In the drilling industry, remote locations and operating
downtime expenses typically exceed $1,000 per hour.
At Schramm, Inc., a manufacturer and global supplier of
hydraulic drilling equipment, all components are analyzed
during the design process to ensure product reliability and
an adequate safety factor. To reach the company’s goal of
deploying exceptionally reliable equipment to the field,
Schramm has standardized on Simulation Driven Product
Development to design its products. However, the
development process hit a bottleneck at the stage when
engineers prepared models for simulation — an issue that
Schramm needed to address.

The century-old Pennsylvania company focuses on
hydraulic drills for land-based applications. All Schramm
drilling equipment is track- or truck-mounted. The
organization supplies companies in the mining, energy,
geothermal and water sectors worldwide. Over 75 percent
of Schramm revenues come from export sales, with global
reach including major market positions in China, Chile,
Brazil, Australia, Russia and South Africa.

To support its product development process,
Schramm adopted ANSYS Mechanical software in early
2010 to replace legacy mechanical analysis tools that had
been in use for the past several years. The engineers who
perform mechanical analysis there also have in-depth
expertise in CAD. The CAD systems available today have
their own unique strengths and weaknesses — but they
historically have been missing the ability to defeature and
repair an assembly in an expedient manner. Feature-
based CAD user interfaces often don’t provide the needed
level of flexibility.

The starting point for most analysis work at Schramm
is a geometry assembly supplied in native CAD or neutral
file (IGES, STEP) formats. These models typically contain
a significant amount of detail that is not relevant for
the analysis and, therefore, must be simplified. Such
simplification and cleanup work in traditional CAD
systems can be highly time consuming. To improve return
on investment from software and hardware assets, the
A traditional goal for those performing engineering simulation is to remove nonessential features in the geometry to facilitate faster and more robust meshing. The Schramm team has found that ANSYS SpaceClaim Direct Modeler enables quick cleanup and defeaturing operations, as the tool works directly with geometry and does not have to take feature dependencies into account. Cleanup work can be done in a few hours, compared with a time frame of several days using a traditional CAD package. Engineers at Schramm strive to spend as much productive time as possible post-processing and interpreting results (not repairing and defeating geometry models) and maintaining throughput on the eight-core cluster available for analysis runs. Spending less time on model setup is a huge benefit.

Another strength of ANSYS SpaceClaim Direct Modeler is the ability to drag and drop components in the structure tree to create or customize multibody parts at will and on the fly. Hexahedral meshes generally are preferred for accuracy reasons. Through proper definition of the multibody parts in ANSYS SpaceClaim Direct Modeler, the team at Schramm employs sweeping tools in the ANSYS Meshing platform that allow hex-dominant meshes to be used on complicated geometries. In many cases, it is obvious that a boundary should occur at a location where the geometry undergoes a step change, such as where a cylinder is attached to the face of a larger body. Decomposing the geometry is done using datum planes to splice the component into multiple parts.

Performing this work in the geometry phase mitigates the need to assign meshing controls in ANSYS Meshing and reduces the overall time for model setup. Shared topology may (or may not) be imposed when importing the geometry into the ANSYS Workbench platform. This means that, at the import stage, the user controls whether or not a common nodal imprint is applied at the shared boundary between adjacent parts. Generally, the shared topology option is desired, but in some cases there is value in applying different meshes to different adjacent parts.

The significant impact of Schramm’s introducing direct modeling as a model preparation tool was larger than expected. For example, one engineer previously performing two to three projects per month is now regularly performing four to five during the same time frame. The larger and more complex the model, the more significant the time savings. Schramm can now reap a number of benefits from higher engineering analysis throughput, including reduced time to market and more reliable equipment.