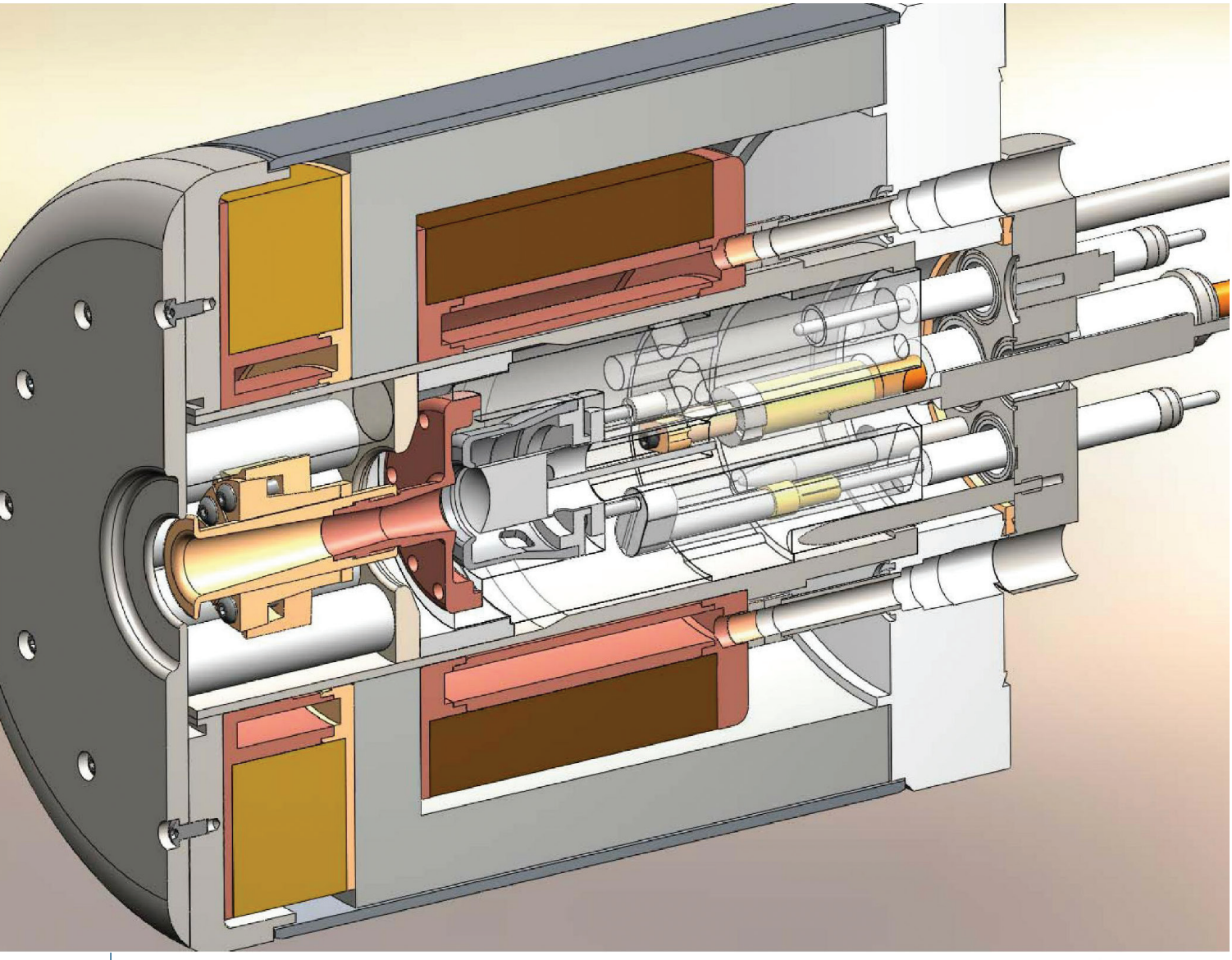
DASSAULT SYSTEMES

SOLIDWORKS

NATIONAL SUPERCONDUCTING CYCLOTRON LABORATORY

ADVANCING ACCELERATOR DESIGN AND NUCLEAR SCIENCE RESEARCH WITH SOLIDWORKS SOFTWARE



NSCL researchers use SOLIDWORKS to design and develop a wide range of accelerator components and detectors to support cutting-edge nuclear science experiments, such as the above beamline segment that is part of the NSCL reaccelerator (ReA$_3$).

