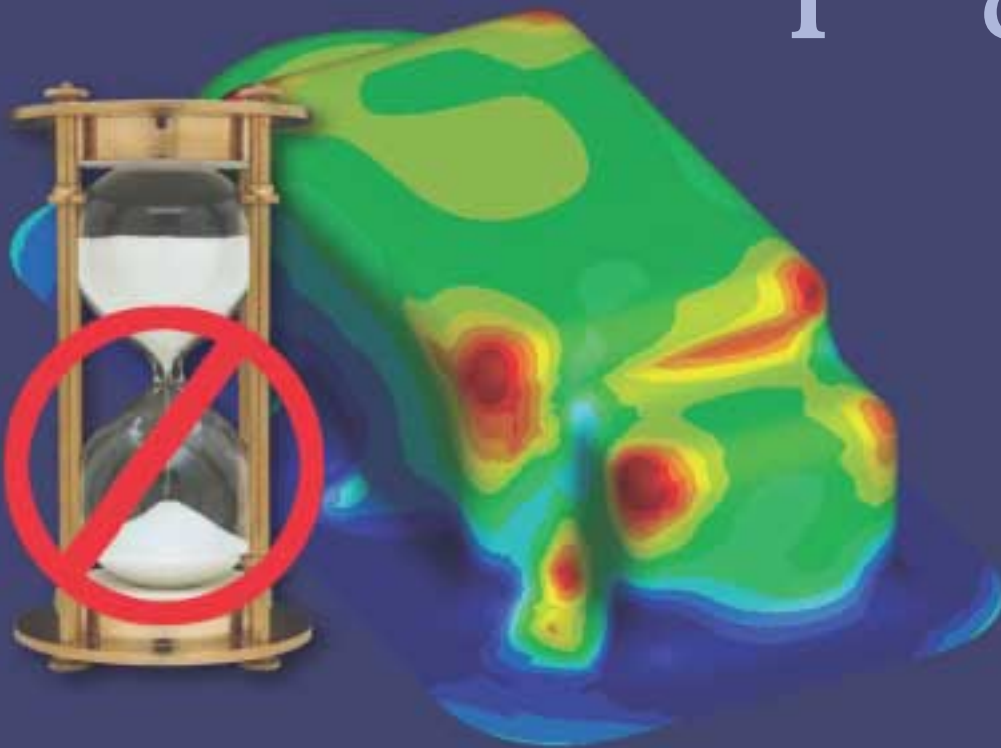# Simpler
# Simulation Software
## for Stamping

Stampers large
and small find
a new way to
use FEA—
for estimating.

BY LOUIS A. KREN,
SENIOR EDITOR

Not long ago, software for simulating forming operations such as stamping required expensive, high-end dedicated workstations and highly trained personnel intimately familiar with the ins and outs of finite-element analysis (FEA). Even then, metalformers couldn't be sure the coding behind such software would accurately predict real-world forming. On top of that, assembling and using all the talent, hardware and software required monetary outlays well beyond the means of most metalformers.

Slowly but surely, simulation accuracy improved, computing power increased and became more affordable, and simulation-software developers introduced packages that even smaller operations with minimal FEA expertise could understand, afford and employ.

"As simulation software becomes more user friendly, companies need less expertise to run it effectively," says Derek Peeling, applications engineer for Forming Technologies Inc. (FTI), Oakville, Ontario, Canada, a provider of simulation software and training for stamped-part and tooling development. "Now, companies offer simplified analysis packages for audiences that hadn't used simulation before. Many smaller stamping and tool-and-die shops don't need the level of expertise previously required to run such software, and the software is available in the four-figure price range."

*(a)*



*(b)*



*(c)*



*(d)*

In addition, most simulation software now runs on PCs as opposed to expensive workstations, further increasing affordability for smaller operations or for those new to computer simulation. Combine all of that with improved, easy-to-operate user interfaces, and simulation in all forms can become a tool for any stamping and tooling operation regardless of company size, or wallet size.

