# SmartCorrect®

'Plug & Play' Technologies to make CNC lathes 'Smarter'
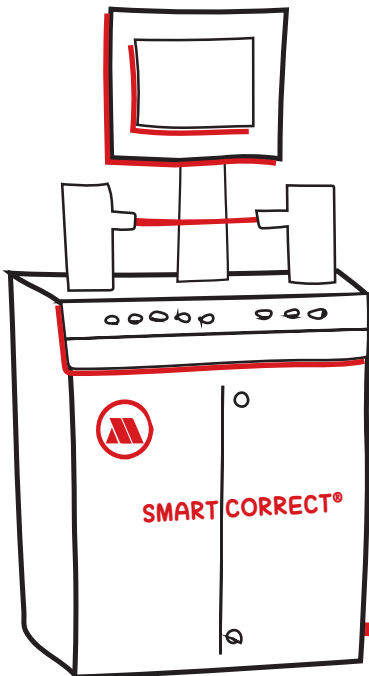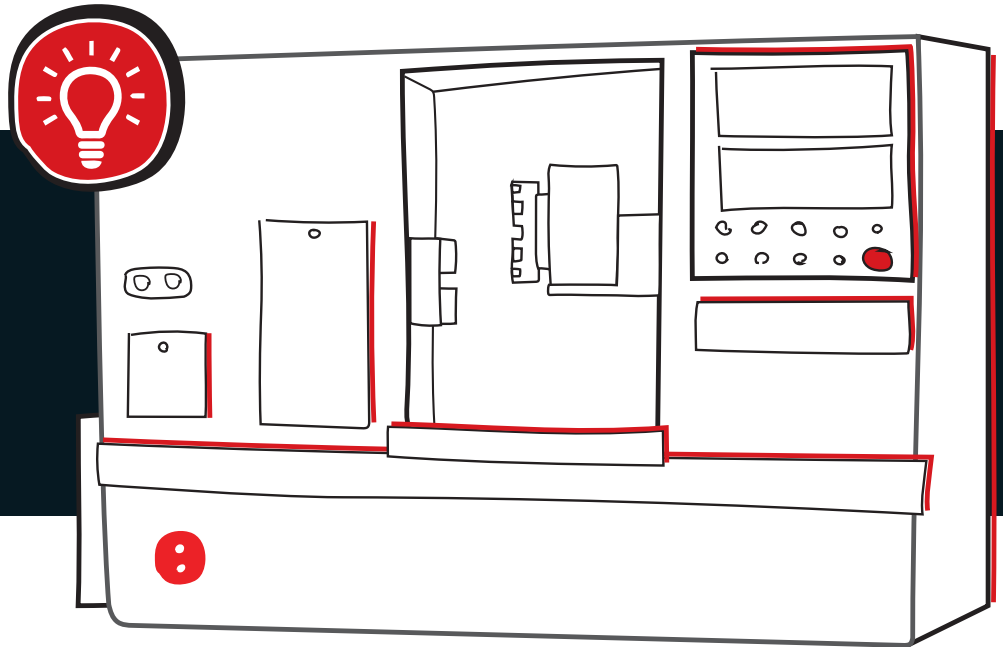
SMART CORRECT®

SmartCorrect® for measurement of Jobs & Auto Correction of CNC Offsets

**Marshall**: Transforming Manufacturing... **Smartly** !

# THE PROBLEM:

## Machine Shops are dependent on 'Skilled' Operators & Inspectors to ensure Quality of manufactured Jobs.

### Decline in 'Attitude' & 'Aptitude' of Operators results in following errors:

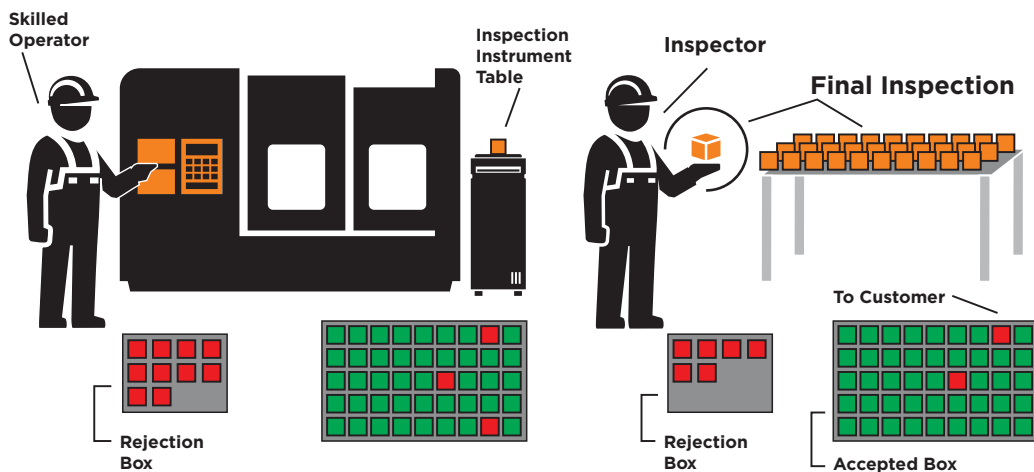| Error #1 = Measurement | Error #2 = Judgement | Error #3 = Input |
|---|---|---|
| Error due to non calibration or carelessness | Which dimension to correct & how much? | e.g. 0.04 value given in place of 0.004 |

