

Tooling Tryout Trimmed Via Sim. Software

BTD Manufacturing cuts tryout time by more than a third while streamlining tool projects.

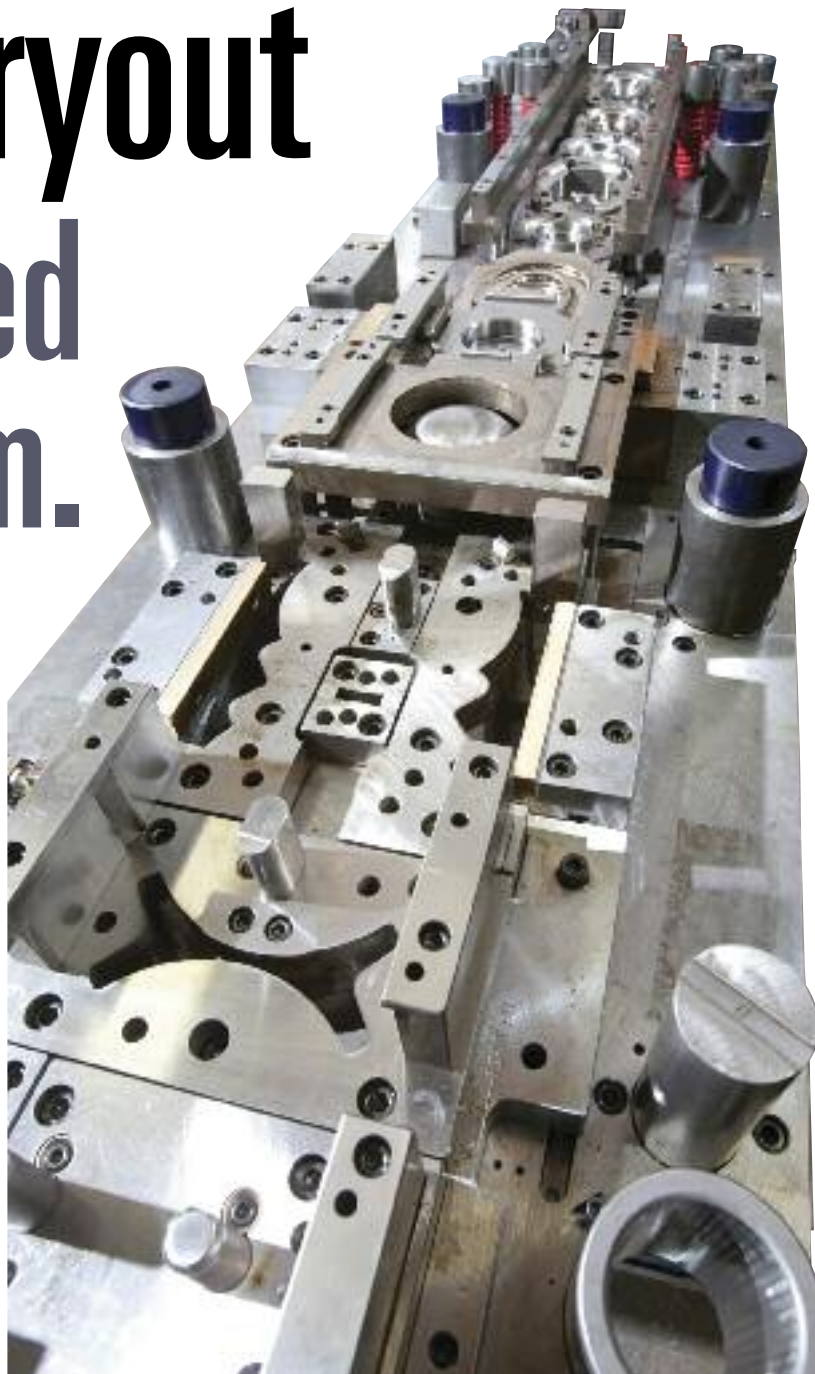
BY LOUIS A. KREN, SENIOR EDITOR

From its North Dakota origins dating from 1979, BTD Manufacturing now boasts more than 1.1-million sq. ft. of manufacturing space across four locations—two in Minnesota, including its headquarters in Detroit Lakes, as well as Washington, IL, and Dawsonville, GA. More than 1200 employees deliver parts and components for recreational vehicles such as ATVs and snowmobiles, agricultural equipment, and high-end turf-care products. To do that, BTD (www.btdmfg.com) employs numerous processes under roof, including tool construction, stamping, fabrication, assembly, finishing and painting.