## Ideal for Quoting

Developers have introduced simplified simulation programs ideal for estimating a job and navigating the quoting process. Often, these types of programs quickly assess part manufacturability based on a particular stamper's capabilities, material requirements and how best to arrange blanks on a sheet. In fact, blank estimating is an ideal use for simulation software.

"Thanks to the advent of systems such as Covisint (for the automotive industry), stampers find greater competition than ever in quoting," says Peeling. "Stampers can't add as much of a safety margin to quotes. Simulation software allows stampers to become much more accurate on material-usage predictions both in estimating blanks and determining ideal nesting patterns. That combination takes some risk out of the quoting process. By employing such software, stampers won't accidentally underbid a project and won't unintentionally overbid."

In addition, blank-prediction software performs much faster than time-worn methods, notes Peeling.

"Traditionally, stamping estimators and tool-and-die makers either added fudge factors to length-of-line measurements or measured various model dimensions to approximate blank shape," he says. "I've even seen them make cardboard part models and flatten them to develop a blank shape. Simulation software eliminates these time-consuming and inaccurate methods."

## Better Blanking through Software

FTI offers such blanking software, including FastBlank and BlankNest. It developed FastBlank, less expensive and simpler to operate than more advanced full-featured simulation pack-

*Stampers can use affordable simulation software to (a) capture a designed part and (b) unfold it, then estimate (c) correct blank size and (d) nest development in a matter of minutes. Advantages include optimal material-use calculation and ability to quote jobs more accurately. These screens were captured from FastBlank and BlankNest, simulation packages available from Forming Technologies Inc.*
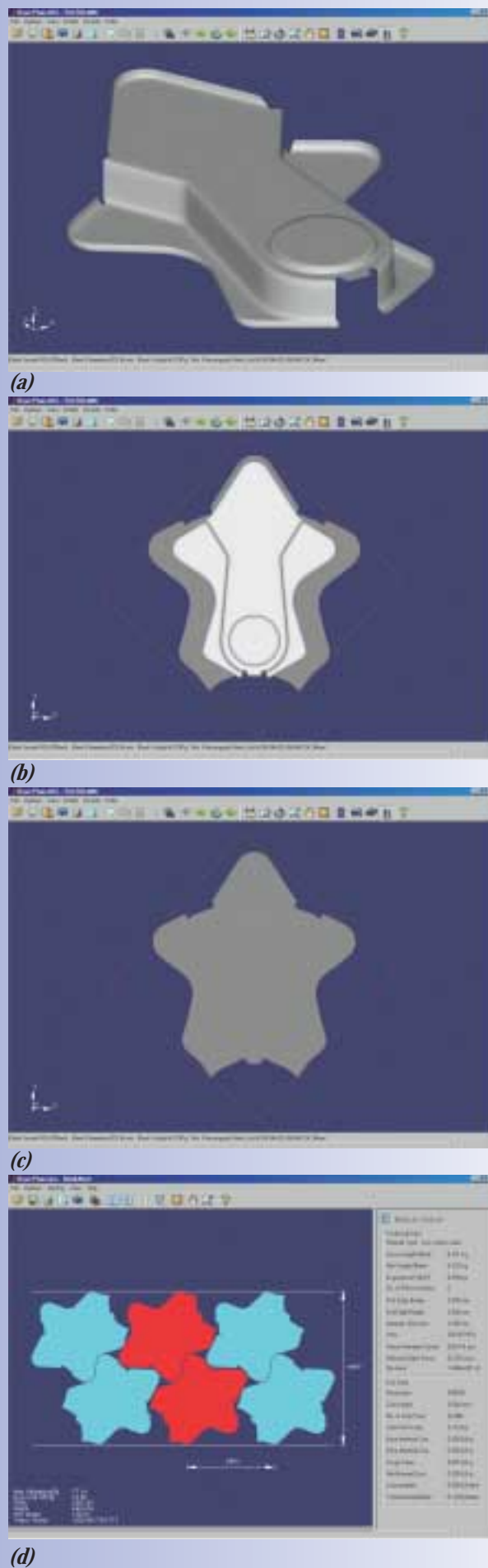
ages, for users with no FEA experience. It reportedly calculates blank shapes for simple or complex stamped parts, and accounts for material stretch and deformation as well as straight bends. It promises blank predictions within minutes with results accurate enough for die tryout, quoting and nesting calculations. It also displays material thinning resulting from forming.

