



NCSS
ADAPTIVE MACHINING



NCSS

ADAPTIVE MACHINING IS THE SMART WAY TO MAKE PARTS

Manufacturing complex parts has always been a challenging task, and with the increasing complexity of materials and dimensions demanded by customers, it's only getting harder. Skilled operators are becoming scarcer, leading to higher labor costs and longer lead times. Moreover, tighter tolerances mean more rejections and delays, leading to dissatisfied customers and lost business. Adaptive Machining provides the solution to meet your manufacturing needs.



MAKE YOUR FACTORY SMART WITH NC TRANSFORM

DO YOU KNOW WHERE YOU ARE LOSING PRODUCTIVITY?

You make parts, and you are probably pretty good at it, but what does that require from your operators? From you engineers? Are you doing any of the following?

- 1 Constantly adjusting offsets?
- 2 Under sizing holes to ensure compliance?
- 3 Performing operations manually to avoid under-sizing or oversizing features?
- 4 Continuously adjusting toolpaths to chase quality?
- 5 Investing significant funds in complex fixtures?

While most manufacturers can produce the necessary parts, the methods required to achieve this can be time-consuming and reduce profits.



MAKING YOUR MACHINE TOOL SMART

NC Transform (NCT) is a software solution developed by NC Software Solutions that enable your machines to adjust to the actual shape of your parts. By automatically measuring the part's position and deformation while on the machine, NCT can adapt the tool path accordingly. The power of Adaptive Machining, made possible by NCT, allows you to manufacture parts that meet quality requirements, regardless of how difficult they are to fixture or how prone they are to deformation.

NC Transform is a versatile tool that can be used with any type of CNC machine, CAM system, and probe. It seamlessly integrates with your current process, ensuring that you achieve the highest quality parts right from the start.

"When visiting a new customer site, there is often apprehension about the setup process required for NC Transform. However, we can typically have parts processed using NC Transform within one to two days of implementation for most customers. The software's user-friendly and intuitive interface enables both the operator and CNC programmer to quickly learn the system with just a few hours of training."



