Ansys

CASE STUDY /

Ansys + Downing

"We've been using Ansys Cloud for five months now and it's been a game-changer for us from a productivity standpoint, especially because we can submit multiple Ansys Mechanical jobs covering different scenarios and run them overnight. Ansys Cloud also eliminates any scheduling or memory capacity concerns regarding our own computing system. It's been a fantastic product."

Tim Marvel
Vice President / Business Development and Technology Downing, A Subsidiary of SEF Energy

CASE STUDY

In the oil wellhead market, conventional technology uses bolted flanges to fasten components of the wellhead, which is a timeconsuming process. In their drive to bring new technology to the marketplace, Downing engineers wanted to develop a Quick Connect system so a worker could lower the connecting equipment on top of the wellhead and run screws around the periphery, eliminating the bolted flanges. The new design saves significant assembly time per flanged connection for batch drilling scenarios and servicing blowout preventors (BOP). The system has to withstand high pressures of up to 15,000 psi, in addition to multiple load cases, so mechanical simulation was critical to verify and validate the design.

Downing Quick Connect System Speeds Wellhead Installation

Company Description

As a technology leader, Downing Wellhead Equipment manufactures a full suite of wellhead and fracking equipment to enhance safety and lower costs. This includes Freedom Series, a new suite of automated products that reduce unplanned costs, compress the fracking cycle, and improve safety by eliminating red zone operations. In addition, the company offers manufacturing, engineering and rental services. Downing Wellhead Equipment serves major operators in the United States who require robust, well-maintained equipment to minimize downtime and costly repairs.

Challenges

Downing had to provide wellhead workers with a solution that saves time while being practical and simple to use. Installation had to be possible using the tools that were already available. The connecting system had to be structurally designed to fit within the geometric envelope of the wellhead. Also, because wellhead operators rent the Quick Connect to drilling companies and compete with traditional flanged technology, it was important to drive down the manufacturing cost of the Quick Connect system.

Technology Used

- Ansys® Mechanical™
- Ansys® Cloud

Engineering Solution

- Used Ansys Mechanical to perform a highly nonlinear mechanical simulation involving bolt pretension, contact and nonlinear gasket materials. The resulting model had two million nodes and up to four load cases.
- Ran the mechanical simulations on Ansys Cloud enlisting 96 compute cores with distributed parallel processing.
- Used Ansys Mechanical to develop a two-piece design and to reduce critical stresses after discovering that a single component would be too large to manufacture.

Benefits

- For each design case, Ansys Cloud reduced Ansys Mechanical simulation time from 15-20 hours on a local workstation to only 2-4 hours.
- Wellhead operators reported saving 8 hours on installation time using the Quick Connect system.
- The Quick Connect system enabled Downing to win additional work where this type of system is a requirement.

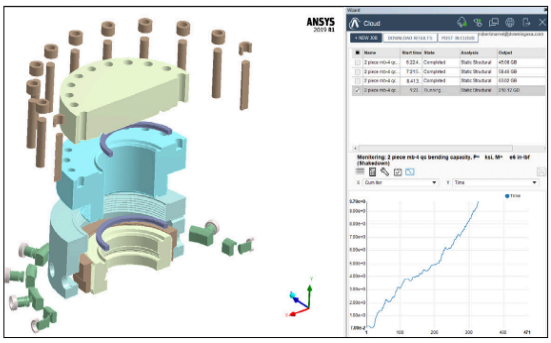

Figure 1. Ansys Cloud Wizard allows for monitoring solution metrics of several simultaneous simulations from the familiar native Workbench environment.

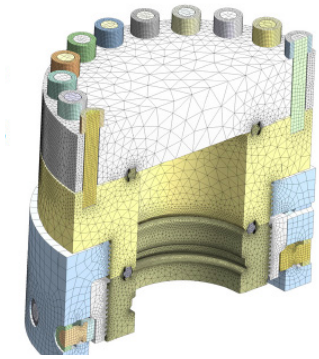

Figure 2. Degrees-of-freedom is not a restrictive factor with Ansys' cloud compute resources.

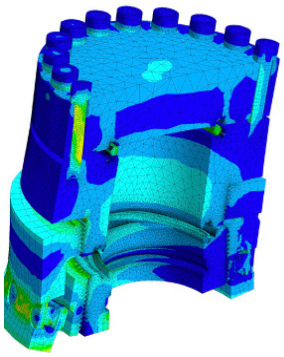

Figure 3. Compute resources offered by Ansys Cloud allows us to run higher fidelity models than what was ever possible before. Compute resources of Ansys Cloud provide quick and hassle-free solutions.

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