

# engineering services outsourcing in the machine tool industry

In the era of fast moving products that need to be developed within a stipulated timeframe, manufacturing has undergone a major revolution in the engineering of products. Two of the industry domains that are causing this growth in India, are the Aerospace industry and the Automotive industry.



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The aerospace industry is expected to grow significantly in India, driven by offset requirements and the need for smart sourcing to gain cost and time benefits. The automotive industry is also growing significantly in India, driven by the need for sourcing components faster and cheaper for both the international market as well as for the expanding domestic market. Hence, both the engineering services sector as well as the manufacturing sector in India, is on a rapid growth path. The latter's growth has translated into demand for high-end and sophisticated machinery like 3/4/5 axis milling and turning machines for metal cutting, SPMs (Special Purpose Machines), EDM (Electro discharge machining), Wire cutting/Laser cutting/Waterjet cutting machines, Spark erosion machining, Chemical etching machines, Bending & Forming machines, etc. Hence, machining and machine tool companies are seeing increased demand for their products in India.

A lot of multinational companies tend to set up their captive centers for engineering services, but over time many companies have realized that getting engaged with the right Engineering Services Outsourcing (ESO) company adds greater value in helping them sustain and improve their cost structures. A research report by Forrester also reiterates this – the link gives more details (<http://www.forrester.com/Research/Document/Excerpt/0,7211,42059,00.html>)

QuEST is a leader in the engineering services outsourcing (ESO) space and has set up Global Product Development (GPD) centers for OEM's who want to leverage the cost advantage and engineering resource availability offered by various locations in low cost and high cost areas. GPD is a framework/methodology for engineering that leverages labor arbitrage and time zone differences to develop products fast, better and cheaper. With its delivery centers in USA, UK, Italy, Japan apart from India, QuEST is able to work on high end projects as well as export controlled / ITAR projects for these geographical locations.

With the intent of penetrating into the market created by the growing demand for high-end and sophisticated manufacturing machinery, QuEST engaged with the

machine tool industry by offering engineering services using CAD/CAM/CAE tools, and developed a few strategic relationships with some OEMs and their suppliers. QuEST has been serving this industry since the last 8 years, engaging with companies in North America and Europe.

Today, QuEST's services to the machine tool industry include assisting them in identifying the core and non-core engineering processes within their company and moving non-core engineering processes and work packages to India for offshore execution. The machine tool industry has evolved significantly since the 19th century when it was created and is highly cost conscious, with a need for delivering at the right time with the required quality levels. Hence, any engineering outsourcing company that caters to this industry has to not only have excellent offshore engineering processes, but also a high level of domain knowledge in the machine tool area. QuEST has been able to achieve this, and today works with some of the top machine tool industry leaders across the globe, addressing their engineering technical requirements while providing cost effective solutions.

QuEST deploys the GPD methodology and provides services ranging from concept design through product re-design, drafting, detailing and modeling, engineering analysis and simulation, verification and validation, application engineering, machine layout detailing, design of tools and gauges, fixture designs, process planning, CNC programming, cost excellence programs, cycle time estimation, VA/VE, off-field troubleshooting, HMI-MMI controls, manufacturing and vendor management, etc. Modular design and creation of standard parts libraries is also something that QuEST provides, thereby saving engineering and manufacturing costs.

The engage usually starts with QuEST sending some of its engineers with the required skills/competencies and abilities to the customer locations, for knowledge capture; this involves understanding the customer's products and services, systems and processes, tools and applications, standards and conventions, and most importantly, to build working relationships with the customer's engineering teams. The engineers then return to India and set up the systems, processes and environment to integrate the customer's product development lifecycle into



QuEST's offshore development processes. PDM/PLM links are also established, along with a communication plan, and this helps in data transfer directly between the customer engineers and QuEST engineers in a seamless manner. This in turn speeds up the interactions and turn-around time for work package execution.

QuEST also supports its long term strategic customers by getting involved in their new product design cycle and capturing their marketing and field inputs. Thus, QuEST engages with its customers at both ends of product development and design – understanding the voice of its customer's customer, as well as understanding the issues in the field after installation. QuEST leverages its in-house talent from various universities it has tie-ups with, and also from other organizations or bodies related to the industry.

Application engineering plays an important role in the entire product development lifecycle; QuEST has developed its expertise bringing in engineers having extensive manufacturing experience who could take decisions from the grass-root level on process planning, simulation of cutting process and fixture designs and tooling. These engineers work collaboratively within a team to arrive at a right design which would yield the required end results like reduced cycle time, reduced tool change-over time and so forth. QuEST has excelled by setting up these GPD models for various top Fortune 500 companies by bringing in the right talent under one umbrella.

In addition, QuEST supports its customers by leveraging its vendor management and supply chain skills in helping customers in manufacturing components and providing them with low cost, high quality fixtures and tooling. QuEST through its wholly owned subsidiary, QuEST Machining and Manufacturing Pvt. Ltd (QMMPL) ([www-quest-manufacturing.com](http://www-quest-manufacturing.com)), supports its aerospace and automotive customers on precision machining, component and assembly sourcing with a high standard of quality.

