



An ISO 9001 certified Company

Manufacturer of Tooling for Commercial Aircraft Industry

Providing Global Manufacturing Solutions since 1985

Illustrations: Some of our Innovations

Case -1: Incredible capability addition to existing Lathe

We received an order (in the year 1993) for the design and manufacture of press tools weighing 16 Metric Tons (MT) and 15.5 MT. The customer came to us after a disappointing experience with a supplier in Bengaluru, India who could not make any progress even after a period of one and half years. These tools were required by them in 10 months to prove their hydraulic press of 4000 Tonnes to be sold to a Defence undertaking in India. The manufacture of these tools involved machining of several plates of size 2750 x 1700 x 200 mm, in addition to extensive die-sinking work in the top and bottom bolsters.

Challenge: Unreliable subcontractor

The machining work was subcontracted to a large public sector machine tool company and when we went to them with material they badly let us down by unilaterally revising the agreed upon charges fivefold making it an unviable business proposition. We were determined to meet our timelines and cost estimates to our customer however.

Solution: Developed in-house capabilities

Faced with this unfavorable situation, our team came up with an innovative solution with which the entire work was done at our own factory by extending the capabilities of our factory lathe to be able to mill these plates and also do the die-sinking. The innovative setup can be seen in the pictures below.



JAISARA
TOOLING SYSTEMS

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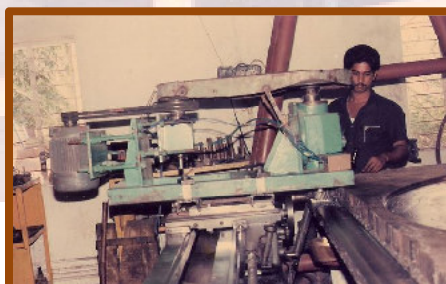
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Case -2: Outstanding productivity enhancement

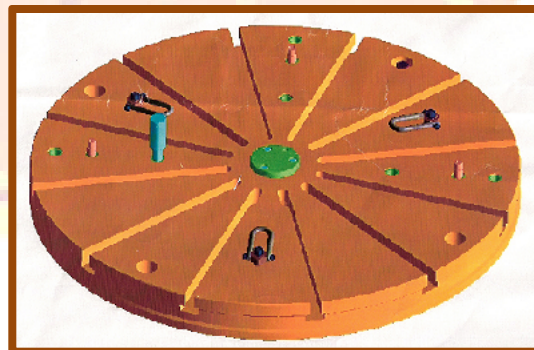
In the year 2002, we bagged a major global order for manufacturing of tooling package for the production of stators of Aero Engine. The customer had only two VTL (Vertical turning lathe) machines on which all the turning operations had to be carried out in a batch production mode, involving fixture change after each operation.

Challenge: Very long set-up time

The changeover time was over 4 hours and two changeovers were required on each machine per day leading to huge loss in output/productivity.

Solution: Introduction of SMDC (single minute die change) concept

SMDC concept in the design of fixtures was introduced by the design team by providing three dowel holes (2 in x-axis and one in y-axis) in which system-3R expandable dowels were used. The fixture changeover time was reduced to a mere five minutes in place of four hours. This involved manufacture of base plate with three different pcd's (accommodating various sizes for fixtures) and the holes had to be manufactured within 4 micron positional accuracy (cumulative error). At that juncture we did not have SIP Jig borer, but we still accomplished by manufacturing a Master within 2 micron positional accuracy and this Master was used to transfer the holes on all the fixtures including the base plate which is shown below.

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Case -3: Capability expansion in EDMing

Jaisara needed to machine a precision square hole in one of the large tooling of GE Engine.

Challenge: Large and heavy tool

The tool was large and heavy, bordering on the capabilities of the factory facility at that time.

Solution: Extension of EDM capabilities

We took up the challenge and the hole was done in an innovative way by our EDM operator on a small EDM machine by creating a small tank with four plates on the tool itself (in-situ). The EDM process was carried out and the plates were removed thereafter. The square slot was finally lapped to achieve the dimension to blue print specs. Our innovative abilities at the shop floor level allow us to stretch our capabilities in a very short time, providing enormous value to our customers.

Case -4: Reduction of turnaround time

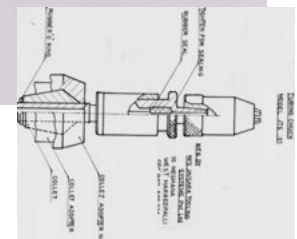
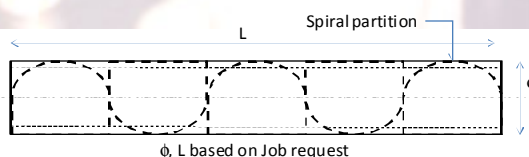
Drilling of holes on EDM using a tubing chuck with coreless electrodes is a well known and proven method.

