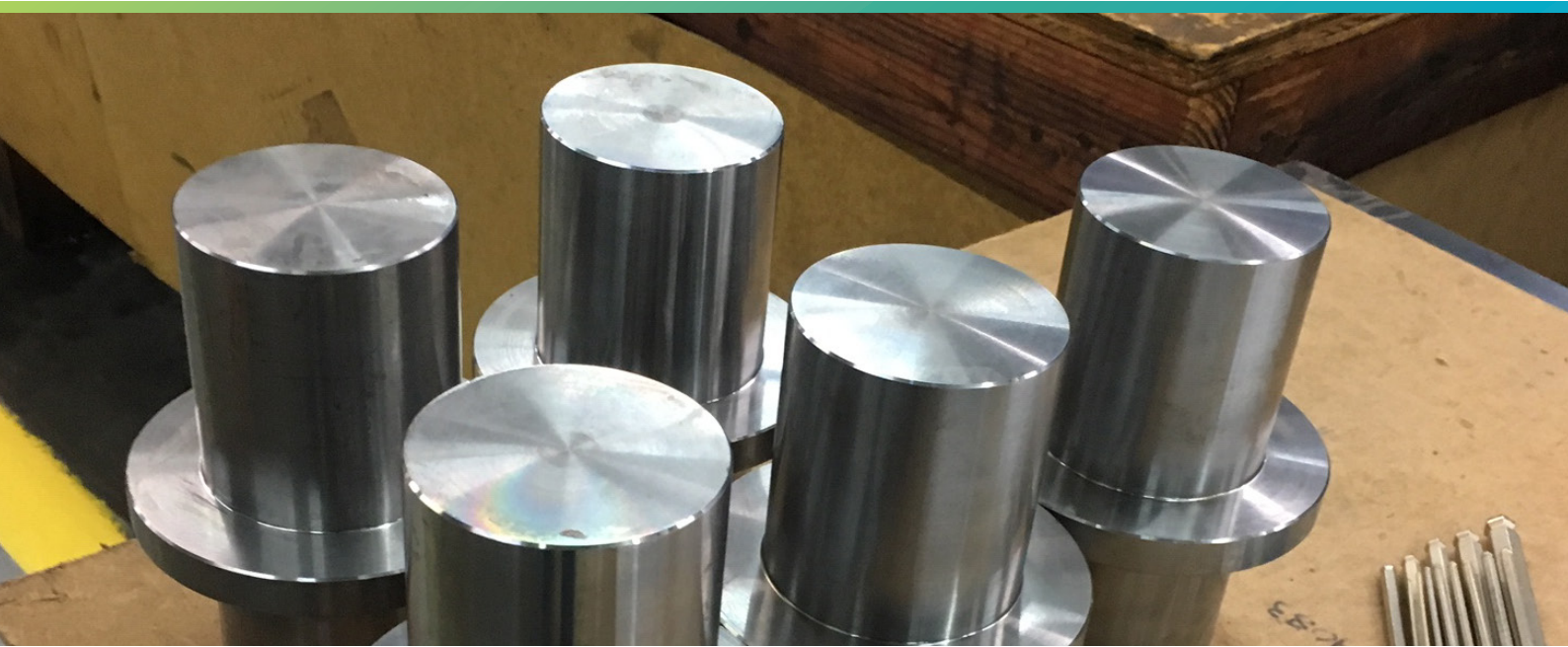


# American Tool & Die, Inc., harnesses the power and flexibility of SURFCAM Traditional to produce a wide range of parts for multiple industries

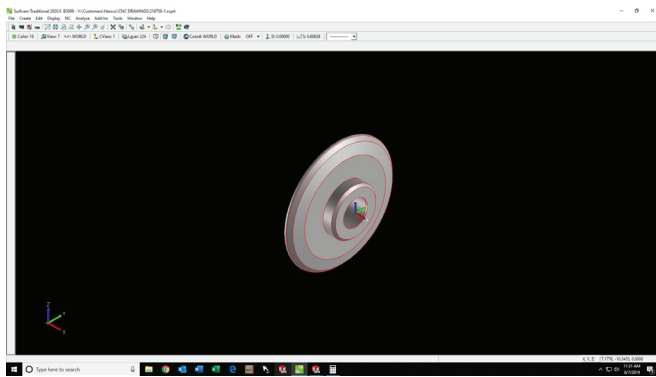


## American Tool & Die case study

Offering a wide range of production capabilities and delivering on its mission to build quality products has kept American Tool & Die, Inc., ahead of its competition for nearly 40 years.

Founded in 1982, American Tool & Die, or ATD, has implemented new technologies to remain competitive while handling a varied range of evolving customer demands. Today, the company's capabilities include CNC milling and turning, metal fabrication and stamping, automation and assembly, and the designing and building of dies, jigs, and fixtures.

"Our specialty is that we are a diverse company and there is a wide variety of work that we perform," said CNC Department Manager Nick Rutland, a long-time manufacturer who has worked for the company for over 19 years. "Dies, tooling jigs and fixtures, special machines, lighting fixtures for aerospace, and firearms parts are some of the products that we make."