NSCL

Results:

- Shortened design cycles
- Improved ability to handle large assemblies
- Lowered development costs through reduced scrap and rework
- Enhanced quality through greater precision

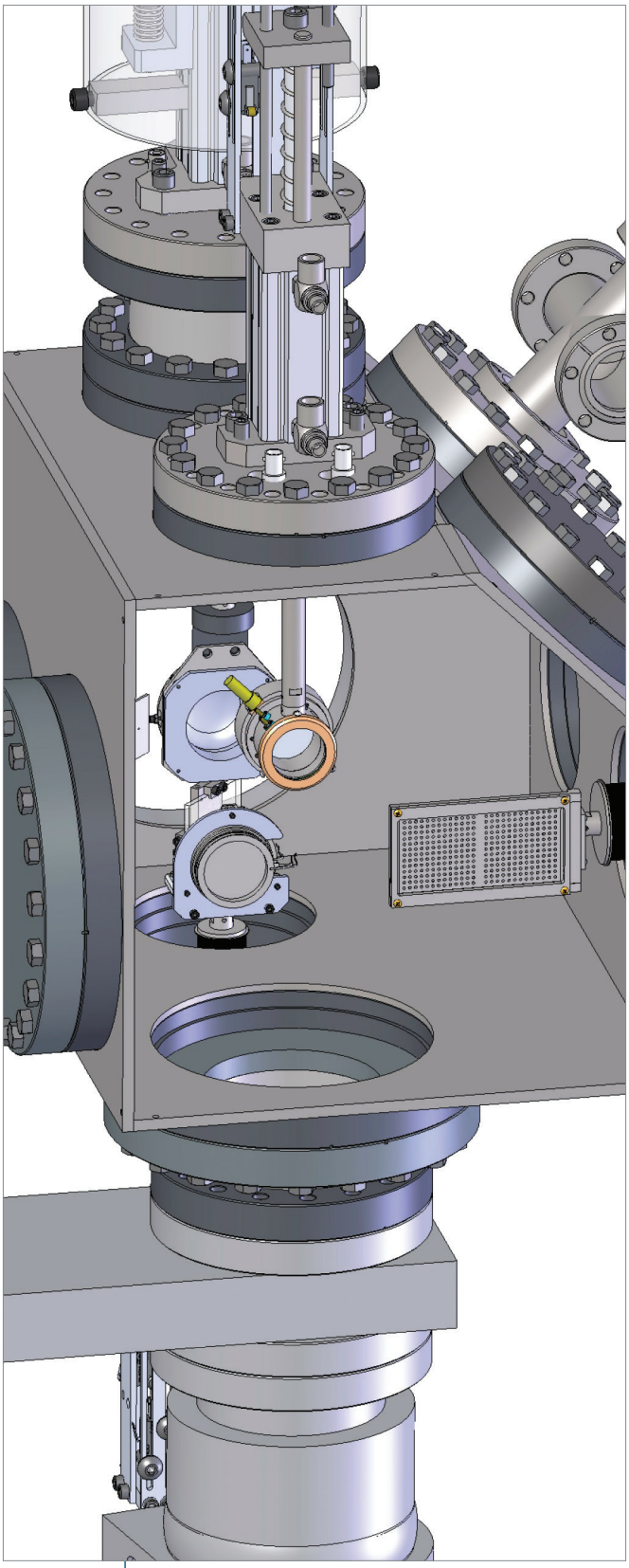
National Superconducting Cyclotron Laboratory (NSCL) works with scientists worldwide to conduct advanced research into fundamental nuclear science, nuclear astrophysics, and accelerator physics. Located on the campus of Michigan State University, NSCL has a staff of skilled engineers that works with researchers to design and develop a variety of equipment for a wide range of accelerator components and detectors to support cutting-edge nuclear science experiments. Up until 2004, the research facility had used a CAD package from another vendor. At that time, NSCL engineers realized that they needed a development platform with a stronger emphasis on mechanical design, according to Jack Ottarson, senior engineer.

"Our previous CAD vendor was primarily focused on civil engineering and architectural design, and the modeling package did not provide the type of mechanical design capabilities we needed to develop equipment for experiments," Ottarson explains. "We design assemblies ranging from two parts to thousands of components. So we needed a 3D CAD package that allowed us to create equipment more efficiently, make design changes more easily, and interact with our machine shop more effectively."