In practice, users load a surface model of the part geometry, mesh it, assign a material and run the program. The software automatically meshes and repairs IGES and VDA part models. Also, a built-in customizable materials database quickens the process.

"Stamping companies most often employ this software for quoting, while tool and die shops run it for blank development," explains Peeling. "Some companies employ FastBlank to determine the amount of material required to make a part, and use that information to evaluate quotes received back from stamping suppliers."

One user, Johnson Controls, Lexington, TN, finds FastBlank indispensable for estimating material costs, formability and nesting optimization before seeking quotes from stamping suppliers. It employs the software to estimate blank configuration and ideal nesting patterns for automotive-seat-track mechanisms produced from high-strength steel.

"The software lets us know if the part is formable in the first place, identifying any problem areas so we can make part design changes," says Randy Taylor, responsible for nesting calculations and identifying target prices for stamping suppliers (in Lexington, Johnson Controls outsources all stamping work except for fineblanking).

"After we design the part and before we develop tooling, we enter it into FastBlank, which produces a flat blank and optimizes nesting. We save $5 million per year alone on piece price by using the software. By the way we nest the part, we set the target tool price and target part price for our suppliers. The least amount of material used to produce that part, the more cost-efficient the job."

A year ago, prior to investing in FastBlank, engineers at Johnson Controls typically spent two or three hours calculating and manipulating a part drawing in traditional computer-aided-design (CAD) software, trying to achieve a flat blank. That process now takes five minutes, says Taylor.

CAD programs can fall apart when encountering anything requiring stretch, such as draws, notes Peeling. That major limitation leads companies to investigate more forming-specific software.

"I've cross-referenced the blank from FastBlank with actual blanks and found a very small amount of error," Taylor says. "That surprised me because while FastBlank is not a full-blown forming analysis tool, it is very accurate."

As a complement to FastBlank, FTI offers BlankNest, targeted to users cutting developed blanks from coils. It reportedly provides rapid nesting layouts based on user-defined constraints. The layouts are said to produce the best possible material utilization for the given nesting application. Users can specify maximum pitch or coil width—ensuring compatibility with machinery—and can add extra material to blanks to account for trim or needed allowances. The software calculates one-up nesting layouts in a few seconds, claim company officials, while solving two-up layouts in less than one minute. Like FastBlank, BlankNest offers a customizable database of common materials.

### Don't Forget the High End

More advanced simulation packages take the risk out of die development and the quoting process, says Peeling, noting that a growing number of smaller-sized stampers now use full-blown simulation, such as FastForm3D, an FTI full-service simulation program, or Form3D, a simplified program offering similar features without some high-end simulation tools.

"With the package, stampers and tool designers and makers identify areas of the part needing redesign or identify materials not suitable for part production," he explains. "Then they can decide whether to bid on that project. Such software indicates the number of operations required to make a part and point out where stampers can ask for concessions in part design. From such concessions come easier-to-manufacture parts and reduced rejection rates."

In addition, ironing out problems early on ensures that tooling creates a quality part.

"When stampers invest $100,000 in a tool and the tool fails to produce a useful part, then they've wasted a lot of money," says Peeling. "Simulation software identifies problem areas before die manufacture, saving considerable rework time and possibly preventing scrapping of a tool."                    MF

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>
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