Brian Tremelling
Client and Software Support
NC Software Solutions



NC TRANSFORM'S ITERATIVE ALIGNMENT SIMPLIFIES FIXTURING

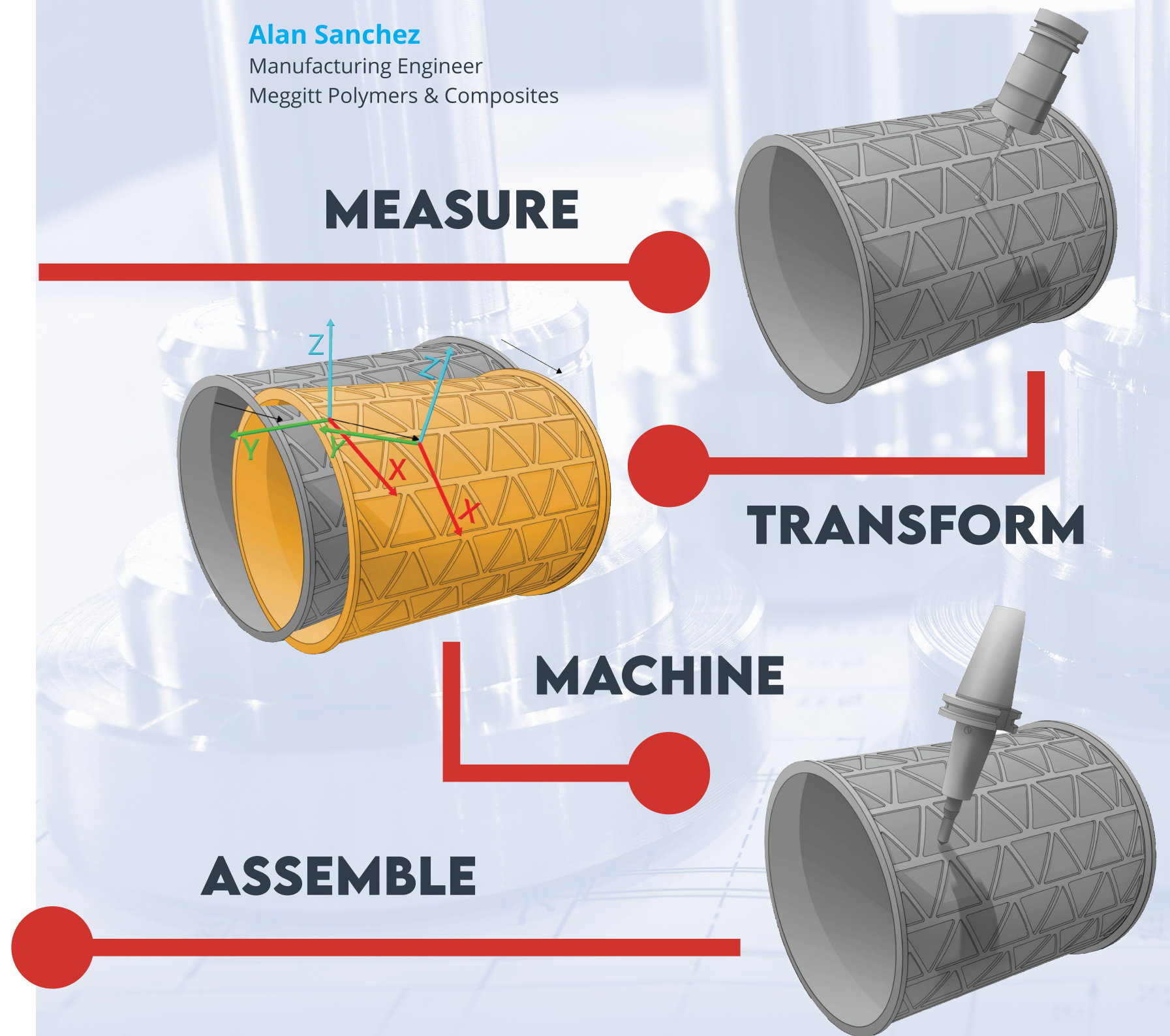
With NC Transform it does not matter if every part from the casting house, forge shop, or carbon fiber layup facility is a complete snowflake. NCT will adjust to the reality of your process. Using measurements to discover the actual locations of your parts datums when fixtured on the machine and adapting your part program accordingly.

NCT creates a pathway for difficult parts to successfully move from raw material to perfect assembly, making NCT a valuable tool for manufacturers.



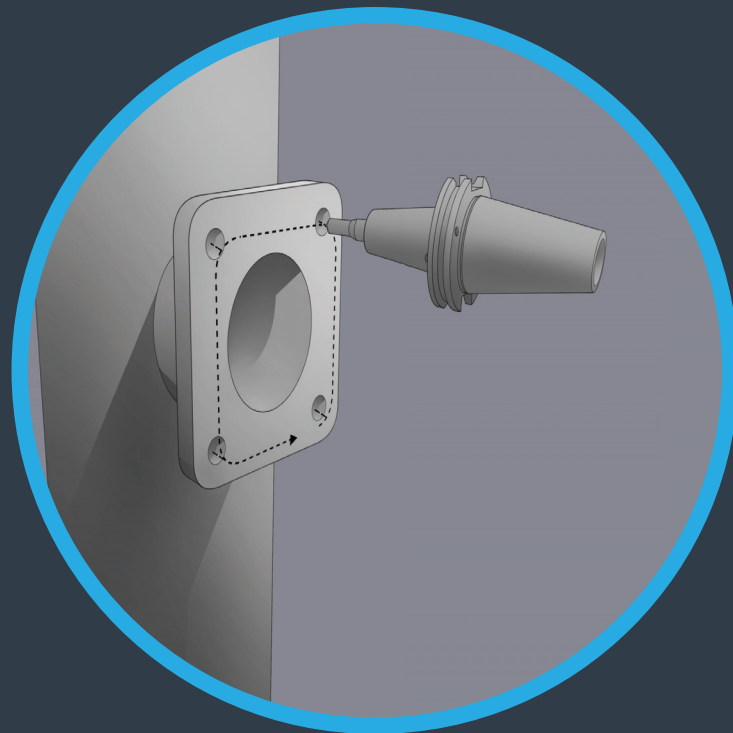
"We were able to reduce cycle time by about 30% by eliminating an entire operation used previously for locating the part."