NSCL engineers evaluated several CAD packages and eventually selected SOLIDWORKS® Research Edition as their primary development platform. Initially, the lab chose to install 18 seats of SOLIDWORKS software because it is easy to use, interfaces well with the shop's machining software, and includes large-assembly capabilities. NSCL engineers also value the software's integrated simulation tools, configuration capabilities, and SOLIDWORKS eDrawings® communications application. NSCL now has over 100 seats of SOLIDWORKS.

"We needed a package that not only met our requirements, but also required a short learning curve. SOLIDWORKS has proven to be the right package for us."

—Jack Ottarson, Senior Engineer



With SOLIDWORKS software, NSCL engineers have improved the quality and accuracy of equipment designs, including the diagnostic box in the ReA_3 beamline.

"We needed a package that not only met our requirements, but also required a short learning curve," Ottarson recalls. "SOLIDWORKS software has proven to be the right package for us."

IMPROVED FLEXIBILITY SHORTENS DESIGN CYCLES

Since implementing SOLIDWORKS software, NSCL has reduced its development cycles and increased its ability to consider multiple technical solutions to engineering problems. While a push for agile workflows and lean production have streamlined operations, Ottarson attributes some of the time savings to the ease of making design changes to large assemblies in SOLIDWORKS software and to the improved interaction the software has enabled between NSCL engineers and the lab's fabrication facility.

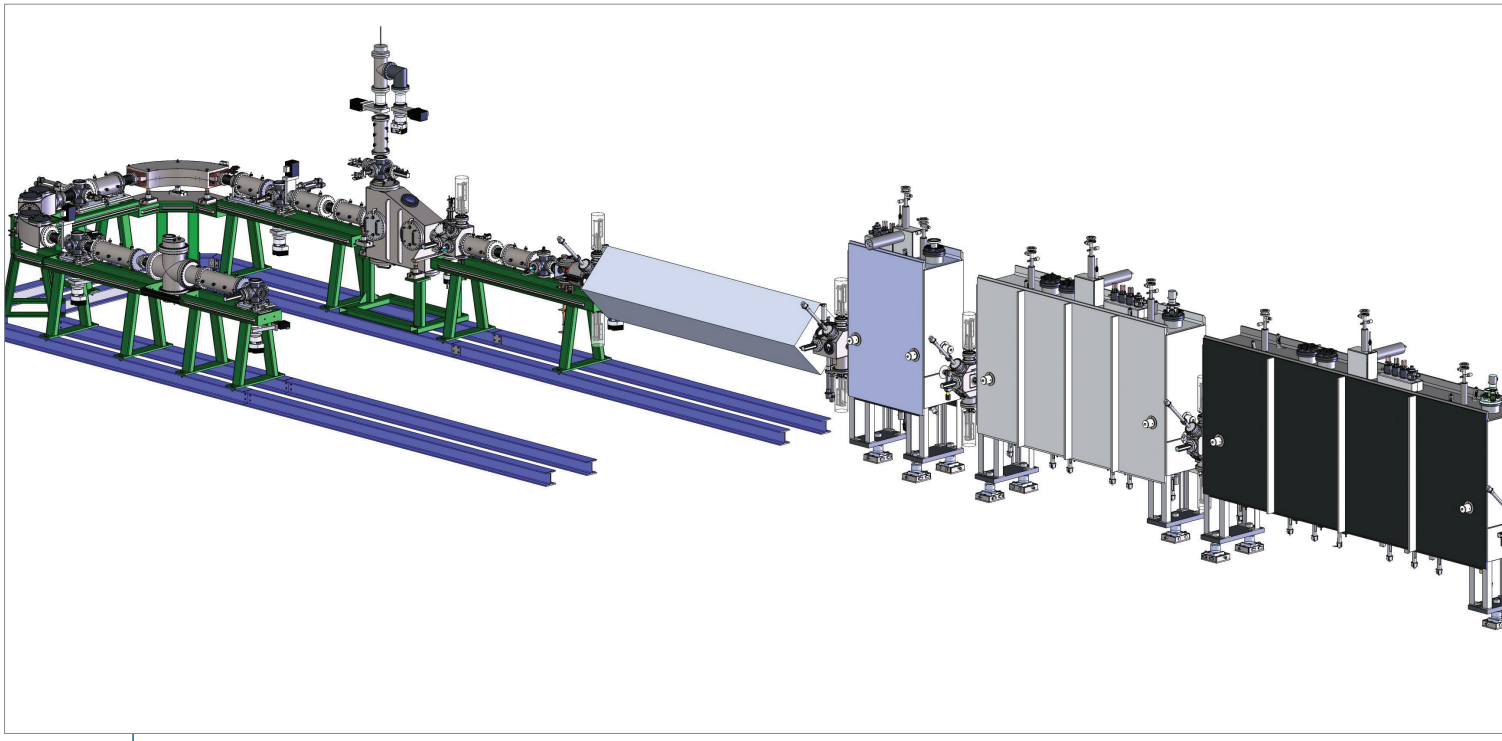
"No matter what type of equipment or devices we design for different types of accelerators, our ability to make design changes—without having a lot of additional detail changes—has improved," Ottarson notes. "We do most of our fabrication in-house, and SOLIDWORKS software has made it at least modestly easier to interface with our shop. Our machinists have access to the solid model, which eliminates questions and misunderstandings. Since our parts come out more quickly, we have been able to expand our operations."

