

Railway engine turbocharger housings: reducing cycle times through in-process control



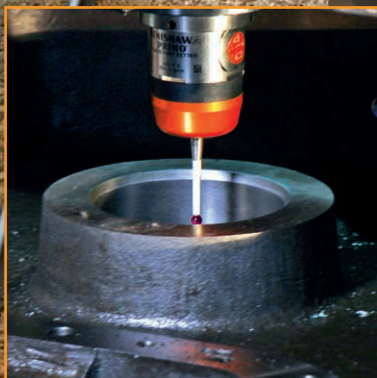
Reduce non-productive time



Eliminate manual intervention



Save money



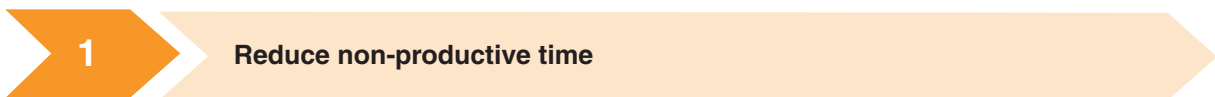
Overview

Company information	Universal Manufacturing Company (UNIMAC) was established in 1987 in Pune, India.
	Originally supplying to the heavy machine tool industry, the company has grown into a versatile manufacturer offering a one-stop solution for all machining needs.
	A 20,000 ft ² machine shop houses a number of large, heavy-duty boring machines, and the latest CNC machining technology.
Products and services	Manufactures large precision components for railway engines, power generation plants, cement manufacturing plants and other heavy-engineering applications.
Industry accreditation	ISO 9001 – certified quality management system (QMS).
Company objectives	Maintain high levels of accuracy on all manufactured parts (15 µm to 20 µm on large parts).
	Achieve globally recognised levels of quality through the adoption of the latest inspection and process control technologies.
	Continue to implement the company's philosophy of 'working with' customers, while delivering consistently high levels of customer satisfaction.

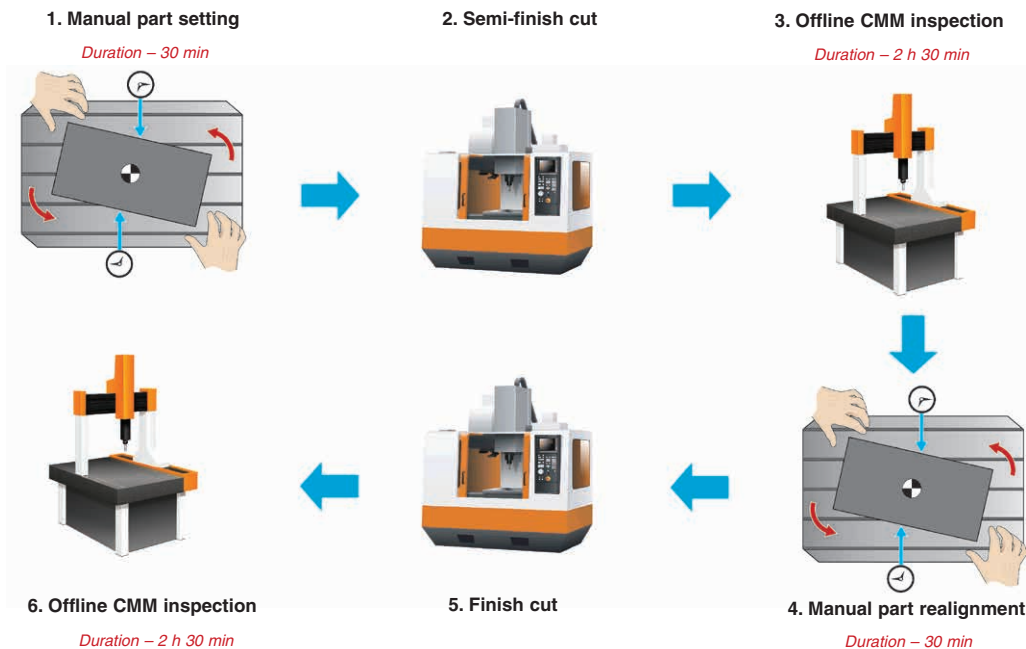
Process

Large turbocharger housings for railway engines are manufactured using Kao Ming CNC milling machines. At the semi-finished stage, parts are taken to an inspection facility and critical features are checked on a CMM. The parts are then realigned on the machine tool for the finish cut before final CMM inspection.

Challenge



The complete cycle time for machining a turbocharger housing was 46 hours. Of this 46 hours, offline inspection and manual part setting/realignment accounted for a total of 6 hours (13%), with part setting alone taking 30 minutes. As a result, CNC machines were left idle for significant periods, while long CMM inspection times created bottlenecks in the process.



Process considerations

Renishaw engineers considered key elements within UNIMAC's process and production stages of manufacturing using Renishaw's **Productive Process Pyramid™**. This framework is used to identify and control the variations that can occur at key stages of the machining process.

For more information, please visit the **When do I probe?** section of the Renishaw website:

www.renishaw.com/en/whendoiprobe

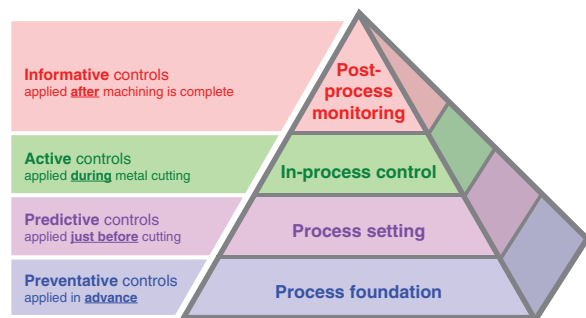
Solutions

Manufacturing process focus: **process setting** and **in-process control**

Focusing on **process setting** and **in-process control**, Renishaw engineers introduced measures to dramatically reduce non-productive time.