Alan Sanchez
Manufacturing Engineer
Meggitt Polymers & Composites

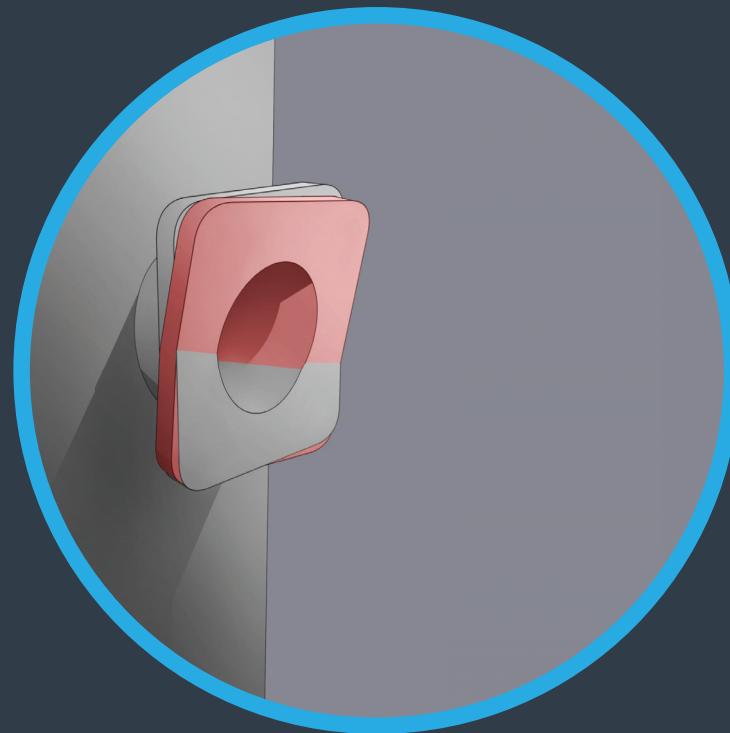


HOW DO I MACHINE THAT??

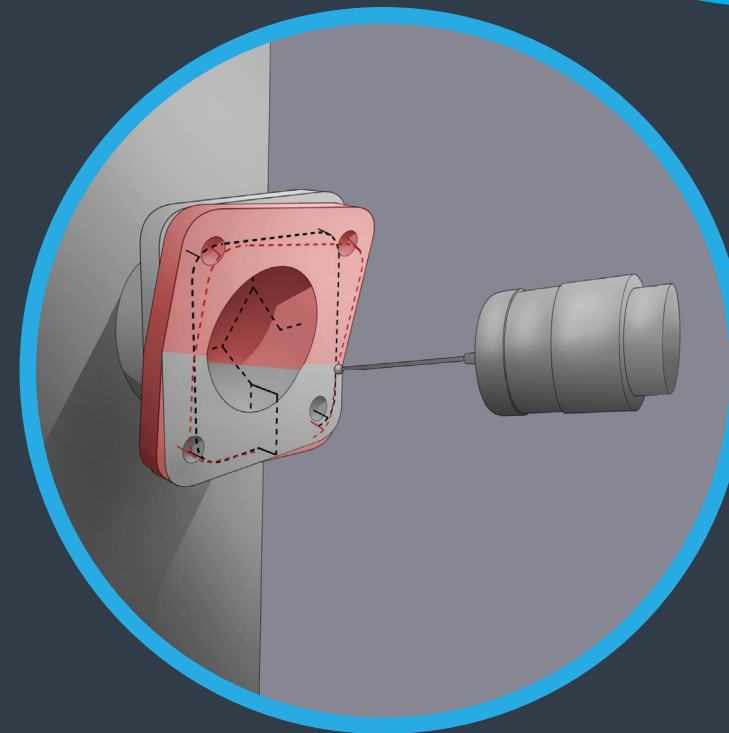
Parts with welded-on features or extrusions that require alignment with previous operations can present significant challenges in machining. However, with NC Transform, these challenges can be overcome. NC Transform adapts the tool path from the perfect state envisioned by the programmer to the reality of the part on the machine, making it easier to machine these complex features.



