OPTIMAL DESIGN FOR CELL PHONE CAMERAS

MOTOROLA MOBILITY USES SIMULATION OF VOICE COIL MOTORS IN CONSUMER CAMERAS

About the Customer

Motorola Mobility is one of the founding companies of the mobile communication industry. Its pioneering spirit brought the world one of the first mobile phones to market. The company brings consumers value through its devices that do not compromise on quality, experience, or style. For more than 90 years, Motorola Mobility has dedicated itself to engineering innovation geared towards advancing mobility in ways that change lives for the better.

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Altair Flux has been an absolutely critical simulation tool for the design teams at Motorola Mobility. With Flux we can quickly optimize designs and keep up with the extremely fast pace of the consumer electronics industry. Without this tool, it would be incredibly difficult to bring a working product to market in a timely manner,"

David Platner, Staff Mechanical Engineer for Camera Hardware, Motorola Mobility
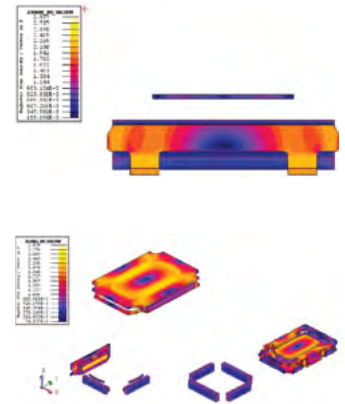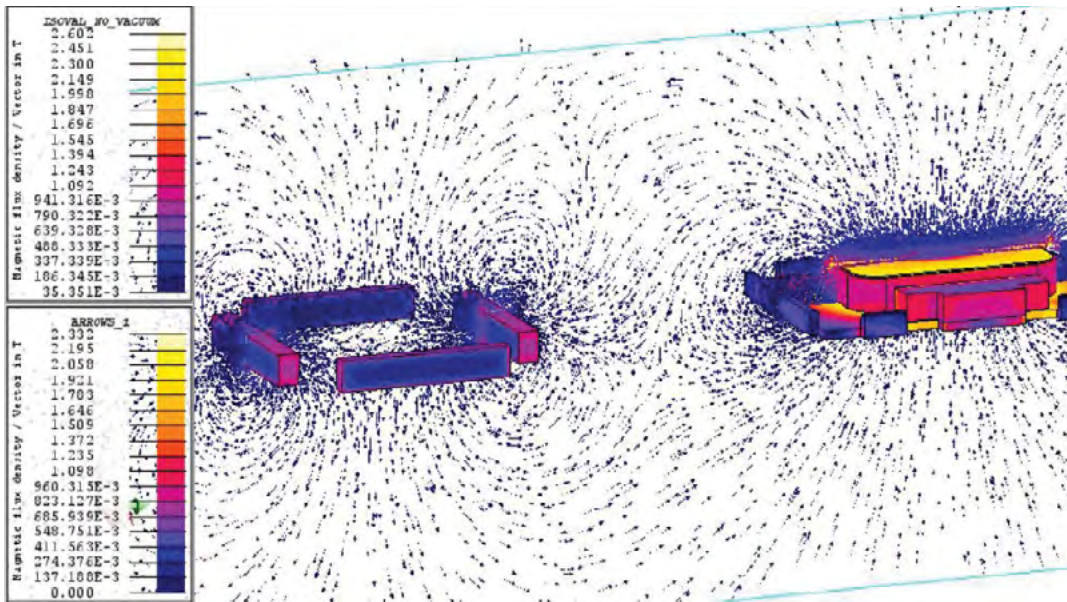
Their Challenge

The competitive consumer device industry has quick time-to-market deadlines. Smartphone cameras use voice coil motor (VCM) actuators to translate a lens in three degrees of freedom in order to bring an object to focus on the image plane and to optically stabilize the camera.

VCMs are typically bought off-the-shelf from overseas vendors, then integrated with a lens, sensor, and printed circuit board (PCB) into in-house designs. This requires the camera designer to ensure that the selected parts and phone design are compatible.

Our Solution

To ensure optimal design, the Motorola Mobility team selected Altair Flux™ to simulate the entire VCM and camera system. Flux allowed the team to quickly validate designs and ensure that the part compatibility and camera performance met the design targets. Other devices within the phone can affect the VCM performance due to magnetic interference. Examples of these devices are speakers, notification vibrators, accessory magnets, antenna shields, and more. With Flux, the team simulated the entire VCM and phone layout, accounting for all possible magnetic interference from other devices.

Full simulation of a VCM system is a requirement for any new or high-risk design. These simulations take place during part selection and product design phases in order to proactively rule out any issues that may arise.

Results

Flux shortened design cycles giving the team access to quick and reliable answers. This cut the design time from weeks and months, to days and hours, allowing the Motorola Mobility team to remain agile and quickly iterate on designs. The team can easily check design integrity and detect issues that otherwise would not be found until parts are tooled, which is too late in the development cycle. With Flux, Motorola Mobility saves time and money with a reduced number of builds, putting the company ahead of the competition.

LEFT: Flux density arrows allow for visualization of field lines.
TOP RIGHT: ISO values on a single voice coil motor magnet/yoke layout. **MIDDLE RIGHT:** Example simulation of the Motorola One Zoom.
BOTTOM: Motorola One Zoom