

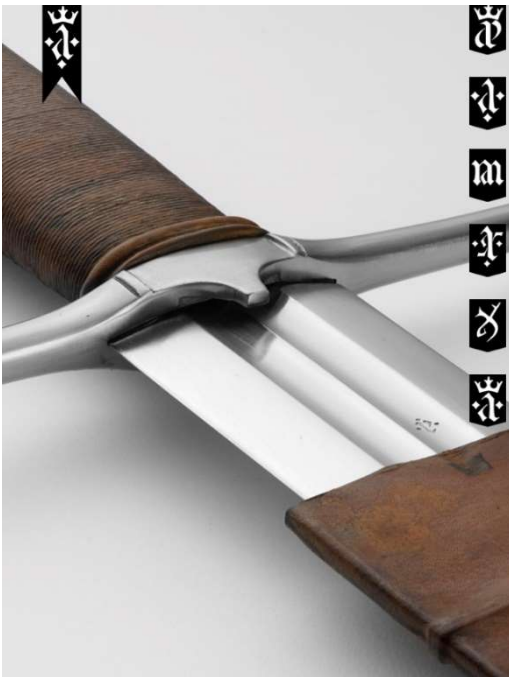


## Finding Success with Cutting-Edge 4-Axis Machining

### *Albion Swords Slashes Development and Production Time with CAMWorks Multi-Axis Milling Solutions*

*A leading North American manufacturer of metal swords and sword recreations was looking for a way to speed up their machining and cutting process, which relied on older drawings that could not handle more complex 4-axis machining. The company needed a program that could support complex machining while integrating with SOLIDWORKS, and found HCL CAMWorks.*

Albion Swords Ltd., LLC, is a leading North American manufacturer of metal swords and sword recreations, for swords that are primarily European and historical in origin. Founded in 1999 by Howard and Amy Waddell as Albion Armorers, the company began producing its own sword product lines in 2001. Although a relative newcomer to the sword manufacturing market, Albion quickly established itself as the high-end standard for exacting historical recreations of popular medieval and other sword designs.



Working closely with some of the world's best swordsmiths and historians, the swords produced by Albion are now widely regarded as some of the best modern recreations of European swords in the world. To signify this high level of quality, the company etches The Albion Mark—the signature of Albion's commitment to quality—on every product that it makes. Each mark corresponds to an Albion Product Line that is defined by its unique aesthetic and functional qualities, such as The Museum Line, The Maestro Line, The Squire Line, etc.

*Albion Swords are widely regarded as some of the best modern recreations of European swords in the world.*

While the final swords are assembled, crafted, and finished by hand, blanks from which the blades are made are machined—mostly from 1075 carbon steel—on a CNC machine, according to Designer and Programmer Mark Risley. “Before I joined the company in 2016, sword drawings were created in a leading CAD software used by my predecessor, as were the tool path programs used to cut blanks,” Risley explains. “Not only was the process slow and inefficient, it also hit a wall when we began developing more

complex sword designs that required 4-axis machining to produce. We needed to develop new products that required milling laterally, vertically, and with twists. We started looking for a better method for producing blanks to improve productivity and increase throughput.”



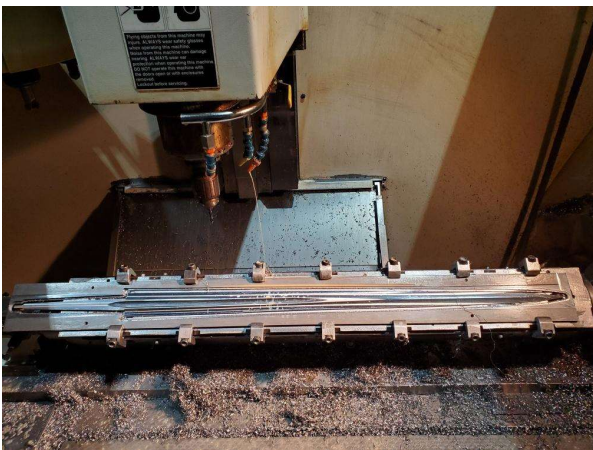
*Mark Risley, Designer and Programmer at Albion Swords*

According to Risley, Albion Swords was initially interested in the SOLIDWORKS® 3D design package for developing new sword product designs, but was pleased to discover that SOLIDWORKS serves as the modeler for all CAMWorks® solutions, including CAMWorks Professional multi-axis milling software, which supports 3-, and 4-axis milling. “We learned that CAMWorks is nested inside SOLIDWORKS

software as a plug-in and would enable us to model a sword blank and export the G-Code for milling in one step. We realized that the seamless nature of the CAMWorks and SOLIDWORKS integration would transform a lengthy, labor-intensive approach into a process that is almost effortless by comparison.”