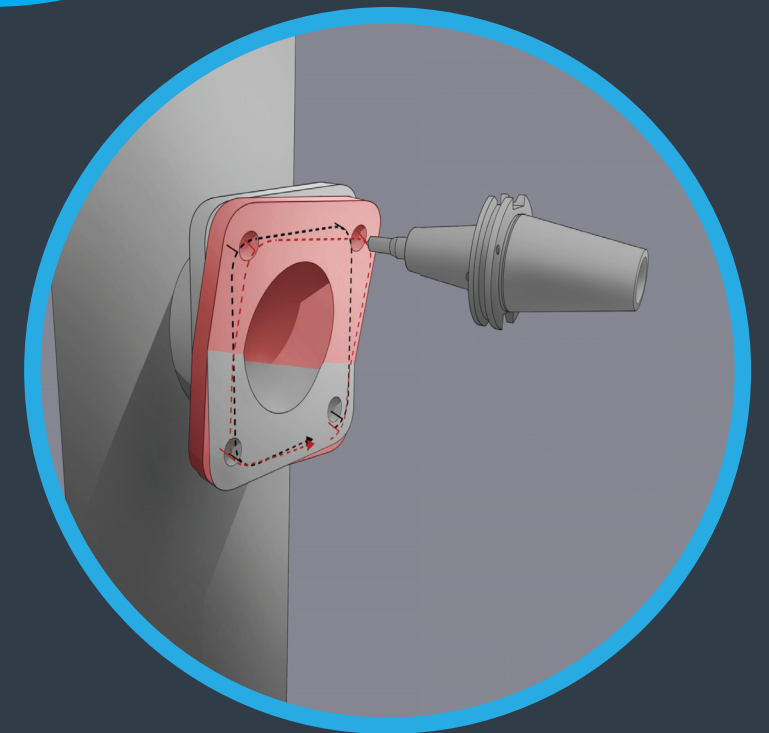
A SIMPLE
TOOL PATH...



BUT THE
ACTUAL PART
DOES NOT LOOK
LIKE THAT.



SIMPLY PROBE THE BORE
AND THE SURFACE AND LET
NC TRANSFORM
DO THE REST.



