

ACE MANUFACTURING SYSTEMS LTD.

ADVANCING CNC MACHINE DESIGN WITH
SOLIDWORKS SOLUTIONS



By transitioning from 2D to 3D with SOLIDWORKS design and analysis solutions, AMS has been able to take advantage of robust dynamic motion tools for resolving interference, collision, and clearance issues. The software includes integrated finite element analysis (FEA) capabilities for ensuring structural performance during the development of AMS's vertical and horizontal CNC machining centers.

AMS[®]
In Pursuit of Excellence

Challenge:

Transition from 2D design tools to a 3D development platform for producing CNC machining systems to shorten design cycles, reduce errors, and improve interactions with customers.

Solution:

Implement SOLIDWORKS Professional design and SOLIDWORKS Premium design and analysis software.

Benefits:

- Cut machine development time dramatically
- Reduced design errors substantially
- Improved design visualization and interactions with customers
- Optimized designs for weight, strength, and material usage

One of the leading CNC machine tool manufacturers in India, Ace Manufacturing Systems Ltd. (AMS) brings its expertise to the development of CNC vertical and horizontal machining centers, and related manufacturing solutions. Since its founding in 1994, AMS has produced more than 8,000 CNC manufacturing systems throughout India and around the world, and has established itself as one of the preferred names in the automotive industry. Customers rely on AMS products to manufacture critical parts for passenger vehicles, commercial vehicles, two wheelers, three wheelers, and farm equipment. AMS is also a single-source supplier of machines to many Indian original equipment manufacturers (OEMs) and large-size component manufacturers.

Until 2005, the company utilized AutoCAD® 2D design tools, when AMS management decided to move to the Pro/ENGINEER® 3D design package. AMS was in the process of converting from 2D to 3D with Pro/ENGINEER software in 2008 when it received some customer tooling changes in SOLIDWORKS® format, at the same time as one of the group's companies purchased a few SOLIDWORKS licenses. This first experience with SOLIDWORKS prompted the company to re-evaluate its 3D solution, according to Technical Consultant Laxmikant Kannappan.

"Once we had an opportunity to experience SOLIDWORKS 3D design software, we chose to standardize on SOLIDWORKS," Kannappan recalls. "SOLIDWORKS software was so much easier to use and provided really good design visualization tools in both 3D and 2D. We believed that SOLIDWORKS software would enable us to reduce cycle times, eliminate design errors, and improve machine development performance. We have not been disappointed."

AMS decided to standardize on the SOLIDWORKS 3D development platform—implementing 32 SOLIDWORKS Professional design licenses and one SOLIDWORKS Premium design and analysis license—because the software is user-friendly; provides robust dynamic motion tools for resolving interference, collision, and clearance issues; and includes integrated finite element analysis (FEA) capabilities. "With

SOLIDWORKS, we were able to more easily transition from 2D to 3D and add critical motion and analysis tools that help us satisfy the increasingly stringent requirements of our customers."

ELIMINATING DESIGN ERRORS, IMPROVING MACHINE PERFORMANCE

Using SOLIDWORKS design and analysis tools for machine development, AMS has reduced design errors substantially, minimizing time-consuming, costly retrofits and rework on the production floor by generating mistake-free drawings. "Leveraging dynamic motion and animation tools in SOLIDWORKS, we can better visualize how every machine component will function in 3D before we release designs to manufacturing," Kannappan explains. "This enables us to identify interference and collision issues, and then quickly adapt the design to provide the necessary clearances.

"Our customers also want to see a machine in 3D before signing off on the design," Kannappan adds. "With SOLIDWORKS, we not only can show them the machine design but also demonstrate the machine footprint—or footprints for multiple machines—on the factory floor. To support this, we've incorporated SOLIDWORKS eDrawings® of machine designs into our design approval process, so customers can review machine designs in detail even if they don't have SOLIDWORKS software."



"SOLIDWORKS integrated FEA has given us the tools we need to shorten cycle times and improve machine performance considerably."

— Laxmikant Kannappan, Technical Consultant

DEVELOPING MACHINES IN LESS TIME

Because SOLIDWORKS software has helped AMS dramatically reduce design errors, the company can design and manufacture better-performing machines in half the time. "Greater design accuracy translates into less scrap and rework, which saves both time and money," Kannappan stresses. "It also results in faster machine development and delivery.

"Before we implemented SOLIDWORKS, it would take about six months to design, manufacture, and assemble a machine," Kannappan continues. "With SOLIDWORKS, we've reduced machine development to four months by eliminating the wasted effort, time, and costs surrounding the need to rework designs after machines are already in production. With faster development times, we've increased our throughput to 800 to 1,000 machines per year, compared to the three machines that AMS produced annually during its first year."

SIMULATION DRIVES DESIGN OPTIMIZATION

In addition to utilizing SOLIDWORKS software to improve design accuracy and accelerate machine development, AMS relies on SOLIDWORKS simulation tools to optimize designs for weight, strength, and material usage, contributing to improved machine performance and development cost reductions. "With SOLIDWORKS simulation capabilities, we gain valuable design insights that allow us to optimize designs and boost performance," Kannappan says. "For example, we run a motion analysis to assess how a mechanism works, then use that information to drive linear static stress and deflection analyses.

"The result is that our machines weigh less and use less material, yet are stronger and more rigid, – through the optimal use of material and resources," Kannappan notes. "SOLIDWORKS integrated FEA has given us the tools we need to shorten cycle times and improve machine performance considerably."

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Using SOLIDWORKS Premium structural design and analysis tools, AMS has optimized designs for weight, strength, and material usage—improving quality and performance—while simultaneously reducing design errors dramatically.

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