## RESULT:

### THESE ERRORS RESULT IN MACHINE PRODUCING HIGH NUMBER OF DEFECTIVES IN PPM (PARTS PER MILLION)

## Despite Inspectors, some defectives WILL reach the customer

Skilled Operator

Inspection Instrument Table

Inspector

Final Inspection

Rejection Box

Rejection Box

To Customer

Accepted Box

**(ZERO PPM TO CUSTOMER IS IMPOSSIBLE)**

## CONSEQUENCES

PROFITS WIPED OUT

UNHAPPY CUSTOMER

NEED FOR HIGH NUMBER OF INSPECTORS

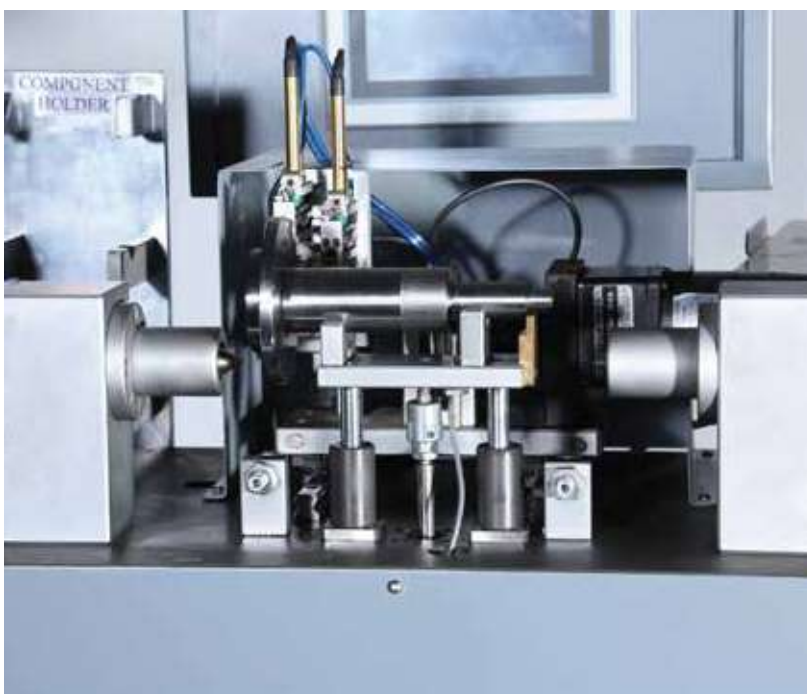LOSS OF BUSINESS

FACTORY

# THE SOLUTION:

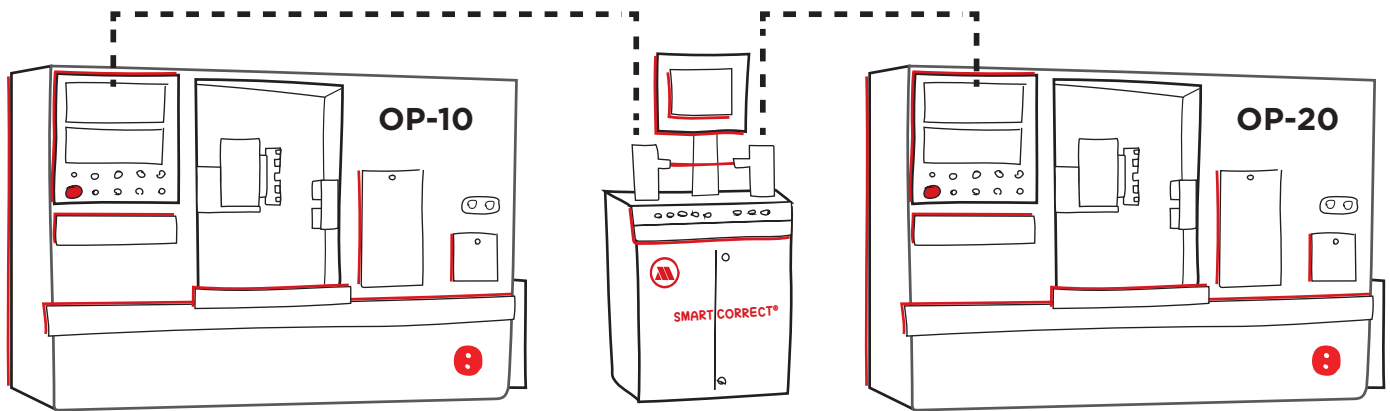## SmartCorrect® Gauging Station
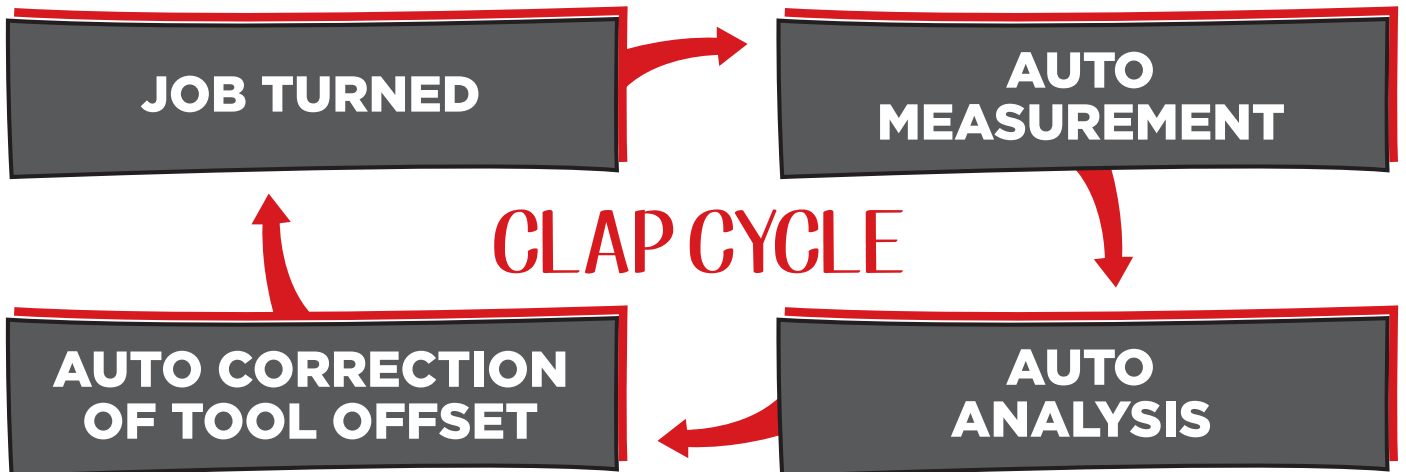## for ZERO DEFECT QUALITY

ANLAYSIS MODULE

INSPECTION MODULE

CONTROL MODULE

AXLE SHAFT INSPECTION MODULE

THREAD MEASUREMENT MODULE

# One **SmartCorrect®** connects with Two CNC Lathes

OP-10

OP-20

SMART CORRECT®

**SmartCorrect®** uses **Marshall's** patented **CLAP** (**C**losed **L**oop **A**uto-Corrected **P**roduction) technology to ensure near ZERO defect production & helps to shift from OBQ (Operator Based Quality) to SBQ (System Based Quality)

## JOB TURNED

## AUTO MEASUREMENT

### CLAP CYCLE

## AUTO CORRECTION OF TOOL OFFSET

## AUTO ANALYSIS

The advanced ALGORITHMS in CLAP software calculate Process Mean **and** automatically correct **wear** osets to match the Mean of tolerance **limit**