The company employs complete tool-and-die design and build (via more than 100 employees in its toolrooms) for inhouse metal-stamping work, where 20-plus mechanical presses, and one servo-mechanical model, churn out more than 1000 distinct part types in annual volumes to 200,000. Mild, high-strength and stainless steel, as well as various aluminum grades in thicknesses to 12 mm, provide the diet for these hungry presses, which range in capacities from 45 to 800 tons.

Tryout Time Targeted

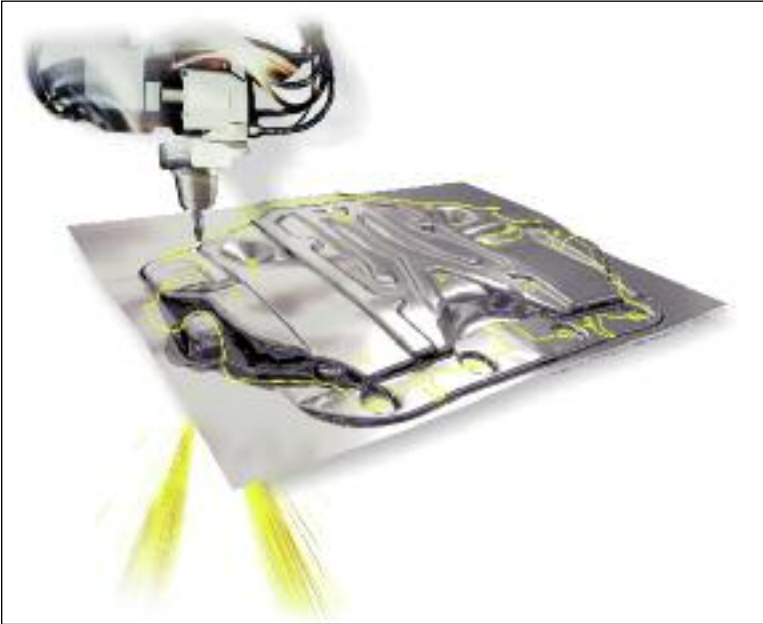
Seven tryout presses ensure that tooling enters



By leveraging the power and capabilities of simulation software, BTD Manufacturing, Detroit Lakes, MN, reduces tryout time by more than 30 percent, and achieves production-ready tooling quickly, leading to more job-bid wins and more satisfied customers.

production ready to run, smoothly and trouble-free, and delivers quality parts on time. Tool tasks fall to BTD employees such as tool designer Brian Newberg. A 17-year company veteran, Newberg is well-versed in the back-and-forth needed to transform concepts and designs into replicable, functioning parts, in timely and economical ways.

Challenges have been eased dramatically within the past four years, Newberg says, through the use of advanced simulation software from AutoForm Engineering. Until then, the company made use of so-called one-step solvers.



Trim-optimization software can identify ideal trim locations, as indicated by the yellow line in this laser-cutting illustration. BTD employs such software early on during stamping-die design to eliminate costly and time-consuming die recuts.

“The one-step solver took us from a formed part to a flat part, providing basic results,” Newberg recalls. “It showed hot spots that identified thinning, but couldn’t provide blank development nor trimline optimization. Also, it provided very limited springback analysis, and no support for secondary operations.”

As a result, the company sought out incremental solvers for tool design, ultimately selecting AutoForm as its provider due to “its powerful solving capabilities,” according to Newberg, along with other reasons.

“We did not have to switch to CAD all of the time to adjust some die faces, and then return to the simulation software to make changes,” he explains. “We could do all of that within the AutoForm software. We perform these tasks quite a bit and were looking for an easier route.”

Another reason: service, as Newberg and his BTD team appreciated the support and guidance during and after software implementation.

Nearly four years later, BTD employs AutoForm software technology extensively. In use at BTD, according to Newberg, and how it’s employed:

- AutoForm-ProcessExplorer^{plus}—used from planning through tryout to set up simulation and evaluate results;
- AutoForm-StampingAdviser^{plus}—used to gain an early understanding of product and process feasibility, as it quickly evaluates material utilization and potential problem areas;
- AutoForm-DieDesigner^{plus}—used early in the

process when no CAD drawings of the tool exist, usually for estimating and planning, and also to assist customers with product feasibility;

- AutoForm-Trim^{plus}—used to develop blank geometry and trim lines, which reduces valuable tryout time during tool development;
- AutoForm-Sigma^{plus}—new to BTD, and early on it’s employed to account for noise in the process (e.g. changes in material properties and thickness).

