VIRTUAL CHASSIS DESIGN VALIDATION

ARÇELIK DEVELOPS RELIABLE, DURABLE CHASSIS DESIGNS USING EXPLICIT IMPACT ANALYSES
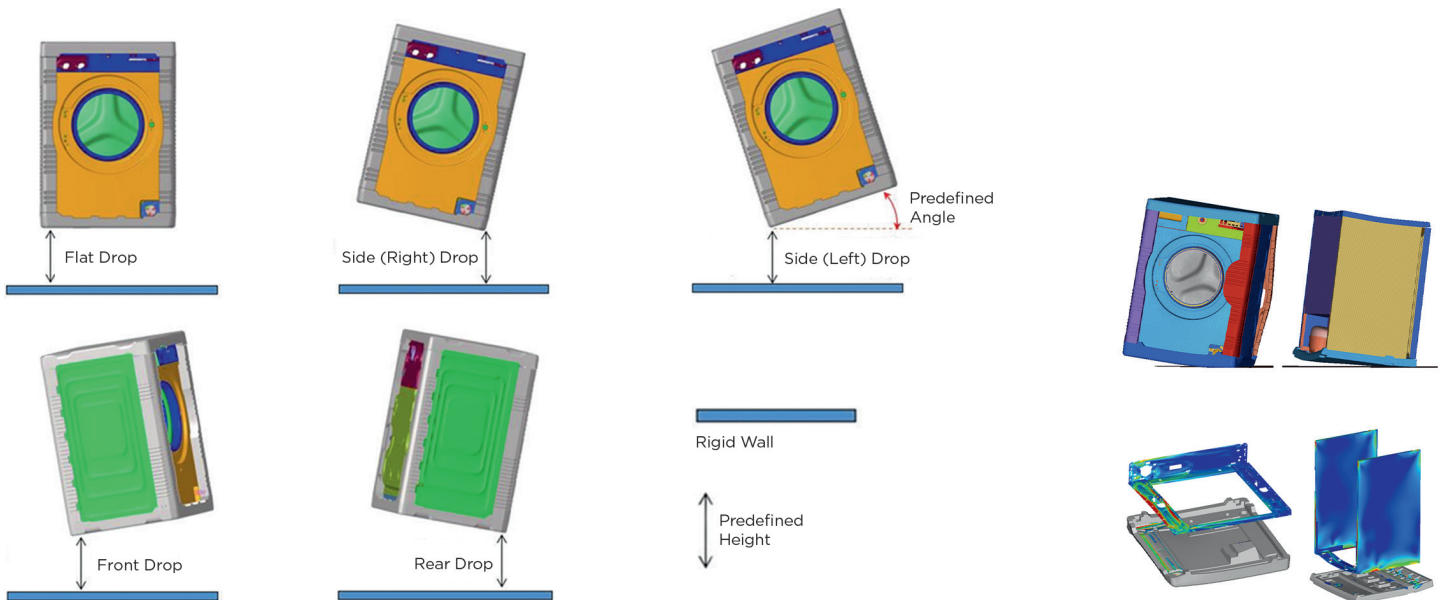
About the Customer

Arçelik is one of the leading global companies for home appliances and lifestyle solutions. The company offers products under its own brands (including Arçelik, Beko, Grundig, etc.), and seeks to lead the industry through its extensive investment in research and development. Arçelik's vision is to become the most trusted lifestyle solution provider for tomorrow's digital household. To build and maintain its customers' trust, Arçelik must design and develop products that can withstand a variety of loads and stresses throughout their lifetimes.

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Explicit drop analysis using Altair Radioss is our key asset to design highly reliable products. These computational assessments made it possible to design packaging groups with recycled materials, resulting in highly environmentally friendly products.

Dr. Armin Amindari
Senior Lead Engineer
Arçelik

Try Altair® Radioss® Today:
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Flat Drop

Side (Right) Drop

Side (Left) Drop

Predefined Angle

Front Drop

Rear Drop

Rigid Wall

Predefined Height

LEFT: Drop performance is evaluated via various impact scenarios using different impact angles and heights. **TOP:** A Drop model of each product is created by discretizing the main parts in the momentum transmission path and assigning detailed non-linear material models. **BOTTOM:** The drop performance of the product is quantified by plotting strain levels in different parts. Afterward, the chassis geometry and contact areas with the packaging group are optimized to reduce the stress concentrations.

Their Challenge

Household appliances experience the most hazardous mechanical loads during transportation. While being loaded into or unloaded from a vehicle, movers and operators can unintentionally drop products, which can dent and damage products as they collide with the ground. When Arçelik develops new products, they must consider durability so they can avoid damage during transportation. Physically testing these impact loads on products is time-consuming and often doesn't produce enough useful data regarding the interaction between the products' various parts and the entire packaging group during an impact. As such, the ability to create optimal, durable designs solely through physical testing was time-consuming, costly, and often ineffective.

Our Solution

To check and minimize the damage on products caused by impacts in transportation incidents, the company implemented an explicit drop test simulation process and defined it as an essential checklist during chassis design. Using Altair Radioss, the design of the chassis, packaging group, and contact surfaces are optimized numerically using an explicit solver from Altair's simulation suite. Radioss provided robust solutions for the company's complex models and can consider both non-linear material models and contact algorithms.

Using this approach, the company can assess products virtually during the design stage without needing to utilize costly and inconsistent physical prototype testing. As a result, Arçelik can optimize chassis designs before creating the mold designs, and have reduced the number of iterations it takes to improve molds. Consequently, the company reduced the amount of repetitive experimental tests, which sped up project delivery times.

Results

By deploying an explicit impact analysis during the design stage, Arçelik can now design more robust and reliable products. Furthermore, by applying design optimization iterations, the company reduced its packaging needs, making their products more eco-friendly and more sustainable. Thanks to Altair Radioss, the company expects an 80% reduction in mold rework and a 30% reduction in necessary packaging materials. And given that time-to-market is a vital factor, Arçelik also expects a 60% reduction in testing time, making their products more competitive in the marketplace.

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