

## Centre for Industrial Research and Engineering Services (CIRES) India

LOCATION  
Coimbatore, India

SOFTWARE  
Autodesk PowerMill  
Autodesk PowerShape

# User-friendly PowerMill reduces cycle time by 15%

## Autodesk software facilitates research along with programming, critical machining of engineering components

“We have extensively used PowerMill in all our projects, especially in those involving roughing and finishing of complex profiles that require the support of a CAM software for effective machining. In roughing, in particular for hard materials plunging and links are crucial to ensure tool life and cycle time. In finishing, the tool path has to be generated with the required tolerances and surface finish. Besides, the selection of boundaries is very important tool to focus and limit the tool path in specific area. Even lead in and links have to be generated without damaging the previously finished surfaces. PowerMill has helped us accurately achieve all this.”

— **Dr Vijay Anand Kandasamy**  
Proprietor  
Centre for Industrial Research and Engineering Services (CIRES) India



Image courtesy of CIRES

### Customer's Profile

Centre for Industrial Research and Engineering Services (CIRES) India, a company that was born with the passion to undertake research projects along with providing engineering services, has carved a niche for handling complex manufacturing projects.

Prior to founding CIRES India, Dr. Vijay Anand Kandasamy, its proprietor, taught at the reputed Kumaraguru College of Technology in Coimbatore. “In 2018, I quit my job as professor and set up my own machine shop. Along with providing complex engineering services to the manufacturing industry, I also use my machine shop to focus on my research on metallurgical analysis, optimizing the machining parameters for developmental components and study the machining of advanced materials,” says Dr Kandasamy, a PhD degree holder in Manufacturing Engineering.

### Unique line of products

CIRES India manufactures engineering components that are used in a wide range of applications such as aerospace, automobile, enclosures of electronic products,

construction equipment, machineries, and agricultural equipment, among others.

The company takes pride in undertaking unique jobs. Manufacturing R&D prototypes, cages for bearings, gearbox or motor housings designed for IOT configuration, moulds for plastic injection, pressure die casting, and die for sheet metal forming, are some of the challenging projects it boasts of. “These jobs bring along their own set of challenges as they have one-of-its-kind designs and no template for bulk manufacturing,” Dr Kandasamy explains.

“But, our manufacturing unit is fully equipped with the necessary design and machining facilities, including CNC machines, testing, CAD software and CAM software,” he quickly adds.

“The components we machine are critical and challenging in terms of geometry, profile, work holding, material properties and with close tolerances. We rely on our machines, CAD/CAM software and skilled personnel to redress these challenges and meet our customers' requirements,” he highlights.

# In three years of operation, CIRES India has already carved a special place for itself in the critical components industry.

## Overcoming Challenges

“The jobs we undertake fall under the ‘difficult-to-machine’ category. Hence, we cannot make do with merely performing manual or bottom-level programming and instead opt for high-end CAD/CAM software. PowerMill has helped us with components that have complex geometry with curvilinear profiles. It can effectively tackle narrow pockets or grooves where only small tools can enter. It also performs the mandatory collision checking while machining narrow zones and deep pockets. PowerMill enables edits to the toolpath where ever necessary ensuring complete control for the user. The software also ensures that the tool follows the lead in & lead out commands and ensures smooth operation without any collisions,” Dr Kandasamy explains.

In 2018, when Dr Vijay Anand set up his company, he realised PowerMill was best suited to meet CIRES India’s needs. “We have extensively used PowerMill in all our projects, especially in those involving roughing and finishing of complex profiles that require the support of a CAM software for effective machining. In roughing, in particular for hard materials plunging and links are crucial to ensure tool life and cycle time. In finishing, the tool path has to be generated with the required tolerances and surface finish. Besides, the selection of boundaries is very important tool to focus and limit the tool path in specific area. Even lead in and links have to be generated without damaging the previously finished surfaces. PowerMill has helped us accurately achieve all this,” he elaborates.

## Key Projects

CIRES India only takes on special projects that encompass new product development—a quality that sets it apart in the manufacturing world. Dr Kandasamy says, “I always wanted to be involved in research work based manufacturing.



Image courtesy of CIRES

Unlike batch or high-volume production, which follows a standard manufacturing process, developing new components poses many challenges that force you to research how the technical knowledge can be applicable.”

“We have worked on several crucial projects over the years. Of our many challenging projects, injecting sensors into the gearbox was one of the critical ones. The gear box is made as prototype with IoT configuration. Making a gearbox is no easy feat and making a gearbox along with injecting miniscule sensors into it is an even greater challenge,” avers Dr Kandasamy.

With the advent of smart manufacturing and Industrial Internet of Things (IIoT), companies are injecting sensors in many engineering components to monitor various parameters such as wear, pressure and temperature, among others, to enhance the component’s performance. Sensors in gearboxes can help provide information on the gear vas and number of rotations.

“I used PowerMill’s boundary feature when machining the gearbox with a narrow profile because of the sensor pockets. It helped me limit my area of operation and avoid unnecessary machining, which, in turn, increased the toolpath’s efficiency. This is a particularly important feature as the sensors have to be injected while machining the narrow profile,” says Dr Kandasamy. At CIRES India, narrow profile is being done using the boundary function where small cutters in the range of 1-2mm diameter are used for machining.

According to Dr Kandasamy, “Another feature that comes in handy during gearbox machining is managing toolpath ‘Leads & Links’. It helps me create a conducive machining environment by ensuring a perfect entry and exit strategy for the cutter. This feature warrants that the tool enters perfectly from any direction—be it vertically, horizontally, or diagonally. It also synchronises the tool’s movement effectively.”

Vortex machining is another feature that Dr Kandasamy vouches for. It is high-efficiency area clearance strategy that provides maximum benefit from solid carbide tooling. “For this project, I used the 4-axis tool path for rotary machining, which made the operation smooth. Overall, I feel, all the finishing strategies in PowerMill ensure a high accuracy rate,” says Dr Kandasamy.

“PowerMill is the first CAM software I installed at my machine shop. It has met all my machining requirements so do not feel the need to look for any other software. I compared PowerMill to the software that my competitors were using and realised that we have been able to achieve a cycle time reduction by 15 to 20%.”

— Dr Vijay Anand Kandasamy

Proprietor

Centre for Industrial Research and Engineering Services (CIRES) India

## The end result

In three years of operation, CIRES India has already carved a special place for itself in the critical components industry. The company, since its inception, has always been focussed on the kind of job it takes on—a factor that has helped them stand out.

Dr Kandasamy says that PowerMill has played a very crucial role in helping his company achieve their goals. “PowerMill is user friendly. The institute where I taught uses the CAM software and its services from three different companies, but we realised that the students were most comfortable with PowerMill,” says Dr Kandasamy.

PowerMill has helped CIRES India reduce its cycle time by 15-20%, which helped save overall machining hours, he says.

“PowerMill is the first CAM software I installed at my machine shop. It has met all my machining requirements so do not feel the need to look for any other software. I compared PowerMill to the software that my competitors were using and realised that we have been able to achieve a cycle time reduction by 15 to 20%,” concludes Dr Kandasamy.