

Automotive pump body machining: eliminating scrap through automatic part location



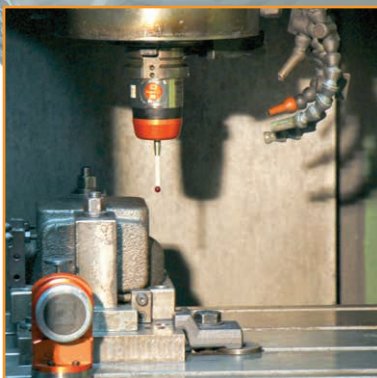
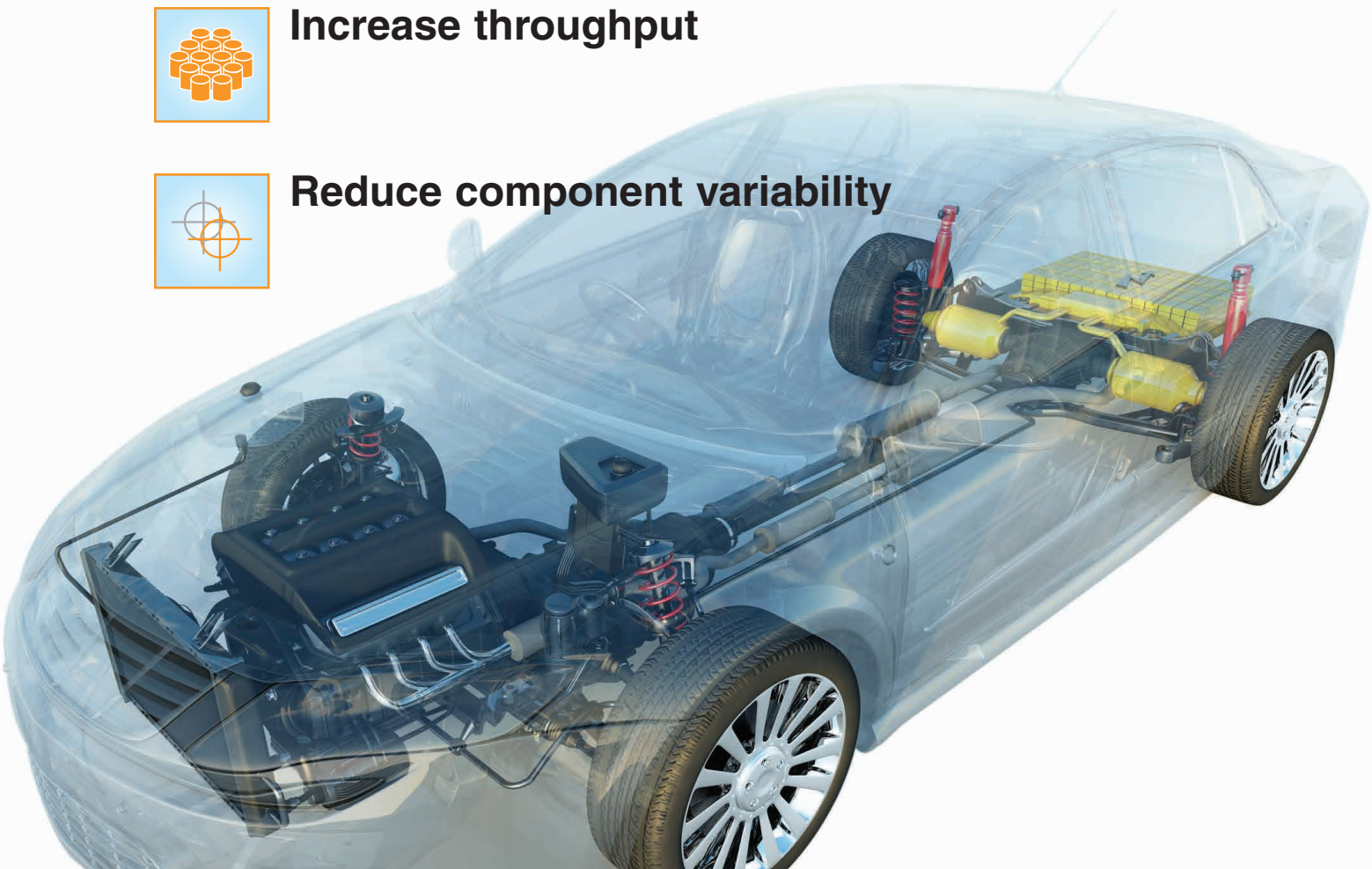
Improve component accuracy