QuEST has worked on many projects in the areas of high speed five axis machining centers, turning machines, universal machining centers and boring machines. CNC rotary system designs and vertical machining centers are some additional areas that QuEST has worked on from concept design to detailed

drawings and support in manufacturing engineering. A few other components and sub-systems that QuEST has worked on from automotive industry are 4-cylinder engine blocks, Cylinder heads, Pistons, Crankshafts, Connecting rods, Braking systems & components, etc. In the aerospace domain, the list includes Turbine blades, Engine components, Airframe sub structures, Impellers, Landing gear subsystems, Wing boxes, etc. The services include fixture design and build for the machining of these components, CNC programming and simulation of cutting tools. QuEST has over 300 man years of experience in this segment and a wide range of supporting tools from CAD such as UG, Pro/Engineer, Inventor, Solidworks. In CAM there is Vericut, Q-Checker, Edgecam, CATIA AM2, UG CAM to name a few and CAE tools like Ansys, LS-Dyna, Nastran, Patran. Complex components like turbine blades and impellers had been some of QuEST's challenging projects where not only size, but also the accuracy, precision, contours play a vital role. These were projects where QuEST not only designed the fixtures, but also built them with its supply chain in and around India and delivered them to international customers. These projects involved understanding of customer preferred catalogs and appropriate usage and recommendations of hydraulic components universally available. QuEST supports its customers in testing and validation of the designs and manufactured components and assemblies while also extends further to installation and commissioning of fixtures with selected few of its customers. This calls upon a good understanding of different engineering processes like heat treatments, colors and paints, metal properties / metallurgy. Aerospace components machining includes handling of metals like titanium, inconel, nimonic alloy, aluminum and steel. CMM Programming capabilities are clubbed within the manufacturing engineering team and QuEST has its own state of art facility to carry out necessary programs and tests. Quick turnaround time, expertise and clear understanding of the requirements of the industry enables QuEST to be competitive in the global market while high standards of quality and process controlled metrics help QuEST execute the projects on time, every time.

A snap-shot of how QuEST serves the machine tool industry in design services is as follows:

**Concept Design**

- Concept Layout
- Proposal Generation
- Machine Layout
- Cycle Time estimation

**Design Engineering**

- CAD
- Product Redesign
- CAE – structural, thermal and failure analysis
- Sustainment Engineering
- Reverse Engineering
- Technical Publications
- Trouble shooting for installed machines

**Application Engineering**

- Fixture Design and Tooling
- Tool Path generation and Tool Selection
- Process Planning and NC Prog
- Design Validation and Verification

**Material Handling**

- Process Automation design and development
- Mechanization layouts and designs
- Selection of systems and sub-systems
- Heavy Engineering Equipments

**Embedded Systems**

- Full SDLC
- Hardware Design and Development
- Testing and Validation
- Integration and Certification

**Global Product Development supports the industry:**

High cost regions like USA and Europe save money by leveraging through QuEST's global talent and proven business models that QuEST defines per domain and industry. One would expect cost savings on the design to the tune of 30% over multiple years' strategic relations and thus give customers more mobility to reinvest same money into newer products and research and development. QuEST provides resources at the customer locations to integrate their product development lifecycle into GPD concept offshore thus reducing time on reinventing the processes and product cycles which benefits an OEM by getting data directly into their product data management tools or at PLM / ERP level. This eventually helps the customer in having

direct point to point contact at their office to deal with day to day dynamics of engineering occurring at the customer's engineering hub.

**End to End capabilities that benefit the industry:**

What would be the advantages one would typically expect out of this outsourced engineering and directly benefitting the manufacturing of these products? With QuEST's support, customers get to know real time simulation of how the machines work, save significant money over the traditional way of designing and engineering, which can lead to leveraging modular designs that satisfy end customer requirements, thus bringing in cost efficient needs to the table. The end-to-end capabilities of QuEST (i.e. design to manufacturing) allows the customers to have different services and consulting under one roof, customers save time by not head hunting or having an extensive vendor management for different services and also restricting their intellectual property by not exposing the same to multiple vendors. QuEST has successively passed on customers IP protection norms and has been preferred vendor in mechanical and electrical engineering design. This reflects in the fact that competing companies use QuEST as their strategic engineering services provider.

QuEST is uniquely positioned engineering and manufacturing organization to globally support customer needs. With its delivery centers in USA, UK, Italy, Japan apart from India, QuEST is able to work on even export controlled projects for these geographical locations which includes machine tool manufacturers who supply machines to defense forces within their countries. QuEST continues to focus on machine manufacturing industry and its accessories in the future bringing its control system capabilities to tie in the ends. With the right combination of people, tools, technology and process, QuEST has been able to achieve a remarkable mark in supporting this industry resulting in the growth of its customer base across the globe in industries like metal cutting, SPMs (Special Purpose Machines), EDM (Electro discharge machining) wire cutting, spark erosion with its end customers from packaging, textile, power generation industry, earth moving equipment manufacturers and heavy engineering.



## About QuEST Global

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QuEST Global is a focused global engineering solutions provider with a proven track record of over 17 years serving the product development & production engineering needs of high technology companies. A pioneer in global engineering services, QuEST is a trusted, strategic and long term partner for many Fortune 500 companies in the Aero Engines, Aerospace & Defence, Transportation, Oil & Gas, Power, Healthcare and other high tech industries. The company offers mechanical, electrical, electronics, embedded, engineering software, engineering analytics, manufacturing engineering and supply chain transformative solutions across the complete engineering lifecycle.

QuEST partners with customers to continuously create value through customer-centric culture, continuous improvement mind-set, as well as domain specific engineering capability. Through its local-global model, QuEST provides maximum value engineering interactions locally, along with high quality deliveries at optimal cost from global locations. The company comprises of more than 7,000 passionate engineers of nine different nationalities intent on making a positive impact to the business of world class customers, transforming the way they do engineering.



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