Based in Swansea, South Carolina, ATD operates from a 70,000 square-foot facility in which it produces aerospace and automotive parts; construction, HVAC, railroad, and outdoor power-equipment; linear motion components, and parts for various other sectors.

To program its five 3-axis vertical machining centers and three turning centers, ATD uses the SURFCAM Traditional computer-aided-manufacturing (CAM) solution, which it purchased in 1999. Prior to implementing SURFCAM, the company utilized a DOS-based program that couldn't handle the growing complexity of its programming needs.

For its computer-aided-design (CAD) needs, ATD uses the SOLIDWORKS® solution, by Dassault Systèmes, which works seamlessly with SURFCAM for ease in importing vital CAD data. "SURFCAM has associativity with SOLIDWORKS, so it streamlines our process of sharing data between the two systems," Rutland said.

One of the tools offered by SURFCAM that Rutland and his team find most helpful in their day-to-day programming processes are toolpath templates, which allow them to store machining strategies in a knowledge database of cutting parameters, tools, and materials.

Toolpath templates are created with information captured and saved from the dialog box of any operation. To create, store and retrieve the templates, users simply access the buttons located at the bottom on an operation's dialog box.

The ability to save and reuse templates from past jobs on projects that are identical or similar allows ATD to significantly cut programming time devoted to redundant tasks, and to easily enforce company standards for greater consistency. Using templates can also make time spent programming more productive, as this results in less time spent programming in the future.

Rutland and his team also take advantage of SURFCAM Traditional's construction views, which deliver flexibility with multiple setups for 2-axis and 3-axis machining. Construction views allow different sections of any given part to be machined using independent machining orientations. They are used for creating views that are not within one of the standard machining planes, or to machine a part that is not in a machinable, or x-y, plane.

"Not everything that we make is complex, but we need to be able to make adjustments and to be flexible in terms of how we approach our jobs," Rutland said. "SURFCAM provides us with tools that help us to do that, and lets us edit our toolpath when we need to."

Also helpful for the ATD team is the Step-Reduction Milling process, an approach to rough machining that optimizes the use of multiple milling tools that step down from large to smaller diameters. "The step-reduction cycle steps down in a pyramid-like shape and then goes back and cuts the steps of the pyramid in half as many times as needed and very efficiently — without air cutting during the roughing cycle like another roughing path might."

With its wide range of machining needs, ATD uses both specialized 2-axis cycles, such as 2-axis contour, and various 3-axis cycles — such as the multi-cut, 3D offset, radial, and spiral cycles.

Two-axis contour operations are used to cut along the contours of boundaries, including the left and right sides and the top, and enables material removal between the edge of the material and a contour.

The 3-axis Multi-Cut strategy enables the machining of single or multiple surfaces in a variety of cutting patterns. This cycle is especially helpful in tackling complex surfaces because it allows the user to combine or isolate surfaces as desired to machine them as one or in separate operations as needed.

"The toolpath chosen is really very driven by the shape of the part and the most efficient way to machine that shape," Rutland said. "There isn't necessarily a single toolpath that's best for machining every type of part that we have, so the ability to choose is important for us."

For instance, 3-axis spiral toolpath looks like a single curved line that emanates from a center point and circles round itself, and is best used to machine shallow, curved surfaces and circular areas. While radial toolpath is used to machine the same types of surfaces, radial passes converge on and pass over a central point instead of moving in a spiral pattern.





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**Nick Rutland,**  
CNC Department Manager

The solution's 3D Offset passes are performed at a constant distance from each other along the surface of the part, regardless of the surface slope. This is an ideal strategy to ensure a superior surface finish with a constant 3D distance between passes regardless of the part shape.

SURFCAM Traditional's TRUEMill toolpath is especially useful when high-speed machining strategies are used, as the specialized cycle increases tool life while reducing machine load and cycle time. Unlike conventional toolpath, TRUEMill maintains constant tool engagement with the material, which helps to reduce tool loading in corners.

Regardless of the selected cycle, Rutland noted, the ATD team relies upon SURFCAM Traditional to verify toolpath and check for collisions before the code hits the shop floor. "We had to scrap a lot of parts out before we used the simulation and verification. With 3-axis toolpath, you have a lot less ability to be able to see far enough ahead to avoid collisions without running a simulation."

Rutland adds that the solution's ease of use is an advantage when training new staff or inexperienced programmers how to use the software. "I know that if I struggle to get through it, it won't be easy to teach the guys," he said. "I've learned SURFCAM over the years and I've been able to teach others over the years to be successful with it, as well."

## Case Study Summary

**Company name:** American Tool & Die, Inc.

**Business:** Tool and die production

**Website:** [www.americantoolanddie.com](http://www.americantoolanddie.com)

### Key benefits achieved

- Ability to easily save and apply machining strategies
- Flexibility in selecting specialized toolpath
- Reduced scrap due to simulation and toolpath verification





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