

Marvel Machining System

LOCATION
Coimbatore, India

SERVICES
Autodesk PowerMill
Autodesk PowerShape

PowerMill brings cycle time down by 30%: Jobshop owner

Extensive use of software makes it possible to produce complex parts with high precision and within record time.

“We started evaluating various CAM software available in the market and realised PowerMill was the best suited. We became one of the first to choose PowerMill in the region.”

— **Thangaraj,**
Co-Founder,
Marvel Machining System

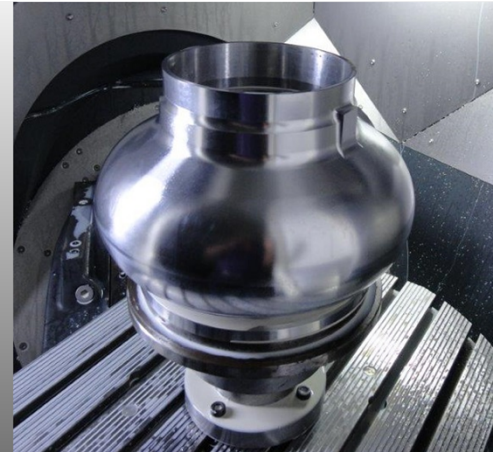
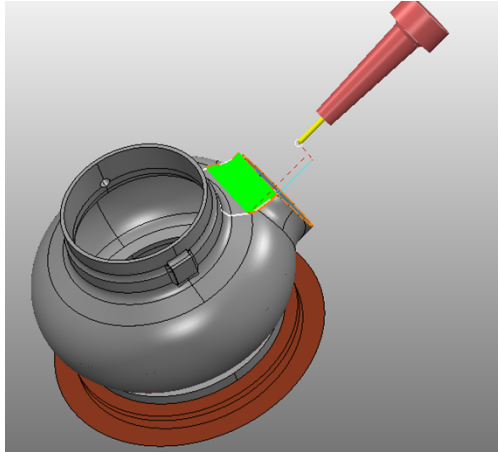


Image courtesy of Marvel Machining System

Customer's Profile

“Quality is not an act, it's a habit,” believes Thangaraj, the Co-Founder of Marvel Machining System. “From the time of the company's inception in 2002, our motto has been to never compromise on the quality of our product's output. Hence, our shop floor is always equipped with state-of-the-art technologies—be it for machines or software,” he says, adding, “PowerMill is one such investment.”

Learning the ropes

Before Marvel Machining System (MMS), Thangaraj made his mark at Premier Instruments and Controls Limited (PRICOL). “Thirty-two years ago, I joined PRICOL as an EDM operator in its tool room division. Eventually, I was given the responsibility of operating the CNC machine. It was here that I learned about tool designing, process planning, machine operation, and CAM programming, among other fundamentals of manufacturing processes,” he says.

Presently, Thangaraj is not only a proficient programmer, but also heads the design and manufacturing at MMS.

A successful launch

MMS was set up with only one milling

machine—the Haas VF-2. But today, in a shop floor spread across 3,000 sq ft, the company boasts of a wide range of state-of-the-art technologies.

The company has been involved in the manufacturing of critical aerospace components like impellers and blisks; high-precision components like food industry pumps, oil pumps, camshafts, alloy wheels, engine parts, and speedometer dies. It also deals in medical components like heart valves, face mask press rollers and dies, and parts for all types of moulding works.

MMS has always been ahead of its time. In 2002, when most companies functioned using conventional tools, MMS was busy trying to complete its first order from PRICOL, which required a high-end CAM software that could handle 3D geometry, provide easy workflow, generate a collision-free tool path, and deliver excellent finishing operation. “We started evaluating various CAM software available in the market and realised PowerMill was the best suited. We became one of the first to choose PowerMill in the region,” recounts Thangaraj, adding, “One particular feature that attracted us to PowerMill was its holder collision checking.”

Once a tool path is generated, the operation can be left to PowerMill because it ensures there are no gouges

According to Thangaraj, this feature was one of the deciding factors and saved him considerable time, reduced part rejections and ensured safe operation. PowerMill also helps MMS ensure that the product is accurate. "To ensure accuracy, a smooth tool path without any collision and gouges is necessary. Gouges will require some form of manual re-work, which is both costly and time consuming. It also relies on the skills of the operator to fix the problem. But this feature helps in checking toolpath against the cutting portion of the tool and the model," he says.

Automating the process

MMS has automated its manufacturing operation and programming activities. Once it receives a 3D model from a client, the file is imported into the PowerShape design software to check its manufacturability and identify surface faults such as trimming error.

