Marshall

Altius

Super Precision CNC Turning Centre

with

IoTQ (Internet of Things for *Quality*)

PRECISION HARD TURNING

to eliminate grinding

TRANSFORMING Manufacturing... *Smartly!*

Hard Turning vs Grinding

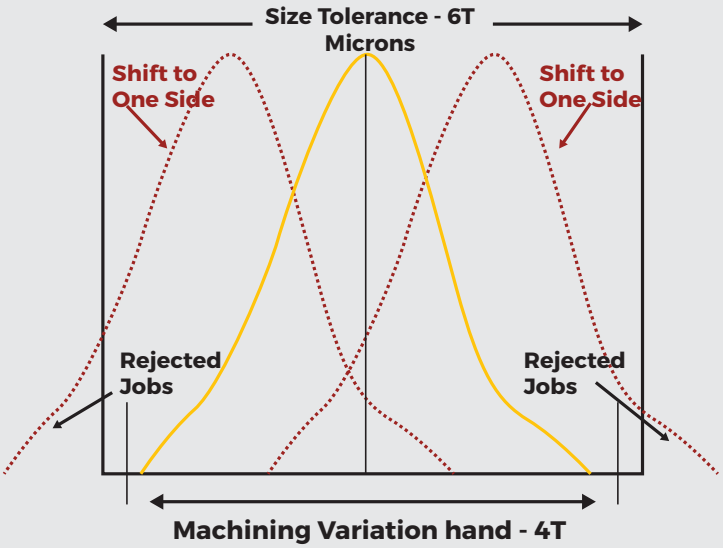
Hard Turning	Grinding
• Lathes relatively Inexpensive	• Grinders are more expensive
• Multiple Operations in One Set-up	• One operation One Set-up
• Higher Material Removal Rate	• Low Metal Removal Rate
• Produces chips	• Produces Swarf
• Dry Cutting	• Wet Cutting

Other Advantages of Hard Turning

- Complete machining in One Set-up
- Better Inter-related accuracy.
- Higher Contact Surface Means Increased Bearing Strength.
- Small Peak-to-Valley Height Through Geometrical Cutting Edge.
- Increased Fatigue Life.

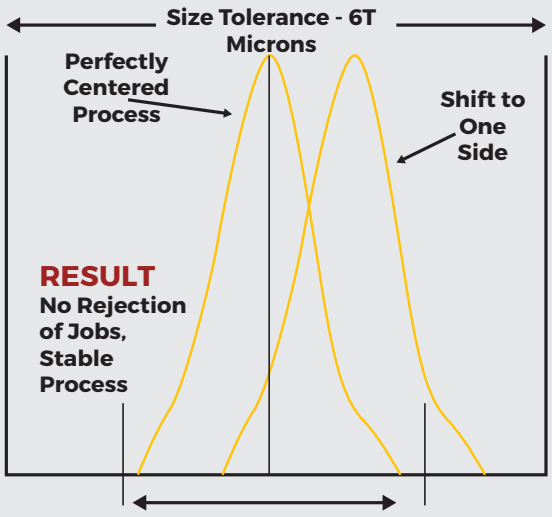
HOW *Altius* ENSURES ZERO REJECTION

Example of Maching of Job with Close Tolerence (e.g. Bearing Size) on Standard CNC Lathe



Shifting of Process can be because of Tool wear, Temperature Changes etc.

Example of Maching of Job with Close Tolerence (e.g. Bearing Size) on Marshall 'Super Precision' Machine

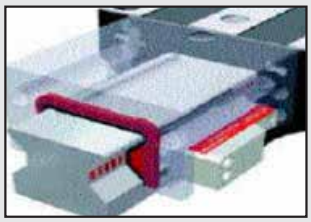


On Altius, Shifting of Process can be only because of Tool wear.

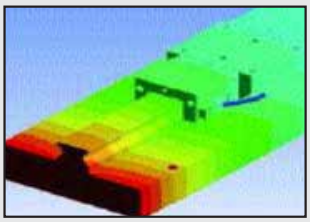
THREE ESSENTIAL MACHINE QUALITIES FOR HARDTURNING:

- HIGH RIGIDITY of machine elements to RESIST CUTTING FORCES: Altius has 'Monoblock' Single Piece 'True Slant Bed' Casting with torque tube design. It also has Medium Preload ROLLER LM Guideways for both axes & highly stiff Spindle design. All these result in high rigidity.