SMALL FEATURES ON BIG DISTORTED PARTS

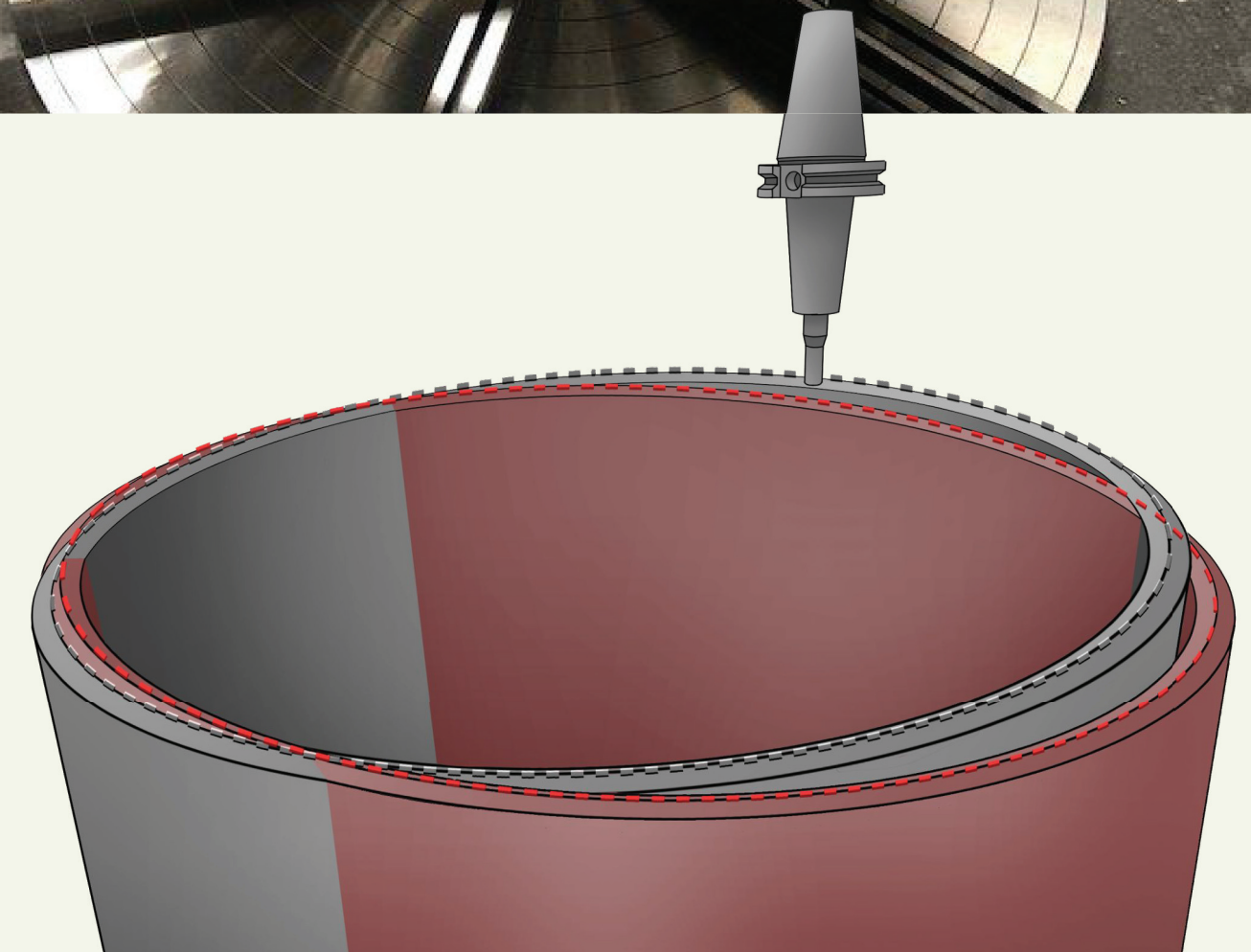
Big parts can be hard to machine for many reasons. They are hard to handle, tough to fixture and in many circumstances do not quite match the nominal part model. Applying small chamfers, narrow slots, or holding counter sink depth on these parts can seem nearly impossible. However, NC Transform makes these processes easy to execute.

Adding a chamfer to a large round part can be extremely challenging. Even if the chamfer is only 3/8" and the part is out of round by just 1/4", the chamfer will never be accurate. It could end up being undersized, or oversized, or it may not even be possible to achieve. However, with NC Transform, you can measure a spline of data around the edge of the part and watch the software adjust the tool path to follow the real edge, resulting in a precise chamfer.



Cameron Dix
Application Engineer
NC Software Solutions

"Customers often develop creative solutions to machine distorted parts, but these solutions can be difficult to implement and support. With NC Transform, even the most challenging processes can be easily run for all three shifts, without requiring the constant presence of an engineer."