Challenge: High turnaround time and costs

The difficulty was the somewhat longer turnaround time and higher cost to procure the coreless electrodes.

Solution: Extension of EDM capabilities

The innovation by Jaisara team was that of making our own coreless electrode as per the hole-size to be EDMed in a machined tube and inserting a spiral partition. This effectively increased our in house capabilities & turnaround time for manufacture of small holes on the Jig plates etc. A schematic is shown below.



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Case -5: Dealing with supply chain issues

Sometimes pipe sizes of required dimension are not available from the standard stock and are also difficult to procure from market, particularly in the case of aluminum alloys and more so, if needed in small quantities.

Solution: Single point Trepanning

Our team introduced a tool holder with a single point trepanning tool for carrying out the trepanning operation on a Lathe with a considerable saving in machining and material cost (benefiting our customers).

Case -6: Long fixture details with hardness requirements

At times Jaisara had to manufacture lengthy fixture details with large length to diameter ratios and these were difficult to achieve with conventional processes.

Challenge: Heat treatment distortions

There were severe problems during heat treatment due to distortion of fixtures beyond the allowed tolerance limits.

Solution: Turning and simultaneous Burnishing

This was solved by our team with Turning and simultaneously Burnishing using steady and follow-rests on the Lathe. The hardness was achieved due to Burnishing, thus avoiding heat treat distortion problems. We have produced parts up to 100 inch long much to our delight and to the delight of our customers as the pricing was very affordable.

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Case -7: High tolerance gage manufacturing

In the year 1996, we manufactured and delivered Fan blade checking Gage, involving a tolerance of 0.0002 inch on a 29 inch length.

Challenge: Lack of required equipment at that time

This was a time when we did not have SIP 8P Jig borer (which was installed and commissioned only in the year 2003).

Solution: Use "button-boring"

We used the concept of "button-boring" to successfully manufacture the fixture within tolerance and deliver to our US customer, Chemtronics. The ability of our team to innovate and display flexibility is a great asset which provides value to our customers.

Case -8: Handling difficult supply related problems

We have manufactured and delivered some tools for the Boeing 747 aircraft like vertical rudder handling tool, horizontal rudder handling tool etc. One of the tools was a protector for axle. The tool needed Aluminum alloy of a particular bore size and thickness which was not available from the market.

Solution: Use extrusion to manufacture material in-house

We manufactured an extrusion tool and converted the available pipe to desired ID/OD for machining.



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Illustrations: Some of our Innovations**Case -9: EDM on large tools and fixtures**

Some of the Aero-engine overhaul tooling has spline on the tool. We had to produce this spline at the end of a long shaft of about 48 inch.

Challenge: Lack of EDM machine to handle large tools

Lack of EDM machine to handle such large tooling was a problem, which we did not face earlier.

Solution: Modify existing machine to accommodate large tooling

The EDMing of the spline on this job was accomplished on our small EDM machine (Tank size of 10inch x 18 inch) using a gooseneck electrode holder, conceived and built in-house.

Case -10: Ability to make use of alternative processes

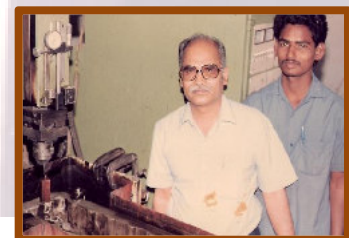
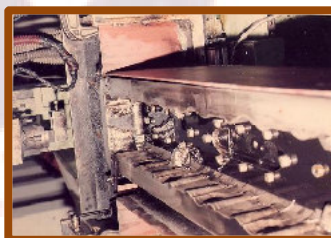
In the year 1990, we received an order for design and manufacture of metal forming pattern for the cylinder head of diesel engine of an APC vehicle (Armored personal carrier). At that juncture we did not have CNC facilities.

Challenge: Unavailability of CNC tools

The job involved lot of 3D profiles. The material of metal pattern was cast Aluminum.

Solution: Use of EDM facilities

The entire metal pattern, including the male and female (size 350mm x 750mm) was manufactured in quickest time by EDMing, much to our delight and that of our customer. Setup is shown below.

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Prior to 1993, we used to undertake design and manufacture of large press tools (some of them weighing as much as 16MT). The segments on some of these tools needed grinding of radius of about 1000mm with a tolerance of 8 microns. The radii on these segments were generated on our large Kolb-60 Jig borer by mounting a hand grinder, on an extended arm.

Challenge: Unwieldy body of hand grinder

The body of hand grinder is such that you cannot hold it or mount it accurately on a setup.

Solution: Design and develop custom fixture for expanding capability of in-house equipment

Our team hit upon an innovation by introducing a plate between the two halves of the hand grinder and assembling the two halves using slightly longer bolts for clamping. Thus, we could hold this mounted plate in any position, accurately producing the perpendicular mounting on the spindle extension arm. The job was ground by generating radii with in an accuracy of 5 microns, a tall order with our facility at that time.

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