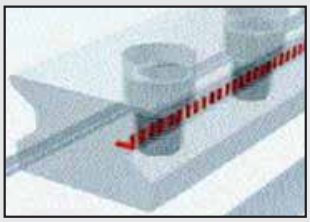
Integrated linear scales



Magneto-resistive measuring principle

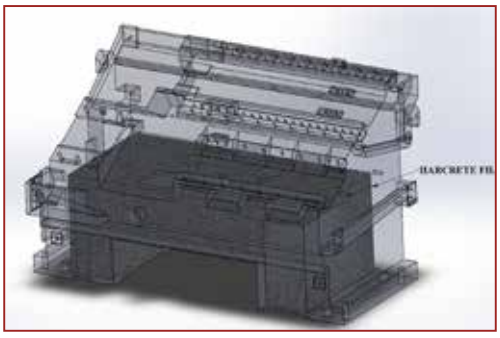


Thermal expansion like steel



Position measurement close to the process

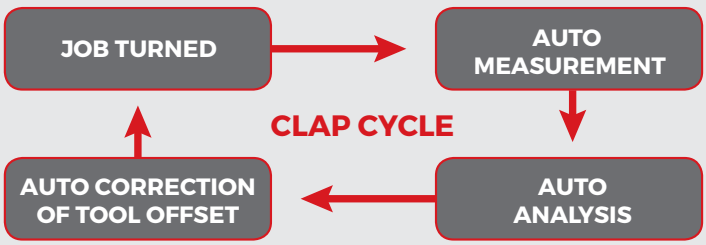
- HIGH REPEATABILITY of both Axis.: Schneeberger (Germany) L.M.Rails with integrated Linear Measuring system (Magneto-Resistive Type) with excellent repeatability (± 1/4 T).



- HIGH VIBRATION DAMPING: The Monoblock structure is filled with concrete like mixture to absorb vibration and hence, improve surface finish and enhance tool life.

IoTQ (Internet of Things for *Quality*): THREE ESSENTIAL *'Smart'* technologies to ensure 'Closed Loop' Hard Turning with ZERO DEFECTS.

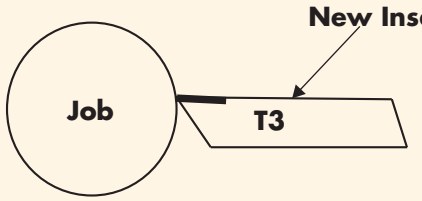
#1 *SmartCorrect*® it uses Marshall's patented CLAP (Closed Loop Auto-corrected Production) technology to ensure near ZERO defect production & helps to shift from OBQ (Operator based quality) to SBQ (System based quality).



#2 *SmartInsert®* - Technology for tool insert life optimization

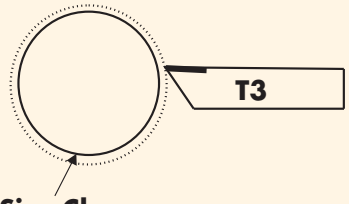
1

Job is turned & size produced

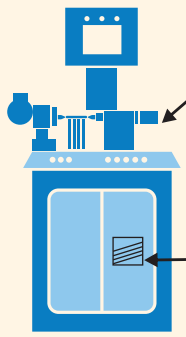


2

Insert wears by some amount



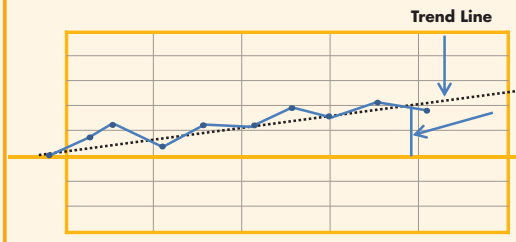
3



SmartCorrect measures Job & records data.