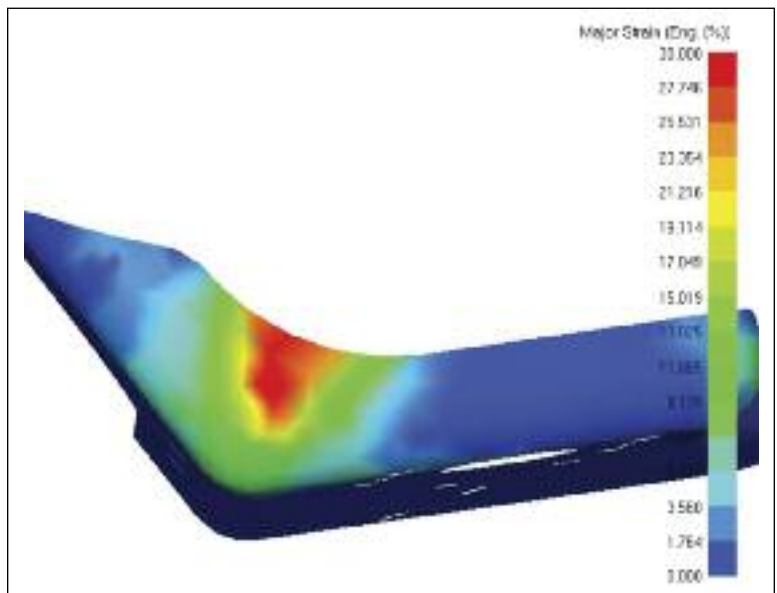
Optimizing Trim Lines Pays Off Big Time

“I design tooling to support our inhouse operations, using the Trim^{plus} software in a variety of ways, from testing small bent widgets to check springback, to folding, drawing and trim development of parts,” Newberg says.

‘Virtual tryout’ is how he explains the software to those unfamiliar with it.

“I tell them that I’m trying out tools on the screen,” says Newberg, who goes on to detail how it saves time, labor and money at BTD. “Specifically with trimlines, it has saved us many iterations through tryout. We reduce the number of tryouts because we are not hitting a part, then adjusting the blank or trim edges, then going back to the press—I would guess a 30-percent-plus reduction in tryouts related to developing trimlines and blank edges.”

Work on one particular part highlights how BTD leverages such capabilities not only to meet customer demands, but to provide assistance that leads to more work down the road.



Red areas in this stamping-simulation screenshot show major strain. BTD uses such information to design and build better tooling, and sometimes to work with customers in redesigning actual stamped parts to improve manufacturability.

Tooling Tryout

“I recently worked with our sales team on a proposed stamped part for an OEM customer,” Newberg recalls. “Given this potential customer’s part design, we could not produce it at a reasonable price—feasibility was failing due to splitting issues. We worked back and forth with the OEM’s engineer on part concessions, ultimately reaching a design agreeable to both of us. We did all of this within the AutoForm software modules, receiving a lot of information prior to even quoting part production.

“Once we earned the opportunity to quote production on that part,” he continues, “we already had a good idea of the challenges we would face. Ultimately, due to information gained from the software, we decided on a preform, then trim, then final form to produce the part. Without the software, our gut feel was to crash-form the part, meaning splitting issues and a lot of tooling recuts. The software helped us upfront to develop our process, using the trim-line-optimization capability to develop the trims. We took the project to a tryout press, made a couple of minor trim adjustments and then qualified the part. We cut steel for production after only two tryouts, whereas in the past we would have performed as many as 10 press tryouts just to dial everything in.”

Leads to Improved Customer Relationships, More Work

See where this is going? The benefits extend well past optimization on a particular part.

“The goal for BTM with this software is to reduce recuts and redesigns, and, as a result, tryout time,” Newberg says, with the example above illustrating success in reaching that goal. “That opens up our equipment and allows us to keep moving forward with original builds without having to back-track for tool recuts and more tryouts.”

Key to all of it, according to Newberg: spot-on correlation between simulation and real-world results.

“If we see a certain percentage of thinning in the simulation and I check the parts off of the production floor, the simulation and the measurement are identical,” he says. “When we first used the software, given our experience, we went with our gut feel, hesitant to accept what the software showed. But as years go by and we compare the real world to simulation, we see the correlation.”

Newberg finds that customers are more willing to redesign parts or make other concessions up front during design prior to any tool building. The ability to provide an increased level of part-forming knowledge at that stage can pay off later on when customers are looking for a part producer. And, the software assists this effort in another way through its reporting capability, according to Newberg.

“I can present the data in an easy-to-understand manner,” he says. “Customers do not need to know the stamping world or all of the process details. We can just show the results of simulation and they get it.”

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