INTEGRATED SIMULATION TOOLS IMPROVE QUALITY

The move to SOLIDWORKS software also has enabled NSCL engineers to improve design quality and achieve greater accuracy using integrated design simulation, configuration, and validation tools. For example, many of the lab's designs involve moving various mechanisms into and out of the path of an accelerated beam of ions within very small spaces.

"Some of our detector boxes have to move several different devices, some of which occupy the same physical space, into and out of the beam in a very precise way," Ottarson points out. "The collision detection tools in SOLIDWORKS software help us to ensure that the detectors do not interfere with each other. We also use SOLIDWORKS software's design capabilities to model our devices in both deployed and retracted states, which helps us to improve our understanding of the dynamics of the assemblies."

NSCL also uses integrated SOLIDWORKS Flow Simulation computational fluid dynamics (CFD) to analyze the thermal performance of its extensive water-cooling systems and to study gaseous flows within a vacuum for certain experiments.



NSCL engineers use SOLIDWORKS software to design Equipment for advanced research in nuclear astrophysics, such as the segment of the beamline that is part of the ReA$_3$ shown here.

Focus on National Superconducting Cyclotron Laboratory

NSCL is one of the world's flagship nuclear science research facilities. It is funded by the National Science Foundation to be a national user facility with a mission to provide beams of rare isotopes for researchers from around the world.

Mission: To serve the scientific community and operate the NSCL in a way that lets researchers perform ground-breaking experiments in nuclear science.

Staff: 700+ including 42 faculty and 150+ undergraduate and graduate students.

Headquarters: East Lansing, Michigan, USA

For more information www.nscl.msu.edu

BETTER COMMUNICATION BOOSTS COLLABORATION

Because SOLIDWORKS can read and output a wide variety of CAD data—and includes the SOLIDWORKS eDrawings® communications application—NSCL has realized greater levels of collaboration with its research partners, including nuclear physicists who have limited or no previous mechanical CAD experience. "We collaborate with scientists who send us plans for experiments," says Ottarson. "We receive their ideas in many different CAD formats and sometimes have to model the equipment from scratch.

"eDrawings files are also a big help," he adds. "Being able to go to a meeting with a group of physicists and show them an actual 3D image greatly improves design communications."

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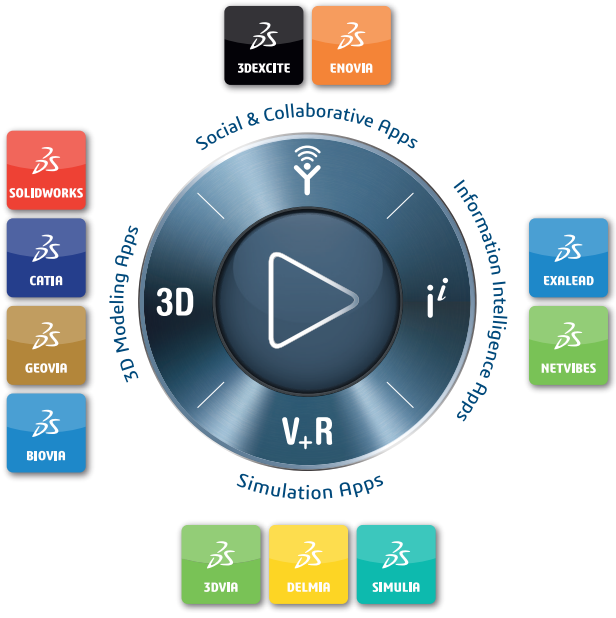

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