop would be a reliable, water borne/powder system capable of delivering batch sizes of one. The change from solvent to water-borne or powder-based paint is necessary due to ever increasing legislative pressure on the pollution caused by solvent paints. All three requirements must be met before the system can

provide the necessary flexible conditions for true build to order. From the evidence presented in this report, this currently appears to represent a significant challenge to Vehicle Manufacturers.



Ideally, the capability of painting in batch sizes of one is desirable to build individual customer orders within a short lead-time. Smaller batch sizes than the current average of 12 cars are significantly more expensive in terms of lost paint, solvent and change over lead-time. Those VM's who are currently using batch sizes of one are finding it difficult to meet legislatively required emission levels.

It is more difficult to achieve a good surface finish with water or powder based paint systems compared to traditional solvent-based systems on which the survey statistics are based. Water-borne systems require longer colour change over times than solvent and use more energy in the ovens due to the slower rate of evaporation. Given that these new paint systems are currently being installed by VM's, the task to achieve a reliable and cost-effective paint process is made more difficult.