"Sometimes, machining requires us to seal the holes or channels. This can be rectified using PowerShape. Its 'Solid Doctor' feature is a great tool, as it helps us identify and fix faults in solid. Once we are satisfied with the file's manufacturability, the 3D model is exported to PowerMill for programming," Thangaraj explains.

The tool definitions like diameter, length, and shank diameter, among others, are already stored in PowerMill. "The standard cutting data from the tool library is also imported. We utilise those inputs in the tool path strategy to create a tool path," explains Thangaraj.

Once a tool path is generated, the operation can be left to PowerMill because it ensures there are no collisions or gouges. It also produces a high quality NC code that MMS engineers know can be trusted to produce an accurate machined component in time. "If issues crop up, the software will flag it or stop the operation, which makes it very reliable," he says.

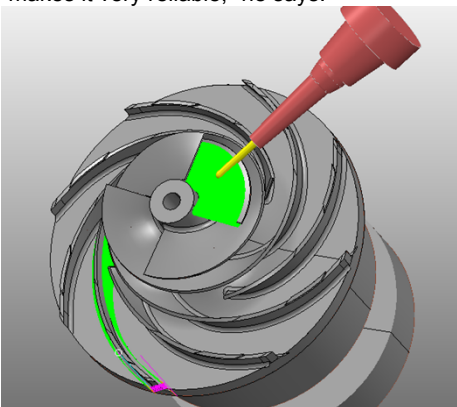


Image courtesy of Marvel Machining System

Thangaraj explains that for any kind of deep channel machining, the rib machining feature is applied. He also vouches for vortex machining, an area clearance strategy that rapidly removes material from a 3D part while controlling the tool load.

Talking about the software's other features, Thangaraj says, "Since we work with aerospace applications, Blisk machining features come in very handy for impeller and diffuser parts. Another small feature, but an important one, for smooth roughing operation is 'Unsafe Segment Removal', where the tool will automatically restrict closed encounter areas."

PowerMill has created a safe manufacturing environment at MMS. "Another advantage of using PowerMill is that we can easily find experienced programmers as this CAM software is used extensively in India," he says.

Proud Projects

Aerospace component manufacturing is usually challenging because of the complexity in geometry and materials. "I would like to highlight two complex projects of the aerospace industry, which we successfully completed with the help of PowerMill," says a beaming Thangaraj.

The first project that Thangaraj was referring to was the impeller manufacturing project that MMS bagged from one of the largest space organisations. This project required us to achieve a 5 microns accuracy and eliminate manual polishing, which is very difficult. Achieving this result on hard-to-machine materials made it even more challenging. "PowerMill offers special strategies for blisk machining which can simplify impeller machining and makes complex part manufacturing effortless," says Thangaraj.

Apart from other features, the 'Blisk Machining' function proved to be particularly beneficial. It helped in the impeller machining strategy during the roughing and finishing operation. Thanks to this function, the cycle time was reduced; the operation was safe and the outcome was highly accurate.

"The second challenging project was when we had to make a cluster part for an aerospace customer. The challenge was to get the part manufactured within a deadline, which meant that we had to reduce the cycle time. Usually, tool path operation cannot be performed continuously, but with 'Positioning Milling', we saved on programming time as well as achieved the desired accuracy. Thanks to PowerMill, we successfully reduced the cycle time by almost 30%," he explains.

"PowerMill offers special strategies for blisk machining which can simplify impeller machining and makes complex part manufacturing effortless."

— Thangaraj,

Co-Founder,
Marvel Machining System

The end result

The aerospace, medical, and tooling industries have little tolerance for errors. This means that the manufacturer has to not only be adequately skilled to cater to those industries but also has to possess the necessary infrastructure. To meet their customers' demands, MMS believes in being equipped with the required state-of-the-art technologies.

"We have never compromised on technology. In fact, all our technologies synchronise with each other. For instance, DMG MORI and Haas Machines operate smoothly with PowerMill, resulting in optimal output. Most of our customers, which include some of the big names in the industry, keep coming back to us with newer projects. This is the biggest testimony of our work. That's why it's important to invest in the right technology," says Thangaraj.

With Coimbatore emerging as one of the most important manufacturing hubs in the country, Thangaraj is optimistic of a brighter future. "Currently, we own three PowerMill seats and are looking forward to acquiring more when we expand our operations," he says.

"These 18 years have been surreal. Today, we have orders from large public and private organisations. I believe, at the end of the day, it's all about how smartly you invest and how you turn those investments into profits. I must say that PowerMill has been an integral part of MMS and has played a vital role in our success. We urge the Autodesk team to continue supporting SMEs, like ours, that form the backbone of the Indian manufacturing sector and help us live up to our country's slogan 'Make in India'," says Thangaraj before signing off.