Increase throughput



Reduce component variability



Overview

Company information	SuMax Enterprises Pvt Ltd was established in 1979, in Pune, India to facilitate additional capacity to manufacture high-precision parts for its parent company, Vijay Engineering.		
	Supplying tooling, fixtures and gauges, SuMax later went on to manufacture tractor components for John Deere.		
	With 65 machine tools at its facility, SuMax has the capacity to manufacture 100,000 parts per month.		
Products and services	Manufacturer of high-precision parts for the automotive, machine tool and other industries.		
Industry accreditation	ISO/TS 16949	ISO 9000	ISO 9001
Company objectives	Reinforce reputation as a premium supplier of high-precision manufactured components.		
	Form partnerships with automotive companies moving their manufacturing operations to India.		
	Achieve globally recognised levels of quality through the adoption of the latest process control technologies.		

Process

Precision machining of pump body castings on vertical machining centres (VMCs).

Blank castings were positioned in mechanical fixtures prior to machining.

Once castings were positioned, it was assumed the part size and location were correct.

Challenge

1

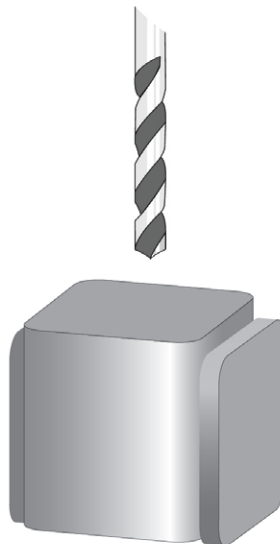
Reduce scrap and costs

The company was experiencing a 12% scrap rate on finished parts due to wall thickness variation. With parts located on the machine using mechanical fixtures only, it was discovered that the root cause of failure was due to part-to-part size variation of the supplied pump body castings. This highlighted the need to establish an accurate part datum, prior to machining, in order to reduce the scrap rate.

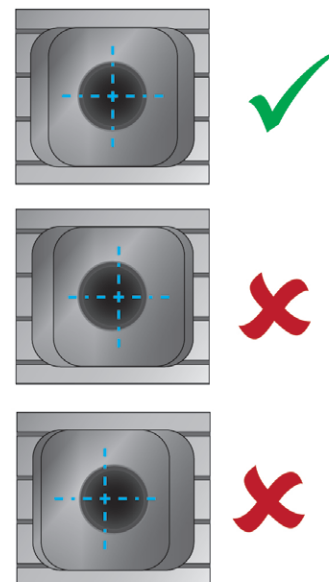
1. Part size variation



2. Part located via mechanical fixture only



3. Good and bad parts

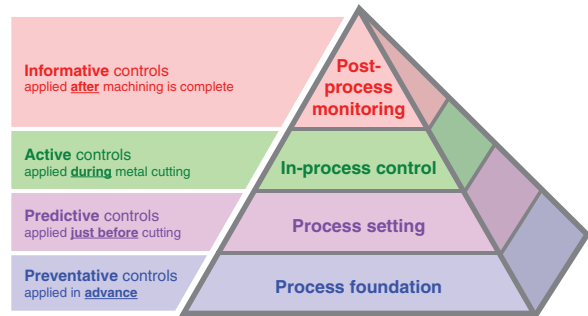


Process considerations

Renishaw engineers considered key elements within SuMax'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/whendoiprobe



Productive Process Pyramid

Solutions

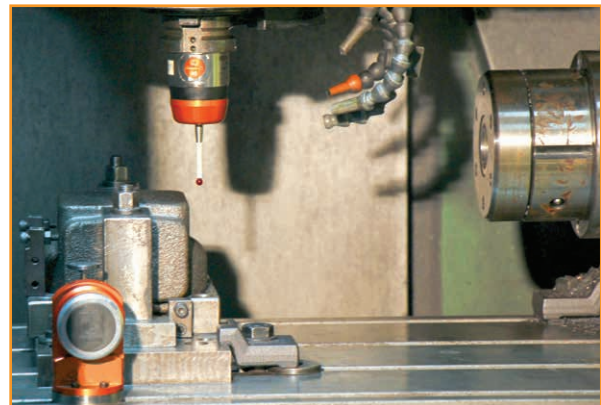
Manufacturing process focus: process setting and post-process monitoring

Focusing on **process setting** and **post-process monitoring**, measures to eliminate scrap were successfully applied.