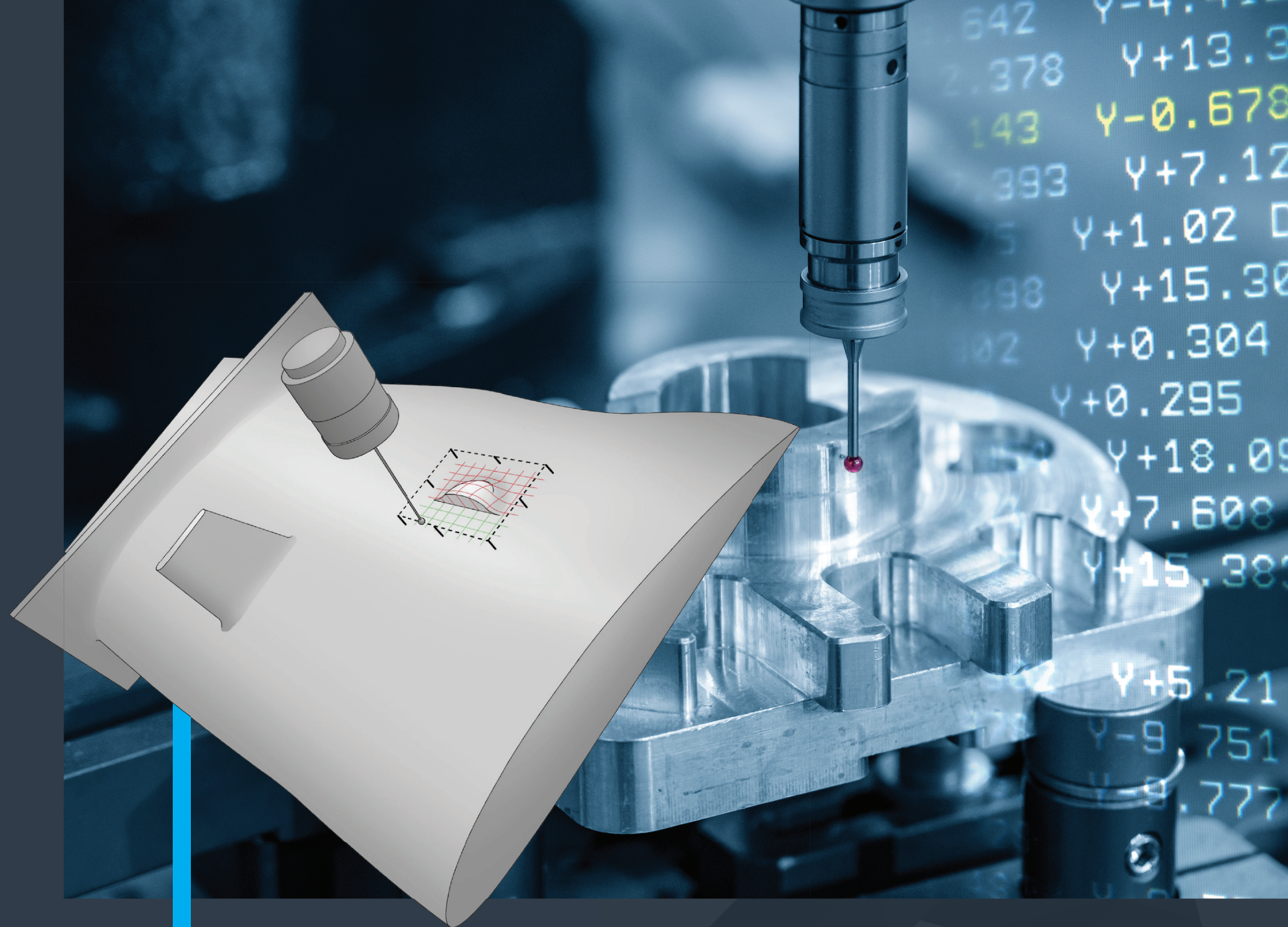
BLENDING ON FORGED, CAST, OR REPAIR PARTS

Manufacturing airfoils can be a challenging task, especially when dealing with near-net cast and forged parts. Fixturing blades, vanes, and shrouds can be difficult, and blending between different surfaces can be time-consuming. Many shops rely on hand blending to address these issues, which can be a labor-intensive process. However, with NC Transform, you can significantly reduce or even eliminate these challenges.

