Hubbardton Forge Gets It Right with Sequence Paperless Work Instructions

From humble beginnings in 1974 and operating out of a 19th century barn, Hubbardton Forge is now the oldest and largest commercial forge in the United States, generating more than $20 million in annual sales.

Located in Castleton, Vermont, the company produces thousands of high-end, hand-forged lighting products – "Art that Lights up" – marketed through residential lighting and home furnishings retailers as well as contract distributors.

In the beginning, the instructions to forge and fabricate the lighting products were filed away in the heads of founders George Chandler and Reed Hampton. Not too difficult to keep track of a limited number of products, says Jan Pressler, Hubbardton Forge's international development specialist and lean process engineer. The startup offered only a few products marketed at fairs and craft shows.

"Very little was formally documented," Pressler says. "As business grew and employees were hired, the founders had to convey what they knew to others, oftentimes as sketches on pieces of paper with Polaroid photos."

And grow they did. In 2009, the product line included more than 1,000 base items. The number of printed work instructions increased to fill more than 17,000 document files in 12 large filing cabinets (46 drawers of paper documents). Today, 200 artisans are employed at the company known for its innovative hand forged design and manufacturing techniques that ensure its products will last for generations.

"Design leadership in the industry is an important part of Hubbardton Forge's strategic planning and every year we introduce an average of 80," Pressler says. "In addition, for a number of years there was not a formal plan for discontinuing products. That annual production increase grew the volume of paper work instruction documents, and we started writing them in early versions of Microsoft Word in the 80s."

Paper Problems

She says finding the proper work instruction in the file drawers was often difficult. Sometimes the instructions were already being used. Sometimes they were misfiled. In other instances, the instructions slipped between hanging files to disappear entirely.

When it was all said and done, employees spent up to 30 hours per day locating, pulling and filing the paper process documents. That equated to more than three full time employees per day.

“It was a tremendous cost to our company,” Pressler says. Not just in time but we would go through 10 reams of paper a week in assembly alone reprinting lost work instructions.”

All the work instructions were saved as Word documents with no formal document management or naming conventions. Manufacturing errors occurred because the paper documents were not always the correct document or revision.

Additionally, if an operator discovered a problem with the instruction, or there had been a change to the process or components, a team member would notify the team leader or process specialist. The person notified often was not the person responsible for making corrections to the work instructions. As a result, the request would be delayed, and a work order would come to the floor before the changes had been made.

Because the work instructions were not connected globally in a database, even more work was created. Every file had to be changed individually and the work documents reprinted and re-filed after engineering or process changes.

“This wouldn’t be too bad if it was a simple change that only affected one or two work instructions,” Presser says. “However, if the change was more global, for instance if UL (Underwriter’s Laboratory – Electrical Standards for safety) asked us to make a change in our testing of an entire category of fixtures using a specific wire or ballast, the change in the work instruction could affect hundreds of different documents. Each had to be changed, reviewed, approved, printed and re-filed for the operators. And we hoped we didn’t miss one.”

Evaluating the Options

In 2009, Karin Lotz, director of Manufacturing Operations, tasked Pressler and other members of the company to find a functionally-specific software answer to the paper process problem. The directive was part of Hubbardton Forge’s desire to be more flexible for company growth and employee training, increase quality and incorporate lean manufacturing initiatives. The solution would also decrease time spent creating, printing, filing and locating process documents.

Just as important, the company also wanted to reduce the amount of rework between departments caused by incorrect or unclear work instructions and increase value added activities. Pressler began by polling management, work instruction authors, team members who use the work instructions, quality auditors, and customer service representatives about what they wanted in work instruction software. She compiled a list of “desires” that would be compared with the functionality offered by the different software solutions.

After narrowing a list of potential database software suppliers to four, Dale Carr of the company’s MIS department, vetted each supplier as a potential partner. They were evaluated for compatibility of their software with the current hardware platforms, ease of operator use, training and support available before and after the sale.

Among the vendors was FFD, Inc., Knoxville, Tenn. Carr talked with FFD Vice President Jack Hay about Sequence software who, like the other potential vendors, provided documentation for evaluation. Pressler says Sequence met 67 percent of the criteria, far ahead of the other companies that came in well under 40 percent.

Hay offered Hubbardton Forge a 30 day trial evaluation of Sequence. Pressler assembled a team of people from every manufacturing department to test the software. A sample of 20 products was selected as part of the evaluation and a team of operators also used the new work instructions to build products.

“At this point we were not thinking immediate paperless deployment on the manufacturing floor, although it was a long term goal of the project,” Pressler says. “We were only considering how it could improve our paper process, the creation of the work instructions, and the ease of use for new and existing manufacturing team members.”

