

Automotive and transportation

Piaggio

Piaggio uses LMS Virtual.Lab Durability for fatigue and durability performance evaluation of scooter crankshaft; cuts the number of required prototypes in half

Product

LMS

Business challenges

Improve the durability of new scooters across new markets

Key to success

Use of LMS Virtual.Lab Durability

Intelligent postprocessing that helps design

Results

Cut the number of required prototypes in half

Reduced the development cycle



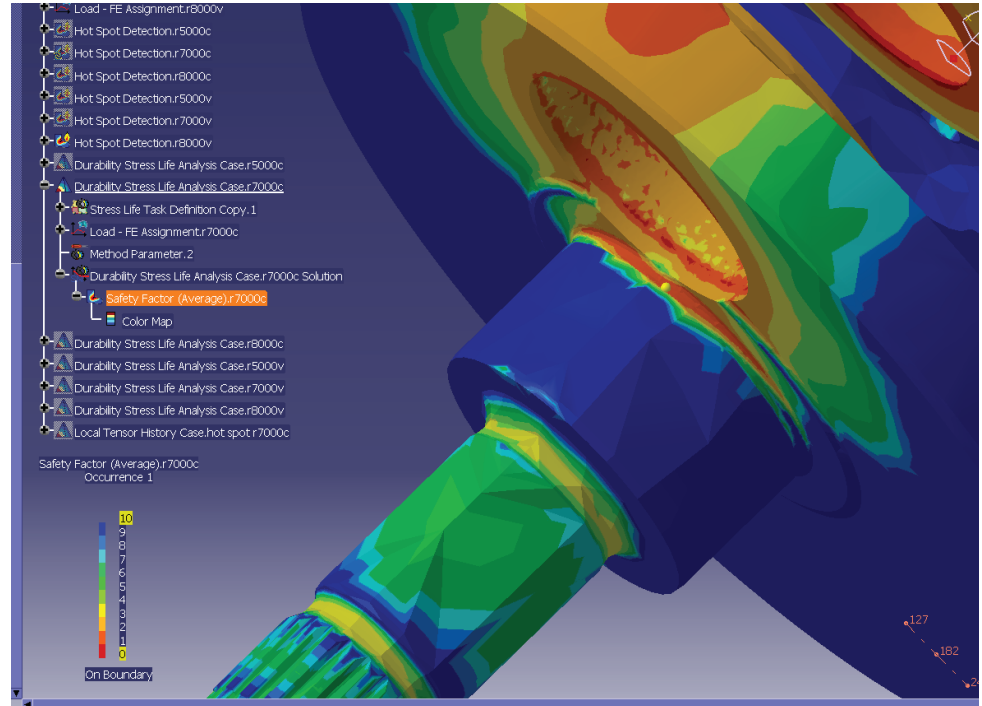
New product, new market, same high-performance simulation tool

The Piaggio Group is the leading European manufacturer of two-wheeled motor vehicles and also holds an important role in the international commercial vehicle market. Its portfolio includes the production of three-wheeled scooters and hybrids.

With more than 7,000 employees at facilities and research centers across Italy, Vietnam, Spain, China and India, Piaggio has recently been investing its efforts in

the creation of a new scooter model destined for the Indian market, and has chosen LMS Virtual.Lab™ Durability software from Siemens PLM Software to address engineering challenges linked to this new ambitious strategic move.

Piaggio started on the project with an in-depth analysis of Indian market demand characteristics and singled out a few key features of the “scooter to be,” such as low cost, high engine efficiency, low fuel consumption, low driver-ground distance and low engine emissions.



“What we also strongly valued about Siemens PLM Software during the benchmarking process of LMS Virtual.Lab Durability was the responsiveness to adapt the tool completely to the existing development process.”

Riccardo Testi
CAE Analyst
Piaggio

With these guidelines in place, Piaggio began development of a small new displacement engine. When the engineers came up with a first design for the crankshaft, the system was submitted to the motor center for assessment of the components.

The engine center employed LMS Virtual.Lab™ Durability software to analyze and reproduce the crankshaft subcomponents’ fatigue and durability performance, using the hot spot feature to single out the least safe point of the system.

The results highlighted a spot next to the contact surface between the crank shaft and the crankpin. Using the damage contribution analysis of LMS Virtual.Lab demonstrated that the crankshaft/crankpin interference fit was the main source of fatigue damage. It gave information to Piaggio that design variations on this assembly technique were delicate and could affect the whole crankshaft performance.

The output data of LMS Virtual.Lab on this spot were then compared to Piaggio’s standards. The conclusion was that, with the current design, all crankshaft components, including the hot spot, satisfied Piaggio safety factor criteria.

Riccardo Testi, an engineer and long-time LMS Virtual.Lab user from Piaggio’s motor center division, asks, “What would have happened to the crankshaft’s performance, and in particular to our hotspot, if – without simulation analysis – we had decided to slightly change the design of one of the system subcomponents?”

Testi notes, “LMS Virtual.Lab provided us with the answer to this question, as it helped us calculate the impact of all neighboring components on the system and pinpoint the highest load channel in the system.”

Finally, the initial crankshaft design was maintained, and Piaggio moved on to finalize the scooter project.

Solutions/Services

LMS Virtual.Lab Durability
www.siemens.com/plm/lms-virtual-lab/durability

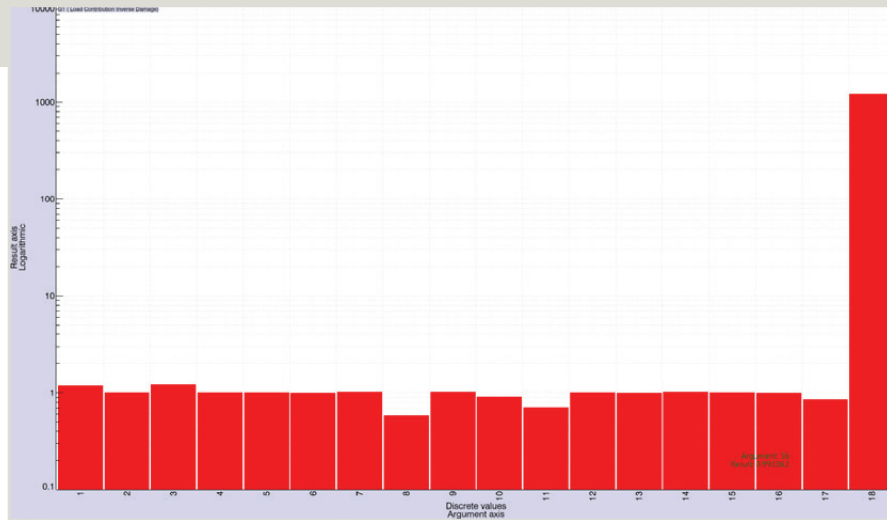
LMS Virtual.Lab Motion
www.siemens.com/plm/lms-virtual-lab/motion

Customer's primary business

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www.piaggio.com

Customer location

Pontedera
Italy



“Use of LMS Virtual.Lab Durability at Piaggio cut the number of required prototypes in half, effectively reducing the development cycle,” says Testi.

Piaggio has been a user of LMS™ software for many years, and the motor center division just recently added LMS Virtual.Lab™ Motion software to its virtual simulation portfolio for effective analysis and optimi-

zation of real-life performance of its mechanical systems.

“Siemens PLM Software is a great partner,” says Testi. “What we also strongly valued about Siemens PLM Software during the benchmarking process of LMS Virtual.Lab Durability was the responsiveness to adapt the tool completely to the existing development process.”

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