

Streamlining diesel engine development

Integrated digital simulation environment saves Isuzu eight man-months per engine program

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► Issues:

Finite element analysis, thermal analysis and correlation to physical testing need to be performed at two points in process

Engineers used separate programs with different, incompatible formats

Converting data required four people one month for design and troubleshooting

► Approach:

Use I-deas® NX® Software Series to digitally evaluate multiple design concepts

Perform finite element modeling and thermal analysis using I-deas tools that provide capabilities equal to the best-of-breed software used in the past

Use I-deas correlation capabilities to compare analysis and physical testing results

► Results:

By performing analysis within a single environment, time previously spent manipulating data and results files is now devoted to design

The time to bring a new engine to market has been reduced by two months

Eight-man-months has been redirected to proactive engineering

ISUZU MOTORS LIMITED

- Isuzu wanted to significantly reduce the time spent preparing and translating engine model data for use by its multiple analysis programs.

Data convergence consumes valuable time

Among the leading manufacturers of advanced sport utility vehicles and commercial vehicles, Isuzu has become the lynchpin for General Motors' diesel engine development. Isuzu is currently producing 13 different diesel engine models – from the 1.1 liter 13LBI industrial engine to the 30-liter model 10TDI truck engine. Isuzu is also developing a next-generation, ultra-clean diesel engine that exceeds stringent exhaust emissions standards around the world, putting this low emissions powerplant in the same class as future environmentally friendly gasoline engines.



Continually seeking process improvement, Isuzu management noted that far too much of the development process was spent on data convergence. It took an engineer about three weeks to convert the design geometry to the format required for each of the best-of-breed analysis programs used in the past. Additional time was required to convert and manipulate results files into formats needed to combine them and compare them to physical testing.

I-deas unified environment eliminates the need to translate data

“We made the decision to implement I-deas NX Series primarily because of its ability to deliver leading-edge modeling and analysis tools within a single integrated environment,” says Yu Fred Homma, CAE promotion department general manager for Isuzu. I-deas is based on the concept of digital master models that are used to evaluate multiple design concepts so that the final product more closely matches customer expectations.

Homma explains, “Now, we can begin analyzing our design concepts as soon as they are defined. I-deas analysis tools utilize the same geometry that is created by the I-deas modeler. In addition, there is integration among the results files so that, for example, thermal analysis results can be easily combined with finite element modeling results, enabling the easy calculation of overall stresses and deflections due to both mechanical and thermal loading.

Solutions/Services

NX

Client's primary business

Isuzu is a leading manufacturer of advanced sport utility vehicles and commercial vehicles; the company has taken the lead responsibility for diesel engine development within General Motors.

Client location

Shinagawa
Japan

Finally, I-deas correlation capabilities provide a unique tool for comparing dynamic finite element analysis and experimental testing results that eliminates a considerable amount of additional data manipulation that was required in the past."

Development cycle reduced by two months; engine performance significantly improved

By moving to I-deas, Isuzu has slashed eight-man months of time that was previously consumed by data conversion. This savings has been redirected to proactive engineering opportunities.

"Performing engineering design and analysis within a single integrated environment has dramatically reduced the time we spend manipulating data and made it possible to evaluate more design alternatives," says Homma. "The capabilities of I-deas analysis tools are in every way equal to the best-of-breed software that we used in the past. The time that we save in data convergence makes it possible to deliver significant improvements in engine performance." With those improvements, Isuzu is taking the engines to market an average of two months faster.

"We saved eight-man months per engine program that was previously spent converting data by performing most engineering analysis within the I-deas environment."

*Yu Fred Homma
General Manager
CAE Promotion Department
Isuzu Motors Limited*

"Isuzu streamlines the diesel engine development process by leveraging I-deas CAE capabilities. We are looking forward to the total product engineering solutions that integrate the strengths of both I-deas and NX. We will continue to use I-deas and NX as a core of Isuzu's product development."

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