"Before using NC Transform, our airfoil repair operations involved nearly 8 hours of tedious hand blending. Since implementing NC Transform, we've experienced a dramatic improvement in efficiency. We're now able to complete the same task in less than an hour, which has greatly reduced our labor costs and allowed us to take on more business. Thanks to NC Transform, our team can now focus on more valuable tasks, and we're seeing a significant increase in productivity overall."

Everett Correa

NC Programming Services Manager
GKN Aerospace Engine Systems



NC Transform enables direct measurement of part surfaces on the machine and adapts tool paths to blend and morph to follow the complex topology of airfoil surfaces. This allows for the smooth removal of casting gates, seamless weld repairs, and automatic blending of welded-on tips and leading edges, eliminating the need for extensive hand blending.

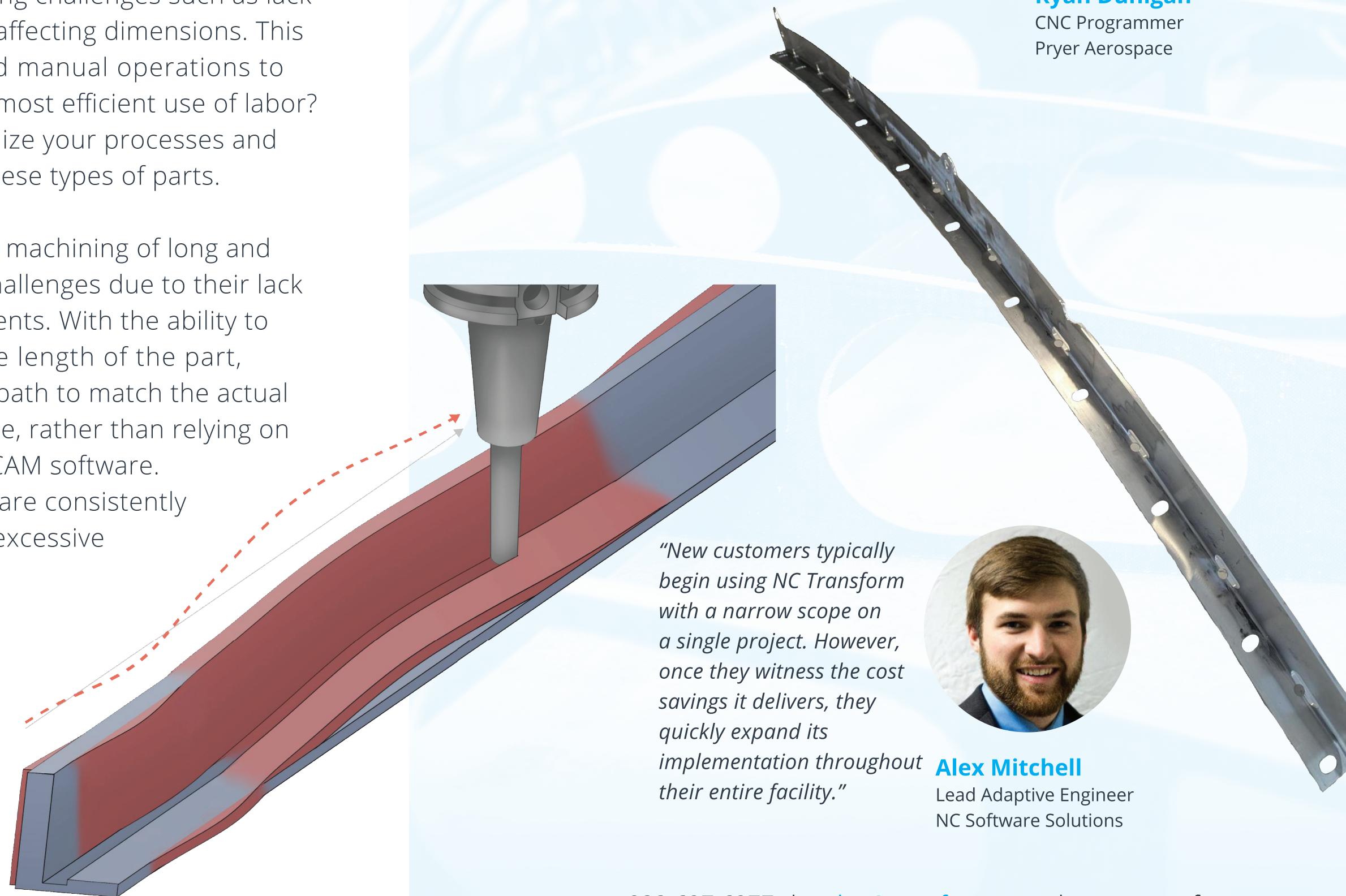
LONG STRINGERS, BEAMS, AND SPARS

Aerospace structures often require long, skinny parts with tight tolerance requirements, posing challenges such as lack of rigidity and multiple processes affecting dimensions. This can result in constant rework and manual operations to ensure conformity, but is this the most efficient use of labor? With NC Transform, you can optimize your processes and reduce labor-intensive tasks for these types of parts.

NC Transform enables the precise machining of long and slender parts, which often pose challenges due to their lack of rigidity and tolerance requirements. With the ability to measure cross-sections along the length of the part, NC Transform can adjust the tool path to match the actual position of the part on the machine, rather than relying on the theoretical position from the CAM software. This ensures that tight tolerances are consistently maintained, without the need for excessive manual intervention or rework.

