Reducing dependency on special service tools

Summary

System designs that require the addition of unique tools specifically designed for the maintenance and repair of that system ('special service tools') often needlessly add cost, risk and inefficiency in the aftermarket lifecycle. By leveraging PLM tools, CAD-IT can help clients reduce the numbers and variation of special service tools needed to repair or maintain their products.

Introduction

A requirement to design, commission and supply a unique service tool, or 'special service tool', specifically for the repair or maintenance of a particular system, has recognised detrimental effects for manufacturers:

- special service tools cost money, and represent a cost to either the manufacturer or the service supplier which is passed on to the end-user;
- for machinery or vehicles in sectors such as agriculture or defence, special service tools reduce flexibility for field repairs and add inefficiency or cost;
- special service tools are also detrimental to right-first-time repairs and reliability, since in many instances where a tool is not available there is a risk that 'workaround' repair strategies will be sought by technicians.

In an effort to reduce costs and improve reliability, CAD-IT responded to a directive from our client's senior management to find ways of improving product development processes such that product design would reduce or eliminate the need for new special service tooling for any service repair or maintenance procedure.

Achieving special service tools reductions in the product-development lifecycle

The process solution defined and implemented as a consequence of the consultation was specific to each product's product development lifecycle, and forms an integral part of any client's product lifecycle management system.

Broadly, the CAD-IT solution was composed of three stages.

1. Compile a 3D special service tools library

Nominated engineers first collate or create a digital tooling catalogue that incorporates 3D CAD data for all the client's existing special service tools. This information has a wide range of applications, from upstream feasibility and package analysis in Teamcenter, to downstream service manual and training literature creation in Cortona RapidAuthor.

2. Fulfil an initial product evaluation

For a new product engineers will assess the new product assumptions and evaluate the existing special tool catalogue against the new product content and a comparable product already in market. This work is always completed early in the product development lifecycle, concurrent with supplier selection stages. In this way a list of special service tools and service operations requiring special service tools that are likely to apply for the new product is compiled.

3. Validation

The validation stage integrates into whatever routines collaborative design review processes the client already operates—most typically package reviews and adjunct service engineering support. The goal is to ensure that the package environment for the new product does not prevent the use of an existing special service tool, or to allow the requirement for any kind of special service tool listed in stage 2 to be deleted.

With this in mind, each service operation identified in stage 2 is evaluated as soon as CAD data maturity allows and as a support activities for the package reviews and other appropriate collaborative forums. The results of each evaluation are communicated to the relevant design teams in order to achieve continued package protection for the existing tooling, or a design or package change in order to accommodate an existing tool, or to eliminate the requirement for the special service tool altogether.

For new components that are known to require critical special service tooling, early engagement by service engineers with designers is essential in order to ensure that the requirement for a special tool is properly considered during the design process. Again, the objective in this instance is to either design

out the need for the new special service tool, or, for applications where this is not achievable, to try and ensure that the new design is compatible with an existing tooling.

Outcomes

Our experience with the implementation of this process with any client has shown that engaging with design teams from a much earlier stage in the product development lifecycle does deliver a reduction in new special-service tooling. This had been achieved by the provision of digital representations of existing special and standard workshop tooling. Also, by evaluating the application of this data in collaboration with design teams, we have also succeeded in helping our clients ensure that new components are developed to either include design features that allow the use of standard tools, or when this is not possible, that support existing special service tooling.

As with all of our services, our aim is to save our clients money by working to deliver results strategically and architecturally, rather than tactically. For example, for one of our client's high profile product ranges, through special service tool assessment during the throughout the product development lifecycle, changes have been driven to the suspension geometry on all future products to accept an existing special service tool for the purpose of separating ball joints.