

Investor Day

Machine Tool Products Division

15th May 2014

Presented by Will Lee



Machine tool products

- Machine tools are machines for shaping and cutting metal
- Renishaw were first in the machine tool probing market
- Our products are fitted to all sizes and types of machines by every major machine tool manufacturer in the world



All machine types



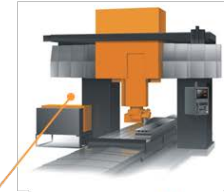
Vertical CNC machining centres



CNC grinders



Horizontal CNC machining centres



Gantry CNC machining centres



CNC multi-tasking centres



PCB drilling and routing machines



CNC lathes



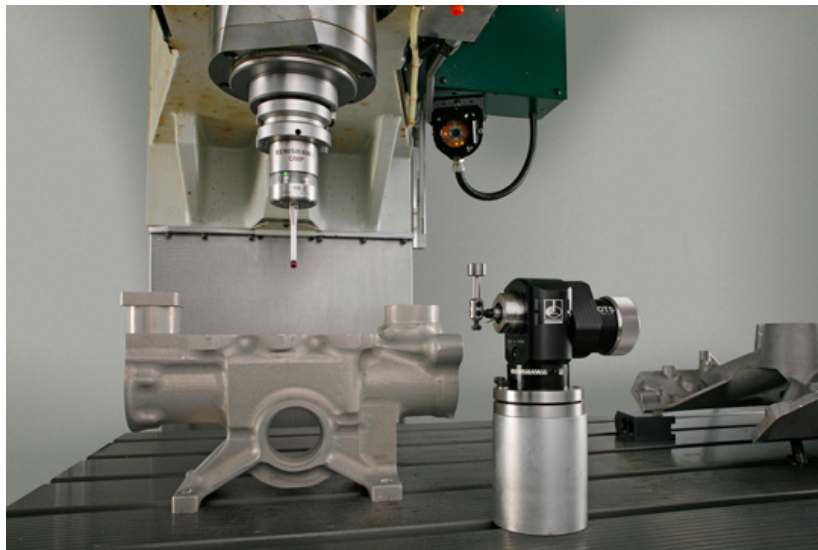
Manual machines

Machine tool probing in action



Customer needs

- Saving money
 - Reducing scrap
 - Faster set-up and cycle times
- Improving quality
 - Making more accurate components or better surface finishes
- Increasing capability
 - Doing things that are physically impossible or economically unfeasible without the use of probes



Machine tool probing markets



Aerospace



Agriculture



Automotive

Communications



Consumer products



Construction



Electronics



Energy



Medical



Mining



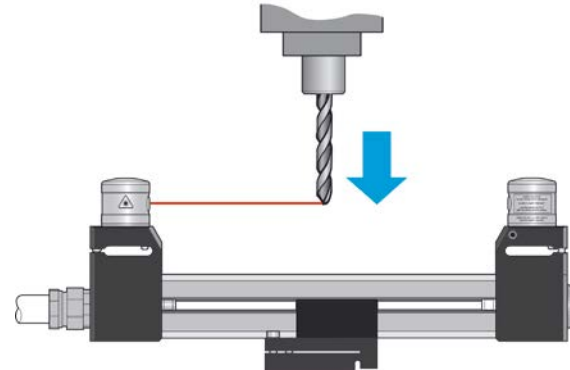
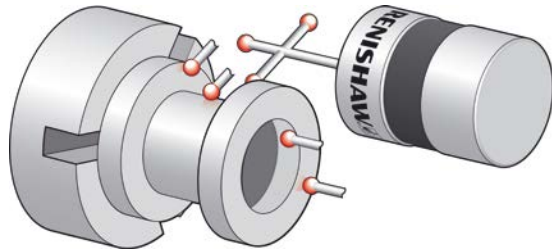
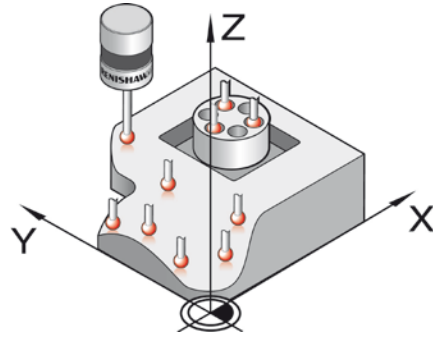
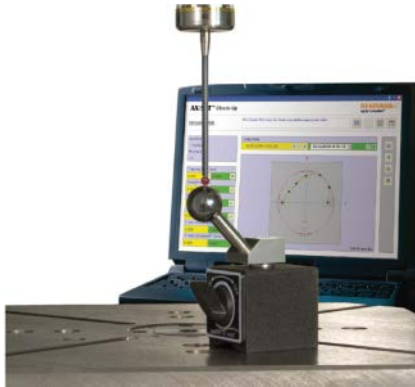
Power generation



Sport



Engineering solutions



Probing solutions



Software solutions

FEATURE-BASED CAPABILITY CHART
S.I. & CIP BASED - 3D1 (CIP) MODEL

4 Sample(s)
0.020 Average Devia
0.040 Stan
0.040 Max. Value
0.010 Min. Value
0.020 Mean
0.020 Std. Deviation

1.59 Cp
1.24 Cpk

Tool Filter	Feature	Point Number	Operation	Sample ID	Nominal	Actual	Deviation	Upper Tolerance	Lower Tolerance	Upper Specified Limit	Lower Specified Limit	Upper Warning Limit	Lower Warning Limit
01-2	TOP SURF TO POSITIONZ	Varies	1	Sample 1	0.0000	0.0400	-0.0400	0.1000	0.1000	0.1000	-0.1000	-0.0750	-0.0750
01-2	TOP SURF TO POSITIONZ	Varies	1	Sample 2	0.0000	0.0110	-0.0110	0.1000	0.1000	0.1000	-0.1000	-0.0750	-0.0750
01-2	TOP SURF TO POSITIONZ	Varies	1	Sample 3	0.0000	0.0270	-0.0270	0.1000	0.1000	0.1000	-0.1000	-0.0750	-0.0750
01-2	TOP SURF TO POSITIONZ	Varies	1	Sample 4	0.0000	0.0510	-0.0510	0.1000	0.1000	0.1000	-0.1000	-0.0750	-0.0750

Successful outcomes – typical general job shop

- Set-up times reduced by 66% from 1 hour to 20 minutes
- Manual errors totally eliminated
- Component rejection rate reduced from 1.5% to zero – no scrap!



Successful outcomes – Alloy wheel hub machining

- Alloy wheel casting
- Hub mount and rim need accurate machining relative to each other
- OMP40 used to set up the job and locate critical dimensions
- Customer increased yield from 70% to 100% - zero scrap!



Successful outcomes – Oil & gas valve manufacture

- OMP60 used to find the centre of the spherical surface of the valve ball
- Job setting time reduced from 1 hour by traditional methods to just *1 minute!*
- Machining accuracy improved to give better product operation and life