### **Modeling and Cutting Swords to Develop New Products More Quickly**

Since implementing CAMWorks Professional multi-axis milling software, Albion Swords has realized dramatic productivity gains. For example,



*Since implementing HCL CAMWorks Professional software, sword production has been cut from about a week to a single day.*

with the previous manual process centered on the prior CAD system, modeling a sword blank, generating the toolpath to mill it, and cutting the sword blank took about a week. With CAMWorks

## **THE CLIENT**

**Company:** Albion Swords

**Headquarters:** New Glarus, WI, USA

**Industry:** Manufacturer of swords and sword replicas, primarily European in origin

## **THE CHALLENGE**

Accelerate design, machining, and finishing of metal swords and sword replicas to shorten delivery times, improve efficiency, and maintain consistently high levels of quality.

## **THE SOLUTION**

Implement CAMWorks Professional multi-axis milling software to support 4-axis machining, take advantage of the solution’s seamless integration with SOLIDWORKS 3D modeling software, accelerate production, and automate manufacturing processes.

## **THE BENEFITS**

- Cut sword machining programming time from one week to one day
- Slashed development time for new line of five swords from a few years to six months
- Cut scrap and waste by 75 percent
- Improved efficiency using machining simulations and fine-tuned post processors

software, Albion can model, program, and cut a sword blank in a single day. This improvement in efficiency is helping the company energize its new product development effort.

“We recently introduced five new sword models, which were developed, manufactured, tested, and put out in record time,” Risley notes. “With our previous process, introducing five new products would have taken three or four years. With CAMWorks, we were able to cut that down to six months.”

### **Simulating Toolpaths Cuts Waste**

In addition to enabling what Risley describes as a “considerably more rapid process,” the move to CAMWorks software is helping Albion Swords maintain consistently high levels of quality while simultaneously cutting scrap and waste by 75 percent. Risley attributes the quality improvements and reduction in waste to the ability to simulate tooling runs with CAMWorks Virtual Machine, which simulates toolpaths and tooling operations using the G-Code generated for each specific machine.



*Higher quality and less waste are just some of the improvements seen since Albion Swords switched to CAMWorks.*

“Instead of relying on dry runs like we used to and creating a greater volume of scrap whenever a dry run reveals issues, we now simulate all of our toolpaths in the CAMWorks virtual 3D environment,” Risley points out. “Before we cut a sword blank, I run the simulation program so I can check on things like tool deflection or if there are any features that I’m not comfortable with. There are a lot of nuances when it comes to toolpaths that you want to identify in software instead of blowing your tools up. CAMWorks enables us to do that and improve quality while we boost productivity overall.”

### **Deploying Strategies, Automating Blank-Cutting and Etching Processes**

Albion Swords has also leveraged CAMWorks tools to further automate its processes. The company tapped the flexibility of the SOLIDWORKS and CAMWorks Application Programming Interface (API) to create its own CAM post editor, which allows the company to configure each post to meet the company’s specific milling needs and further automate its processes. With this tool, Albion can edit the post to change the initial setup of a part program or change how particular operations work, such as having one post for standard jobs and another for 4-axis runs.

"I typically start with the strategy recommended by CAMWorks and may edit that strategy with our post editor based on the simulation output," Risley explains. "This enables us to break the G-Code down into blocks to fit different styles and needs, which makes cleaning up the code effortless. There's also an incredible amount of etching and runes on our blades, and CAMWorks also automates that process."

"In recent years, we've experienced increasing demand for our swords," Risley continues. "The automated tools in CAMWorks are helping us meet that demand."



*With the new processes, Albion Swords has been able to introduce new sword models significantly faster.*

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#### **About CAMWorks**

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