"Often times we deal with machining tight tolerance features on formed parts, where it is extremely difficult to match actual position and contour to our CAD/CAM position. NCT has been a real lifesaver for these types of jobs, eliminating the need for labor-intensive reverse engineering and ultimately reducing scrap."

Ryan Dunigan
CNC Programmer
Pryer Aerospace



"New customers typically begin using NC Transform with a narrow scope on a single project. However, once they witness the cost savings it delivers, they quickly expand its implementation throughout their entire facility."



Alex Mitchell
Lead Adaptive Engineer
NC Software Solutions

NC SOFTWARE SOLUTIONS – PROVIDING TECHNOLOGY FOR THE MODERN FACTORY

Parts are getting harder to produce for many reasons:

- Shorter lead times
- More complicated features
- Advanced materials that are getting ever harder to machine

While manufacturers have traditionally found innovative solutions to overcome these challenges, the process remains tough.

NC Transform offers a competitive advantage in advanced manufacturing by enabling the production of difficult parts with tight tolerances while managing fixture and labor costs.

See what NC Transform Can Do

Call 833.627.6277

Email sales@ncsoftware.us

Visit www.ncsoftware.us

“Adaptive machining has been implemented by various developers, including CMM developers who add a specialized package to their On Machine Inspection software, or CAM developers who perform a simple alignment and repost the G-Code. However, NC Software’s adaptive machining software was designed by machinists for machinists, providing unmatched capability and ease of use.”

- Dave Shields

“After implementing NC Transform, I no longer needed to ask my customers for concessions or loosening tolerances as I was confident in the capability of adaptive machining. In fact, I could now ask my customers to retain those tight tolerances knowing that I could meet them with ease, giving me a competitive edge over my rivals who were not using adaptive machining.”

- Darren Levak





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