

Designing the complex assemblies needed to meet today's emission standards and customer requirements would be virtually impossible without Autodesk Inventor.

—Albert Allen
Mechanical Designer
Tucker Sno-Cat® Corporation

Masters of Rough Terrain.

Tucker Sno-Cat® meets the challenges of the world's harshest environments with Digital Prototyping.



Project Summary

A family-owned company founded in 1942, Tucker Sno-Cat® Corporation (Tucker) is the oldest successful manufacturer of snow vehicles in the world. Tucker's involvement in the first motorized crossing of the Antarctic testifies to its industry leadership. Tucker also invented the four-track vehicle design, which features superior traction, stability, safety, and climbing ability. The famed vehicle's innovative design eliminates pitch poling on moguls and rough terrain, and creates little terrain disturbance. It's been said to traverse the snow as lightly as a skier would.

Always at the forefront of snow vehicle innovation, Tucker strives to respond quickly to customer needs, whether it's customizing an existing vehicle or designing an entirely new SNO-CAT® vehicle. Driving Tucker's success are flexible—yet fast—design and manufacturing processes that yield the highest quality. Committed to innovation, the company powers its product development process with Autodesk® Inventor® Professional software, the foundation of the Autodesk® solution for Digital Prototyping, and validates its designs through finite element analysis (FEA) and mechanical event simulation (MES) using Algor® Professional MES software. These sophisticated tools enable Tucker to perform complex simulations to assess the performance of designs in the

harshest environments. With the Autodesk solution for Digital Prototyping, Tucker has been able to:

- Produce fewer physical prototypes before manufacturing parts
- Reduce engineering change orders by 80 percent
- Use materials more efficiently, cutting waste and material costs
- Realize 50–60 percent cost savings by performing FEA and MES in-house
- Cut the product development cycle from as long as two years to six months

The Challenge

Tucker pioneered the SNO-CAT® vehicle more than 65 years ago—and it has been at the top of the industry ever since. The company's over-snow and all-terrain vehicles range from single-occupancy to 26-passenger machines, which are used to traverse the world's rough and snowy terrains. In today's competitive market, Tucker needed a way to meet customer needs for customized, high-quality vehicles more quickly.

"A customer may want to change the deck size or mount a special plow blade or forklift attachment," says Albert Allen, mechanical designer at Tucker. "To get the sale, we need to model how it will look and work in a few hours."

Tucker slashes product development time from two years to six months using the Autodesk solution for Digital Prototyping.

Allen adds that Tucker's challenges extend beyond design speed. "One of our biggest battles is keeping up with stricter emissions standards," he says. "We have to squeeze more equipment into a smaller area. With the complexity of machines, which often have more than 10,000 parts, we don't have the luxury of guesswork. We need to know that everything will work together before we cut steel."

The Solution

One of the earliest adopters of Autodesk Inventor software and Digital Prototyping, Tucker uses a single digital model, which is an accurate 3D digital prototype, throughout its product development process. Designers use Autodesk Inventor software to sketch concepts and create complete 3D models of their SNO-CATS®. Electrical engineers refer to the model to determine requirements for the wiring systems they design in AutoCAD® software. Engineers then validate the design using Algor Professional MES software for FEA and MES. Finally, the company's manufacturing vendors rely on the same digital model to produce parts exactly as designed.

Tucker relies on IMAGINiT, an Autodesk Premier Solutions Provider, for the support and service it needs to get the most from its Autodesk software. "IMAGINiT, Portland has always provided excellent support and partnership, and we look forward to many more years working with them," notes Allen.

More Innovative Designs—Faster

Whether it's being used to customize an existing vehicle or to design an entirely new SNO-CAT®, Autodesk Inventor software helps Tucker produce designs rapidly. Designers can easily reuse existing part designs, such as engines, steering columns, radiators, and axles. When they create new parts, designers work in an intuitive 3D environment—using functional tools that automate and speed up many routine design tasks.

For example, to confirm the fit of a part in a complex assembly, designers simply add it to the model to spot problems instantly. "When you're dealing with thousands of parts, you must be precise," says Allen. "With Inventor, we can visualize every part—and how the parts will work together."

Benefits of Digital Prototyping

The advantages of Digital Prototyping couldn't be clearer for Tucker. It decreases the need for costly physical prototypes and reduces engineering change orders late in the development cycle. It also helps the company minimize costly material waste and avoid recreating designs from scratch every time there is a change.

"With Inventor, you can create design iterations quickly and then visually experience them as realistic prototypes—without ever touching a tool in the shop," explains Allen. "Digital Prototyping gives us a lot of confidence in our designs. We know parts will fit if they're machined as designed, and that means less wasted material."

Algor Software Validates Quality

Because Tucker SNO-CATS® are operated in areas as harsh as the Antarctic, they must be extremely durable and reliable. Using Algor Professional MES software for FEA and MES, Tucker simulates the motion of parts and validates the quality of their designs—faster than ever before. For example, rather than outsourcing FEA on its roll-over protective structures, Tucker can perform the analysis more efficiently and cost-effectively in-house.

Manufacturing and Beyond

Autodesk Inventor software is also helping Tucker reduce manufacturing errors. Manufacturing teams receive native Inventor files, so there's no need to redraw or interpret confusing 2D designs. When people on the shop floor have questions, they can view the 3D digital prototype or get printouts of the

model from different angles. "When they see it in 3D, they understand almost instantly," says Allen.

Not only has Digital Prototyping reduced errors in manufacturing, it's eliminated the need for costly product photography. Tucker uses imagery from digital prototypes to produce owner manuals before SNO-CATS® are manufactured.

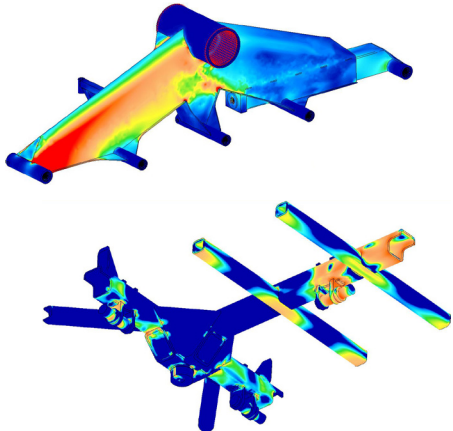
The Result

Start to finish, the Autodesk solution for Digital Prototyping helps Tucker reduce costs, save time, and produce high-quality snow vehicles. "We used to scrap a tremendous amount of money, hours, and steel," says Allen. "Designing the complex assemblies needed to meet today's emission standards and customer requirements would be virtually impossible without Autodesk Inventor."

Tucker can attest to a reduction in product development time from as long as two years down to six months. Contributing to this speed is an 80 percent reduction in change orders. Analysis and simulation time has also dropped drastically since Tucker started using Algor several years ago. "By bringing FEA and MES in-house, we've slashed both the time and cost for design validation by 50–60 percent," concludes Allen. "The bottom line is that Autodesk supports our ability to innovate quickly and cost-effectively."

For More Information

To find out how Autodesk solutions for Digital Prototyping can help you complete projects faster and at a lower cost, visit www.autodesk.com/digital-prototyping.



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