



NNS Digitizes Sheet Metal Shops with Custom Program Built in Autodesk Inventor Software

The Organization

Founded in 1886 as the Chesapeake Dry Dock and Construction Company, **Newport News Shipbuilding** (NNS) is the nation's sole designer, builder, and refueler of nuclear-powered aircraft carriers and one of two shipyards capable of designing and building nuclear-powered submarines. With more than 25,000 employees, including experts in nuclear propulsion, naval design, and manufacturing, NNS is the largest shipbuilding company in the United States. From its 550+ acre site in Virginia, its people have built more than 800 ships, including some of the most famous ships in American history.



**Newport News
Shipbuilding**

The Challenge

With a history spanning more than 136 years and employee tenure stretching into decades, NNS had perfected its processes to design and manufacture some of the most advanced ships in the world. The NNS team of expert craftsmen performed calculations, sketched out designs, transferred the designs to metal, and cut the metal all by hand.

Impressed with NNS's history and reputation, Anthony Ugoletti, joined the company right out of college from the University of Pittsburgh at Johnstown as a Manufacturing Engineer supporting the sheet metal shops. Although new to the shipbuilding industry, Anthony brought extensive experience with Autodesk software, and he recognized the need to automate some of the manual shop floor processes to improve overall efficiencies and shop manufacturing throughput. He introduced the NNS sheet metal team to AutoCAD and Autodesk Inventor.

"While replicating the manual processes in AutoCAD, I realized that we needed a tool to automate the work," said Anthony. "We needed the tool to accomplish our goal of fully digitizing the sheet metal lagging creation without requiring our craftsmen to have an in-depth knowledge of AutoCAD or Inventor."

The Solution

Anthony discussed the challenge with various groups around the shipyard and was introduced to IMAGINIT Technologies by NNS's trades training department who had worked with them for Autodesk software training and tool development.

After an initial conversation with Anthony, the IMAGINiT account representative for NNS put together a team of experts from IMAGINiT's Manufacturing Solutions Division. Together, they visited the shipyard to fully understand the scope of the project. They met with NNS craftsmen to see the product, review their current manual processes, and identify areas for improvement. The IMAGINiT team then developed a digitization solution that included:

- Moving NNS from AutoCAD to the Autodesk Product Design & Manufacturing collection, which includes both Inventor and AutoCAD and offers more efficient collaboration and automation tools
- A custom software program built by IMAGINiT experts using Autodesk Inventor to automate the NNS team's calculations and design process to generate the lagging assemblies, parts, and flat patterns based upon inputs from the user as well as scans of the lagging rods
- Integrating the NNS team's technology that scans the lagging rods into Inventor software
- A review process between the IMAGINiT team and the NNS craftsmen to test the software and identify areas for refinement

The Results

After a period of fine tuning the software, the process of manufacturing metal lagging at NNS went from being a completely manual process to using a fully digital process. The same craftsmen that had been working with calculators and pencils can now scan the rods and upload the data into the Inventor to generate 3D representations of the final part on various piping sections. The craftsman then uses these models to identify areas that need fine tuning to ensure proper fit-up on the ship. Once the models meet their requirements, the craftsman then exports the data into individual laser programs to cut and etch the metal. From there, the metal goes to the fabrication and assembly team where it is hand rolled and welded. "The pieces fit perfectly and the craftsman quality of life has improved dramatically," said Anthony.

Moving from the manual to automated processes has brought NNS numerous benefits:

- **Increased efficiency** that decreased sketching and layout time and increased manufacturing throughput
- **Improved safety** through the elimination of repetitive motion required for hand drawings and use of band saws for cutting individual components
- **Enhanced customer and employee satisfaction** through the use of digital manufacturing and CNC equipment to improve individual quality of life and component quality

"This project went smoothly and was so successful because of the knowledge and commitment of the IMAGINiT team," said Anthony. "They helped us completely transform the shop into a safer environment that is more efficient with the same staff working the same hours and same equipment."

Solutions Beyond Software

IMAGINiT Technologies, a division of Rand Worldwide, helps architects and engineers become more proficient in the use of 3D technologies to design, develop and manage complex engineering projects faster and more cost-effectively.