

## Industrial machinery and equipment

# Morbark

## The lighter side of engineering

### Product

Solid Edge

### Business challenges

Need to improve and speed the output of 2D drawings

Too many design errors in 2D

Weight of machines must be reduced to meet strict limits to travel on public roads

### Keys to success

Evaluate four 3D CAD systems

Find best sheet metal design tools

Determine easiest-to-use 3D system with best customer support

Test integration with finite element analysis (FEA) programs

### A Solid Edge customer is featured on Monster Garage

Extreme machines designed with Solid Edge® software puts Michigan company in the national spotlight.

What happens when you cross a PT Cruiser with an industrial-strength wood chipper? This isn't a joke and there's no punch line. It really happened, on The Discovery Channel show, Monster Garage. The result was a PT Cruiser that tools along like a regular car but when you open the back end and feed in wood, chips blow out the roof – a crazy concept, but that seems to be the point of Monster Garage, one of the most popular shows on cable television.

A company called Morbark Inc., based in Winn, Michigan, supplied the chipper and some engineering expertise to the project. Morbark, founded in 1957, is the world's largest manufacturer of brush chippers, forestry, recycling and sawmill equipment. Since the year 2000, the company has been using Solid Edge computer-aided design (CAD) software from Siemens PLM Software to design its machines, which range from 25 to 1,000 horsepower. The chipper model used in the Monster Garage project was a Model #2070 Twister, which is capable of handling seven-inch-diameter material. (This model has since been replaced by the Model #2070 XL, which handles 10-inch material.) The model featured on Monster Garage was one of Morbark's smaller chippers but even so,



getting it to fit inside the PT Cruiser was not easy. "There is not much room in the back of those things," says Mick Gifford, Morbark's national account sales manager. "The project was labeled '10 pounds of potatoes in a 5-pound bag.'" Gifford appeared on Monster Garage as a member of the build team.

Every nonessential item in the back of the PT Cruiser was removed. The Monster Garage team pillaged the wood chipper for working parts, then reassembled them into the 64.2 cubic feet of PT Cruiser space. Positioning was crucial as only 1/4 inch separates the wood-chipping mechanism from the edge of the PT's outer body.

Once the chipper was installed and tested, focus shifted to the car's liftgate. The team

## Results

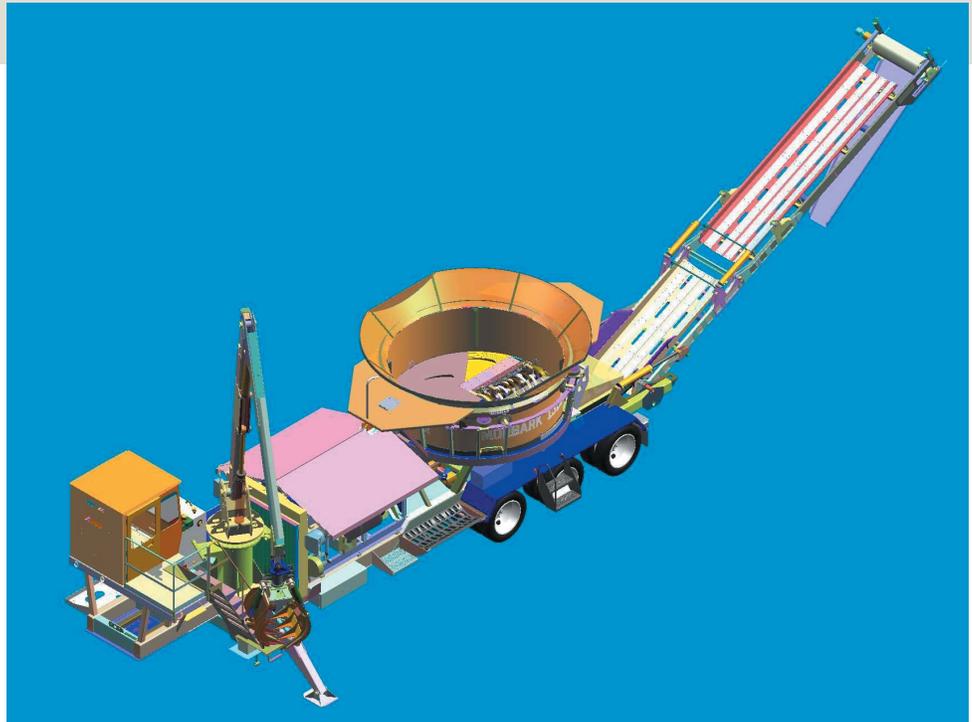
Solid Edge software was only system capable of modeling all parts