The introduction of the Primo™ twin-probe system has enabled automated, on-machine measurement of the component position in the fixture, prior to machining. In addition, automated, on-machine inspection of the component is now carried out after machining.

This accurate and repeatable solution has eliminated scrap caused by wall thickness variation.

Renishaw tools in use

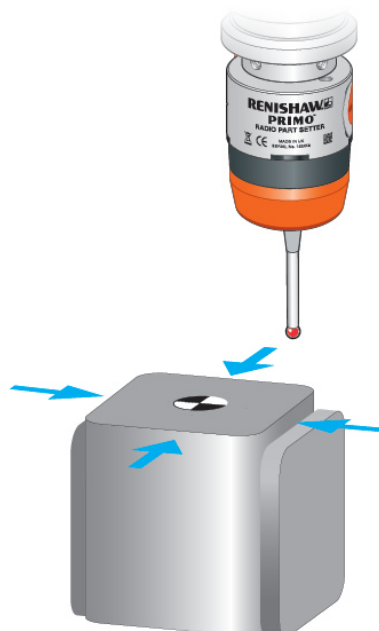


Locating the datum edge of the pump body casting using the Primo Part Setter

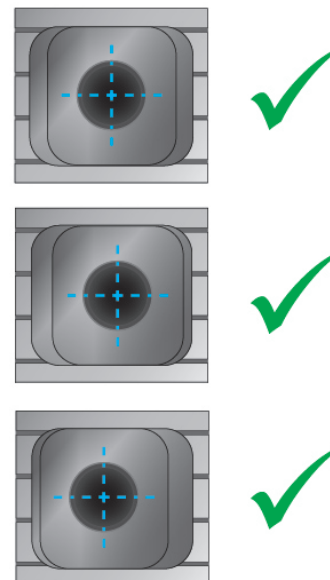
1. Part size variation



2. Automatic part location and work co-ordinate system update



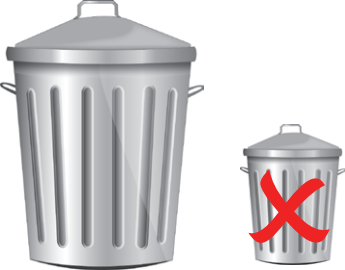
3. 100% yield



Results

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

Eliminated scrap

		Without probing	With probing	Benefit
	Manufactured parts/day	200	230	+15% throughput
	Scrap rate	12%	0%	100% reduction
	Scrap parts/day	24	0	100% reduction
	Good parts/day	176	230	+54 parts

Increased savings

		Without probing	With probing	Benefit
	Scrap parts/year	7008	0	100% reduction
	Cost/part US\$	7	7	
	Total annual cost US\$	49,056	0	49,056 saving

Summary

The introduction of the Primo twin-probe system has added a new layer of control to the pump body production process. The application now benefits significantly from the ability to automatically set components prior to machining and inspect components after machining.

The affordable, easy-to-use Primo system has enabled SuMax to establish the part location accurately prior to machining, eliminating scrap due to part size variation. Inspecting the part before removal verifies it is within specification.

Additionally, the new capability helped the company to:

- **Maintain higher levels of accuracy on all machined components**
- **Achieve more throughput from their existing machinery**
- **Reduce finished component variability**

Contact

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Customer comment



Without the probe, the operator has to find edges and calculate the mean value to come to the centre. It is a process in itself and is a job which can be done by an experienced person only. If it has to be done with a trainee or inexperienced person, then there is no alternative to Primo. He has to just call a code to find out the width of the part so as to come to the centre. It is a very simple process which any operator could pick up within 10 minutes.



 **SuMax** (India)
Enterprises Pvt. Ltd

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

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