At the end of the 30 days the teams were convinced Sequence would satisfy closer to 70 percent of what they needed.

Problem Solved in Stages

The economy was entering a decline when Sequence was first deployed at the facility and resources within the company were limited. Hubbardton Forge purchased a single administrative license and two authoring licenses that were immediately put to work in the forge and weld departments, the first two steps in the production process.

Initially, only new products were selected for the software upgrade.

Today, Hubbardton Forge has 10 Sequence authoring licenses that are used in every production phase - forge, weld, finish, assembly and fulfillment. Manufacturing teams also have access to the instructions on 58 touch screens deployed throughout the plant. The work instructions are available on the Hubbardton Forge computer system for engineering, design, supply chain, customer service and every support and administrative department in the company.

A RFID scanner is also mounted with each touch screen in production and fulfillment. Kelly Murphy, Hubbardton Forge’s MIS manager, wrote a program that creates bar codes for the cover page of the manufacturing work orders containing the product information. Operators scan the bar code on the work order and the proper work instruction folder appears on the screen. Operators select their respective departments and complete the work instructions for their areas.

Customized carts fitted with wireless PCs, touch screens and scanners were also developed by Hubbardton Forge for work areas without permanent benches or multiple processes. The carts allow operators to plug into any area and become their own workstations as the workflow dictates.

Quality Increases, Waste and Training Time Decrease

Now that 56 percent all Hubbardton Forge's products are documented using the software, Pressler says decreases in waste and training time needed for new employees are apparent. Additionally, internal rework has decreased and overall quality to the customer has continued to increase. The company's rework goal in 2013 is 7.2%, or less. Through March 2013 the percentage was a low 4.3%.

Hubbardton Forge encourages labor sharing as part of its lean initiatives. Employees "go with the work flow" rather than being confined to one department, Pressler says a standard format makes it easy for a person to go from one department to another because of the uniformity of the work instructions.

She says the format provides consistent document structure across departments. The standard format includes: (a) the critical elements; (b) what parts are coming to the operation; (c) any pre-build or assembly work that needs to be done; (d) what needs to be done in that department; and (e) what the completed operation looks like that passes to the next department.

In the past, there was no formal training process for training authors writing work instructions for their departments' processes. The documents had varying appearances and emphasis.

"The standard format and a set of author guidelines helped us go from four to eight weeks for training an author to less than four hours," Pressler says. "And it only takes about six hours for the author to be proficient in building a work instruction. These time savings add up and give the authors more time to support their teams with refinements, clarification and new product training."

At the time of the Sequence deployment, total paper work instruction document management for all the departments was approximately 30 hours per day. This has been eliminated (roughly three full time persons per day) and the additional capacity is now utilized to produce more product throughput. Additionally, the team leaders and process specialists have many fewer interruptions in their day searching for paper documents.

And the days of Polaroid photos and black and white copies are long past. In the paperless world, operators now have high resolution color photos and images available to them at the touch of a screen.

"They can select and expand pictures as needed," Pressler says. "Welders can see where the welds go. They don't have to rely on words. This is important because some people are much more visually oriented than others."

Hubbardton Forge, nationally recognized numerous times as an environmentally green company, has also reduced the amount of paper it once used to print the work instructions. "We were using a case of paper per week to print and reprint process documents. That's not as socially responsible as our company would like to be."

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Growing a Partnership

"Hubbardton Forge has a tremendous niche in the marketplace," says FFD President and Founder Barry Lucas. "Sequence allows the company to ensure the quality and integrity its work. We are a partner with the employees because we are all committed to customer service, value and the way their products work. They take great pride in what they create, always working to achieve the highest standards of craftsmanship, and so do we."

Pressler says this good and growing partnership was apparent from the beginning. "When we first started we couldn't commit the financial resources to the number of licenses we needed," she says. "FFD worked with us to spread our purchases out over time. Additionally, they have worked with us to make software modifications or improvements to suit our manufacturing world and our environment. The building blocks within Sequence are easy to use and adapt. The flexibility is built in."

Today, Hubbardton Forge is experimenting with new dimensions of Sequence software as part of its lean focus.

"I recently worked with some global applications for our work instructions that will save our authors more time, decrease the frustration for our team members and increase the quality to the customer," Pressler concludes. "I can't wait to see some of the new iPad and video applications FFD is developing and look forward to the next improvements that we will make to the Hubbardton Forge processes."

Sequence Enterprise

Designed for the manufacturing enterprise needing work instructions that are collaboratively authored, fully integrated with ERP/PLM/MES and deployed in a real time, interactive paperless environment.

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