An example of service engineering support to avert adverse warranty cost implications stemming from a late design change

Summary

CAD-IT service engineers were responsible for significant engineering input to drive a major late change to key structural components. It was necessary to engage with senior engineering management and work in a way that was both proactive and reactive and within the strictest of timeframes in order to ensure that our client avoided warranty costs that would have amounted to many millions of dollars.

Introduction

A core aspect of CAD-IT Service Engineering support is the provision of service engineer consultants who are qualified CADPLM specialists with a background in process engineering and 'hands-on' product serviceability (appropriate to the industry in which they are deployed). These specialists join a client's service or product development community and establish or enhance processes providing service engineering support for product development, and enabling the client's service community to engage more effectively with product development through the medium of the client's CADPDM toolset.

In this capacity, our engineers do whatever it takes, from convening liaison meetings, designing and delivering CADPDM training programmes, introducing a voice for service into product development forums where it previously did not exist, or supporting the client's development of PLM processes and strategy, to taking responsibility for monitoring and developing the service repairability for one or more nominated systems through a product's development and driving and leading all collaboration between service and product development communities in support of this.

This paper is the second from among the documents presented on our website that draws from our experience of working in the automotive sector. It reviews a case where service engineers worked to avert possible adverse warranty implications of a late design change.

A development conundrum

As the development of the proposed body structure design for one of our client's vehicles progressed, it became apparent that in order to meet structural integrity targets additional engine bay bracing was required. The bracing strategy was introduced to the programme at a relatively late stage in the product development process and included two removable braces secured to the suspension turrets on each side and then to the centre of the engine bay to cabin bulkhead.

Due to manufacturing concerns regarding the ergonomic implications of a line-side operator having to apply a tool to fasteners securing the brace bars to the centre of the bulkhead at the rear of the engine bay, the main body structure was subsequently extended above the engine bay, reducing the length of the removable brace section and therefore reducing the required reach to secure the inboard fasteners.

In resolving the manufacturing concerns, the extension of the bulkhead body structure had a potentially major impact on the service requirements for the programme. Specifically, due to the extent of the non-removable body overhang, it would not have been feasible to remove and refit the engine assembly for service via the top of the engine bay

Removing the engine from beneath the engine bay would have required the transmission and front subframe to be un-decked from the vehicle body. In addition to the significant increase in labour time, this procedure implied the potential issue that the maximum lifting weight of service transmission and engine lifting jacks would be exceeded, requiring a new tool to be developed and mandated to the service dealerships.

In addition, the body overhang would have meant that service operations such as diesel fuel pump replacement, vacuum pump replacement, emissions recirculation system replacement, engine oil seal replacement, and wiper motor replacement, along with other service operations, would no longer have been feasible without removing the engine from the vehicle.

The challenge was to engage with product development and manufacturing to drive a solution that met the requirements of each area. However, with the programme progressing.

The solution

For CAD-IT service engineers, the first objective when attempting to resolve a service repairability issue is to quantify the issue on the basis of warranty saving. Expenditure avoided composes the justification for an engineering change.

In this case, with the number of service operations that would have been affected, this would not have been feasible in the time available. However, based on service CAD geometry for tool access and component withdrawal, along with digital manikin representation of service technician access, it was possible to illustrate the scale of the negative impact on service operations to senior management

through an impromptu service package and design reviews led by CAD-IT service engineers engaged with the programme.

Two main proposals were evaluated - either the current brace design could be completely removable in service as per the original proposal prior to manufacturing concerns being raised. Or the brace, bulkhead cowl panel and secondary NVH bulkhead panel could be redesigned so that they were multiple piece items that could be removed individually in service.

As it was, it was deemed that the negative impact on service outweighed the concerns of manufacturing and the programme reverted to the original design proposal, with some minor design changes to improve the assembly process.

The decision not to incorporate the proposed bracing strategy had the potential to realise a potential multi-million pound warranty expenditure saving on the lead vehicle programme alone. In addition to this, some critical components could have been completely unserviceable without the development and deployment to dealerships of special heavy lifting equipment that could facilitate the un-decking procedures detailed above. By reverting to the original proposal, the tool research and development and purchase costs to the dealerships had also been avoided.