Inspection readings are input into SmartInsert module

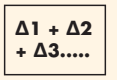
4



Δ = Shift in process mean due to wear

Δ readings periodically added to total wear window

5

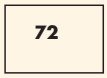


Total wear value

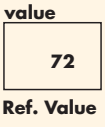
Ref. Value (Microns)

indicates max. insert wear allowed for particular insert type

6



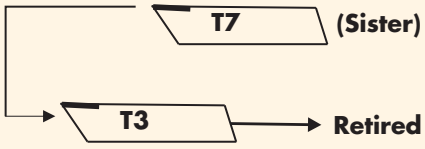
Total wear value



Ref. Value

When total wear value of a tool reaches ref. value, insert edge life is over and tool replaced by 'sister'.

7

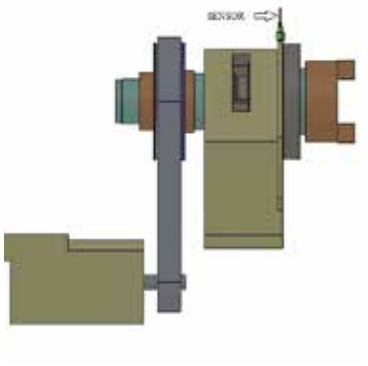


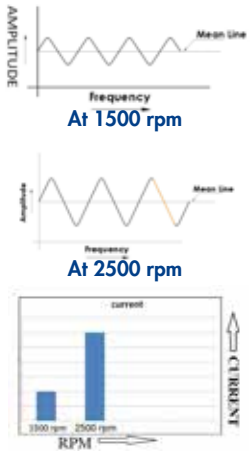
#3 SmartChek® - Technology for prevention of machine breakdowns

Automatic 15 second daily health check

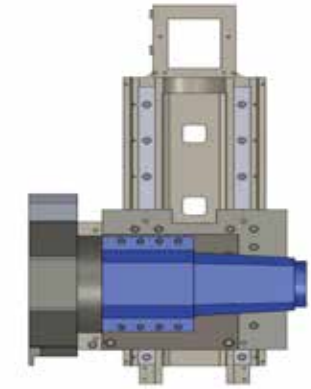
(A) Measured Parameters:

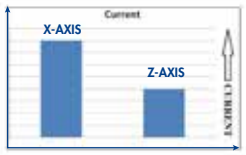
HEAD ASSEMBLY





AXIS ASSEMBLY





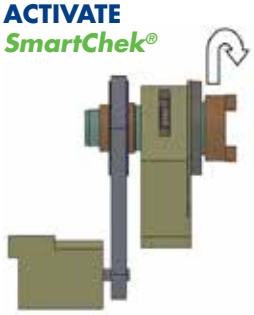
Average currents of servo motors when slides moved at fixed speed over fixed distance in one direction

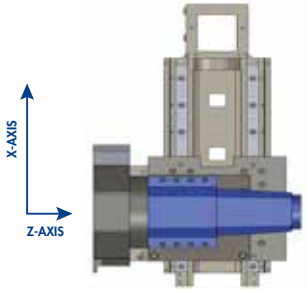
(B) Reference Health Report

REFERENCE HEALTH CHECK AFTER NEW MACHINE COMMISIONED

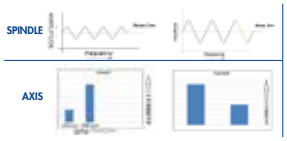
SmartChek® (HMI SCREEN)

ACTIVATE SmartChek®





SPINDLE AND SLIDES MOVE AS EXLAINED PREVIOUSLY FOR 15 SEC.

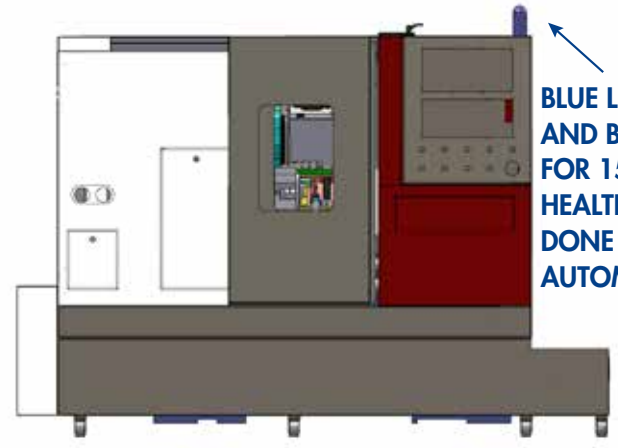


SUMMARY

	RANGE	
SPINDLE	LOWER	UPPER
X		
Z		

DIGITAL REFERENCE HEALTH REPORT GENERATED

(C) Daily Health Monitoring:



BLUE LIGHT FLASHES AND BUZZER RINGS FOR 15 SEC WHILE HEALTH CHECK IS DONE AUTOMATICALLY

DIGITAL HEALTH REPORT CARD

DIGITAL REFERENCE HEALTH REPORT

DD/MM/YY DAILY DIGITAL HEALTH REPORT CARD GENERATED AND SENT TO SMARTCHEK MODULE

COMPARISON

BASED ON THE COMPARISON

MESSAGE BOX → AUTOMATIC MESSAGE SENT VIA SMS TO CONCERNED ENGINEERS AND MANAGERS OF MARSHALL MACHINES AND CUSTOMERS

TO TAKE NECESSARY ACTION

LOG MAINTAINED

RESULT

HEALTHY MACHINE
WITH VERY HIGH RUNTIME

Essential elements for ‘CLOSED LOOP’ super precision hard turning

Turret Touch Probe

SmartCorrect® Gauging Station

SPECIFICATIONS		Altius 2540	Altius 3050	Altius 3070
CAPACITY				
Swing Over Carriage Cover	mm (inch)	500 (19.7)	500 (19.7)	500 (19.7)
Maximum Turning Dia.	mm (inch)	250 (9.8)	300 (11.8)	300 (11.8)
Maximum Turning Length	mm (inch)	400 (15.7)	500 (19.6)	700 (27.5)
Chuck Size	mm (inch)	165 (6)	200 (8)	200 (8)
MAIN SPINDLE				
Spindle Nose	(std.)	A2-5	A2-6	A2-6
Front Bearing Bore	mm (inch)	85 (3.4)	100 (4)	100 (4)
Maximum Bar Capacity (Std.)	mm (inch)	36 (1.4)	52 (2)	52 (2)
Max. Speed	Rpm	5000	4000	4000
SPINDLE DRIVE				
Spindle Motor Cont. Power	KW (HP)	7.5 (10)	11 (15)	11 (15)
TOOL TURRET				
No. of Stations (std.)		8	8	8
Tool Cross Section	mm (Inch)	25x25 (1x1)	25x25 (1x1)	25x25 (1x1)
Max. Boring Bar Dia.	mm (Inch)	40 (1.6)	40 (1.6)	40 (1.6)
POSITIONING REPEATABILITY				
X-Axis		+ 1/4 T	+ 1/4 T	+ 1/4 T
Z-Axis		+ 1/4 T	+ 1/4 T	+ 1/4 T
CNC Controls	SIEMENS 828 (SL) / FANUC 0iTF			
Weight (approx.)	Kg (Lb)	3400 (7480)	4000 (8800)	5000 (11000)

Note: Product improvment in a continous process at “Marshall”. Design & Specifications are therefore, subject to change without prior notice.

Case studies of Closed Loop Hard Turning

Job - Counter Shaft

Job - Crankshaft

WITHOUT GAUGING STATION				
Qty. / month	Rework	Rejection	R&R %	R&R PPM
9000	166	16	2.02	20222
	WITH *SmartCorrect*			
	Rework	Rejection	R&R %	R&R PPM
	59	2	0.68	6778

WITHOUT GAUGING STATION				
Qty. / month	Rework	Rejection	R&R %	R&R PPM
1000	0	5	0.50	5000
	WITH *SmartCorrect*			
	Rework	Rejection	R&R %	R&R PPM
	0	0	0.00	0

JOB – BODY STARTER CLUTCH

CHALLENGE: HARD TURNING of Critical Component with Tolerance of 15 Microns.

Rejection & Rework without Auto-Gauging : 1.8%

Results with *SmartCorrect*®

Job	Total Qty. Machined	Rejection + Rework (Pcs)	Rejection %
Body Starter Clutch	14882	33	0.22

Our clients who use *SmartCorrect*™ supply parts to:

Factories & Works:

Headoffice & Works
(Ludhiana, India)

Automation Unit
(Ludhiana, India)

Tech Center
(Delhi, India)

Tech Center
(Atlanta, USA)

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Phone: +91-0124-4241813-15 | Cell: +91-96502 93944

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Dealers