The introduction of the Primo™ twin-probe system has enabled automated part setting and inspection to take place on-machine, eliminating time-consuming offline checks and manual alignment/realignment of the part. The process now takes just 30 minutes, reducing non-productive time by 90% and overall cycle time by 12%.

This significant reduction has enabled UNIMAC to manufacture more parts using its existing assets, while simultaneously releasing valuable inspection time on its previously overloaded CMM.

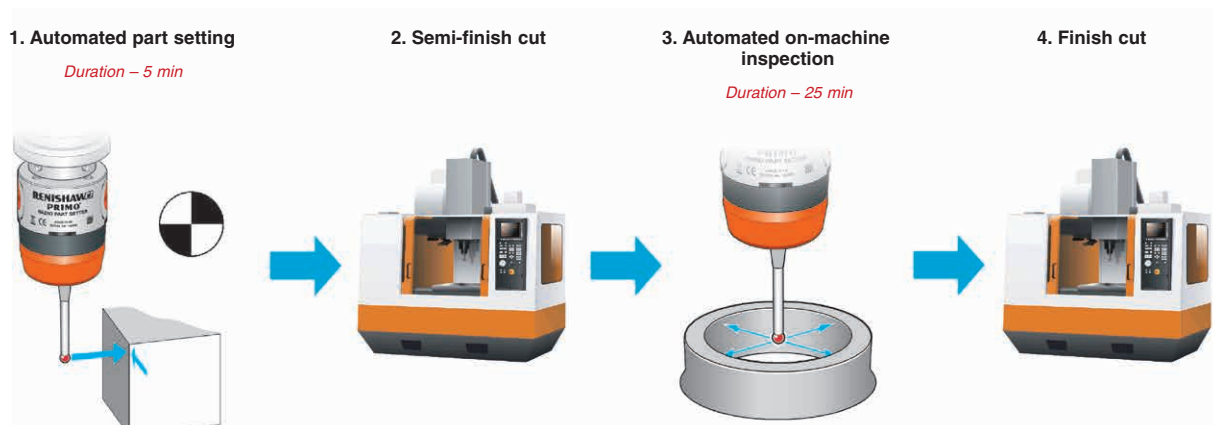


Productive Process Pyramid

Renishaw tools in use



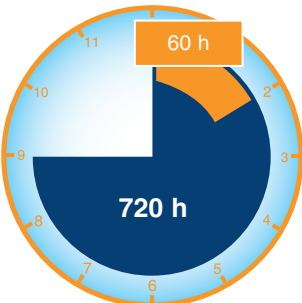
The Primo Radio Part Setter inspecting the turbocharger housing



Results


These charts provide a typical illustration for this industry application where probing has been introduced.

Reduced inspection time*


	Without probing	With probing	Saving	
	Time/ component	6 h	30 min	5 h 30 min
	Components produced/year	120	120	
	Total time/year	720 h	60 h	660 h

* Including part set-up time

Increased savings

	Without probing	With probing	Saving	
	Machining cost/hour US\$	30	30	
	Total machining cost/year US\$	21,600	1,800	19,800

Payback period

	Without probing	With probing	Saving
	Time	4 months	

Summary

The introduction of the Primo twin-probe system has saved UNIMAC US\$19,800 in the first year. This has been achieved by reducing the time taken to set parts and inspect components by 90%. The previous manual, time-consuming, offline methods have been replaced with a single, automated, on-machine solution.

Having optimised the manufacturing process, the company is now able to produce more parts with the same number of machines, and release valuable time on the previously overloaded CMM. Manual intervention has been eliminated, and the company has seen a return on investment (ROI) in the first 4 months of use.

Additionally, the new capability has helped the company to:

- **Enhance manufacturing capability and take on more work**
- **Improve part conformance and consistency**
- **Reduce delivery times and improve customer relations**

Contact

To find out how you could benefit from our process control solutions, contact us today – find your local office at www.renishaw.com/contacts

Customer comment

// After installing the Primo system, manpower costs, material handling costs, material equipment and power consumption charges are saved so no additional investment is required. This gives our manufacturing unit the flexibility to accept orders of any size and from segments such as the machine tool industry. The manual analysis of the results is also avoided, as the data is available on the same controller. It's an amazing experience to use Renishaw machine tool probes for the first time. //



Universal Manufacturing Company (India)

Best practice

Productive Process Patterns™ from Renishaw provide guidance on best practice and the implementation of a wide range of probing solutions.

For more information regarding job set-up and other applications, visit www.renishaw.com/processcontrol



About Renishaw

Renishaw is an established world leader in engineering technologies, with a strong history of innovation in product development and manufacturing. Since its formation in 1973, the company has supplied leading-edge products that increase process productivity, improve product quality and deliver cost-effective automation solutions.

A worldwide network of subsidiary companies and distributors provides exceptional service and support for its customers.

Products include:

- Additive manufacturing and vacuum casting technologies for design, prototyping, and production applications
- Dental CAD/CAM scanning systems and supply of dental structures
- Encoder systems for high-accuracy linear, angle and rotary position feedback
- Fixturing for CMMs (co-ordinate measuring machines) and gauging systems
- Gauging systems for comparative measurement of machined parts
- High-speed laser measurement and surveying systems for use in extreme environments
- Laser and ballbar systems for performance measurement and calibration of machines
- Medical devices for neurosurgical applications
- Probe systems and software for job set-up, tool setting and inspection on CNC machine tools
- Raman spectroscopy systems for non-destructive material analysis
- Sensor systems and software for measurement on CMMs
- Styli for CMM and machine tool probe applications

For worldwide contact details, visit www.renishaw.com/contact



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