Mass vehicle recall problems could be solved by Midlands Company

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Last week Toyota announced a recall of more than 1.5 million cars worldwide over brake and fuel pump defects but a small new Midlands company Warwick Analytics, which has spun out of the University of Warwick, could solve, and even prevent, these massive recalls in future.

Warwick Analytics have created a computational simulation technique to study and illustrate the statistics related to the most unlikely combinations which can occur in a manufacturing environment. Root cause analysis can be carried out using this model, without even having possession of the problem part, and statistical analysis for the assembly can be accomplished at a rate of several thousand parts per day, as opposed to one item in days or weeks.

Warwick Analytics uses this technology to provide computational product analysis services to the automotive industry in the area of warranty control and early warning systems related to product recall management. Its technology was developed at the University of Warwick's WMG department, in work led by Professor Darek Ceglarek.

Professor Darek Ceglarek says:

"Warranty and recall issues have been particularly painful in North America where annual cost run into billions of dollars. The striking thing about recent recalls is the mundane nature of the items recalled, throttle pedal assembly (Toyota), seat belt latches (GM) and ignition switches Honda). These are all low cost elementary assemblies produced by

external suppliers, and yet they have shown the capacity to cost large amounts of money when recalled. “

“Interestingly, the three big recalls at the moment are centred on elementary assemblies, such as throttle pedals, ignition interlock mechanisms, and seat belt latches. They are manufactured on a "build to print" basis, for commodity level prices, in large volumes, by specialist suppliers. They could not be rated as complex devices by any stretch of the imagination, and yet replacing these simple assemblies under recall conditions, has cost the industry vast amounts of money. This is because they all have to deliver a safety critical function with total reliability for the life of the vehicle.”

“Under garage service conditions, defect problems are typically dealt with by changing out the item, with the defective item either going back to the company that made the vehicle, maybe for further investigation. On many occasions for a low value item, it simply gets flung in a bin as scrap, and forgotten. The new parts and labour for fitting are charged to the manufacturer, and the whole process is repeated many times. The critical dimension that is missing is a thorough root cause analysis for the defective part, carried out by a knowledgeable technical expert. Someone in a white lab coat if you like. Progress is slow and costly for this person, so if every defective item was to be subject to a thorough root cause analysis, a cast of thousands would be needed to support the work load. A fully professional root cause analysis will generally be only invoked as a mandatory requirement, if there is a fatality or serious accident with a lot of liability at stake.”

“When car parts are made under high volume manufacturing conditions, the costs are under very strict control, because the manufacturing unit would quickly go out of business if this was not the case. Very small tolerance variations are accepted, and for most of the time an assembly performs to specification for 99.9% of the time. In a population of 1000

parts there might be a single item with a peculiar combination of tolerances which takes the functionality right to the edge of acceptable performance, when it is new. As the part acquires life hours by continuous use, there is the possibility that marginal performance turns into unsafe performance under certain service conditions. If there are half a million vehicles with marginal performance through the accumulation of life, that translates into 500 cars with a serious safety critical problem. That normally means a recall of half a million cars to isolate and replace the defective items."

"Random variance in manufacturing at the micro level has been extensively studied by Warwick Analytics which has created a computational simulation technique to study and illustrate the statistics related to the most unlikely combinations which can occur in a manufacturing environment. Root cause analysis can be carried out using the model, without having possession of the part, and statistical analysis for the assembly can be accomplished at a rate of several thousand parts per day, as opposed to one item in days or weeks."

More information: www.warwickanalytics.co.uk/

Provided by University of Warwick