Sheet-metal design in Solid Edge best suited for fabrication

Dual level support best in the industry

Solid Edge and DesignSpace from Ansys for FEA works very well

Design errors reduced



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Production drafting manager  
Morbark Inc.

removed the liftgate and fitted it with a pelican hinge, effectively reversing the back door so it would pull objects directly into the chipper. Also the car needed a different suspension to support the extra weight of the chipper. (The chipper drum alone weighs 250 pounds and the housing is heavily reinforced steel.) The team removed the Cruiser’s MacPherson strut independent suspension and rear springs and refitted them with an air-suspension system. In the spirit of the show, the team also decided to create a monster amplifier

by directly routing both engine exhausts into the chipper’s discharge tube so that the Cruiser’s motor and the chipper’s engine roar together in loud harmony.

### Back in the real world

Tree chippers have been around since the early 1940s and have come a long way in technology. Morbark revolutionized that technology in the early ‘70s with the first hydraulic-powered brush chipper that is still the leading brush chipper on the market today. The company supplies machines to a wide range of customers all over the world, including large tree-care contractors, rental stores and governmental agencies.

Prior to the year 2000, design engineers at Morbark used 2D AutoCAD. When solid modeling technology became affordable and available on the PC, Morbark decided it was time to upgrade. “We wanted to move to solids because it would be good for the drafting department, but mostly because of all the downstream

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advantages," says Doug Jones, production drafting manager at Morbark.

He and some colleagues undertook a thorough evaluation, inviting representatives from Autodesk, PTC, SolidWorks and Siemens to demonstrate their software. A critical requirement was the ability to model actual Morbark parts. "Only Solid Edge did everything we asked," says Jones. "Some of the others had trouble with one of our more complicated parts." Although all of the programs offered special sheet-metal modeling functionality – an important factor for Morbark since its machines are more than 50 percent sheet metal – Solid Edge's sheet-metal environment was the best suited to the company's needs. "It seemed to be tailored to manufacturers and fabricators like us," Jones explains.

Ease of use was an issue as well. "Two dimensions were all we were used to and we knew the transition to solids would be tough. We looked closely at things like how many clicks were needed to perform a

task and how deeply commands were buried," says Jones. Solid Edge was clearly the leader in the user interface category.

Another factor in favor of Solid Edge was dual-level technical support. Some of the vendors provided support only through their resellers. "Solid Edge has its Tech Center where they guarantee they'll answer your call in 60 seconds," Jones explains. "With other vendors' resellers, we weren't sure if they'd always be that accessible." Morbark purchased 17 seats of Solid Edge from a nearby reseller, CAM Logic, based in Oxford, Michigan. "We're very pleased with them, too," says Jones.

Since then, Morbark has used Solid Edge to design many new machines. The hoped-for advantages of solid modeling over 2D have been realized, and then some. For example, the company now regularly performs finite element analysis on troublesome areas, something that wasn't always done in the past. Now, using the DesignSpace program from Ansys, a Solid Edge Voyager Program application,

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## Solutions/Services

Solid Edge  
[www.siemens.com/solidedge](http://www.siemens.com/solidedge)

## Customer's primary business

Morbark Inc. is the world's leading designer and manufacturer of wood grinding, chipping and processing equipment. From its world-famous chip harvestors and flails to industrial tub grinders, Morbark is the company that many decision makers turn to when they need heavy-duty, dependable equipment to handle tough applications.  
[www.morbark.com](http://www.morbark.com)

## Customer location

Winn, Michigan  
United States

Solid Edge models are imported into the FEA software to quickly generate an analysis mesh. "There's no data translation; the programs work together seamlessly," says Jones. An important benefit of having FEA more accessible is that it's there to help designers remove excess weight from the machines. Weight is a concern with the bigger machines because they have to meet strict limits to travel on public roads. "We had trouble doing that in the past and it's much easier now," Jones says.

Another downstream benefit of designing in solids is less rework. "It is difficult to quantify, but it's been very significant," says Jones. "Production tells us the machines are going together much better and we have fewer design changes. Not having to go back and tweak drawings saves a lot of time." The preparation of technical manuals and sales materials is also going faster now that solid models are available. To create illustrations in the

technical manuals, a user simply picks the desired angle on the Solid Edge assembly model and pushes a button to create an exploded view. Sales literature also benefits from the use of rendered Solid Edge images.

More downstream benefits are on the horizon. Morbark is now evaluating CAM software that will allow the company to use design geometry to create tool paths for the CNC machines. "Solid Edge has done almost everything we expected," says Jones. "It was a very good purchase for us."

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## Siemens PLM Software

Americas +1 314 264 8287  
Europe +44 (0) 1276 413200  
Asia-Pacific +852 2230 3308

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