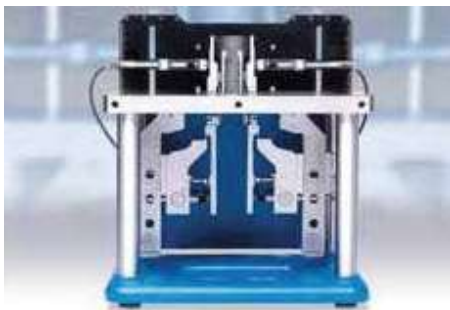| | |
|---|---|
| Red Zone | Upper Tol. limit |
| 40.010 | |
| | Auto Correction taken place |
| Yellow Zone | |
| 40.004 | Upper control limit |
| Green Zone | |
| 40.000 | |
| | Lower control limit |
| 39.996 | |
| | Lower Tol. limit |
| 39.990 | |
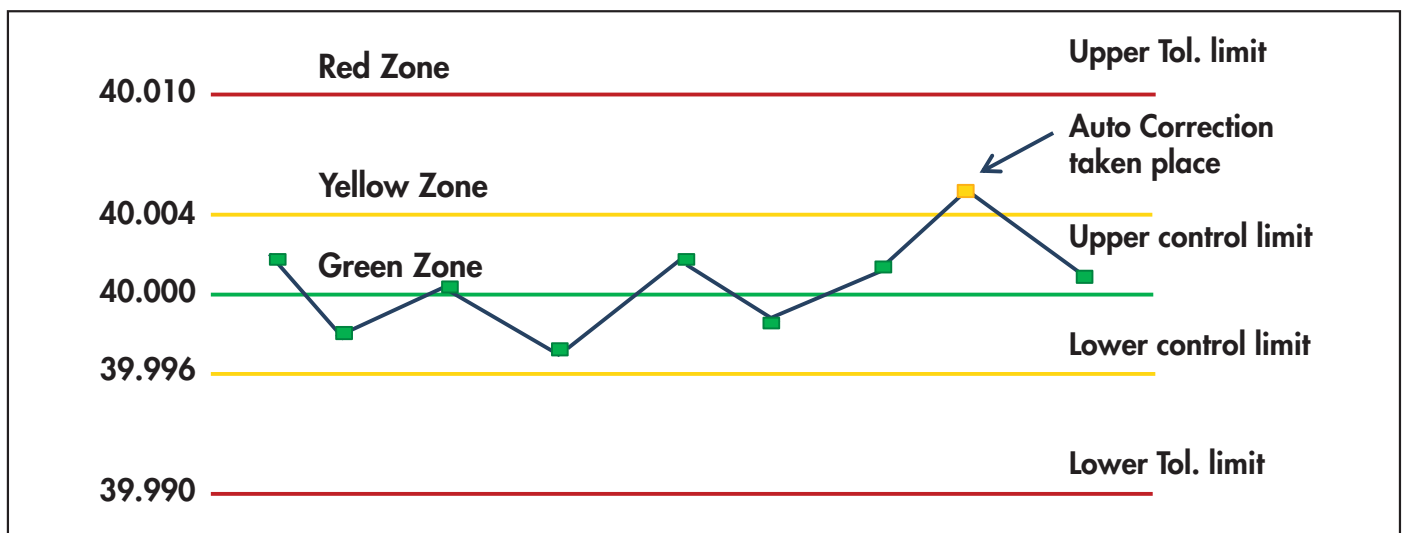
**SmartCorrect®** Magic 'MANTRA' for ZERO DEFECT PRODUCTION

# Cpk > 0.9 x Cp.

# HIGH QUALITY INSPECTION PARTS FROM MARPOSS, HEIDENHEIN, & SOLATRON



**DIGITAL PROBES**



**ELEMENTS**



**ELECTRONIC SIGNAL PROCESSORS**

## OPTION OF PC BASED SOFTWARE AUTOCOMP FROM CARON ENGG. (USA)



**AUTOCOMP**

**MACHINE ENHANCEMENT TECHNOLOGY**

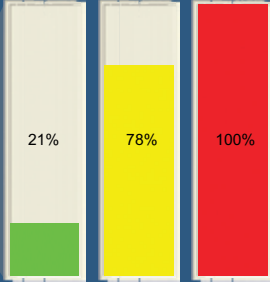AutoComp software makes automatic tool osetting and error-free tooling contro l a reality.

**REALTIME DATA**

**PARTDATA**

21%  78%  100%

**TOOL LIFE USED**

## COMPILES AND REPORTS HISTORICAL TOOL WEAR MEASUREMENTS

All measurement and compensation data is saved to a file. The data is date and time stamped for future analysis. The operator also receives real-time status of the useful life for each tool.

## ACCEPTS PART MEASUREMENTS FROM WIFI GAUGING DEVICES

Wireless data entry allows the operator to measure and simultaneously transmit the data. AutoComp will then automatically compensate tool osets, without manual data input. This feature expedites the data-entry process and virtually eliminates data-entry errors.

## MAINTAINS ACCEPTABLE TOLERANCES OF MACHINED PARTS

AutoComp statistically controls your tool osets to maintain acceptable tolerances of your machined parts. AutoComp calculates tool compensation based on tolerance limits and tool compensation limits.

## REPORTS A TOOL CHANGE NEED TO THE OPERATOR

When tool compensation has exceeded a userdefined threshold, a wear-limit is issued, informing the operator that the tool needs to be changed. A signal can also be sent to the CNC control so a redundant tool can be called automatically or the machine can be stopped before the next cycle.

# SmartCorrect® @ Work
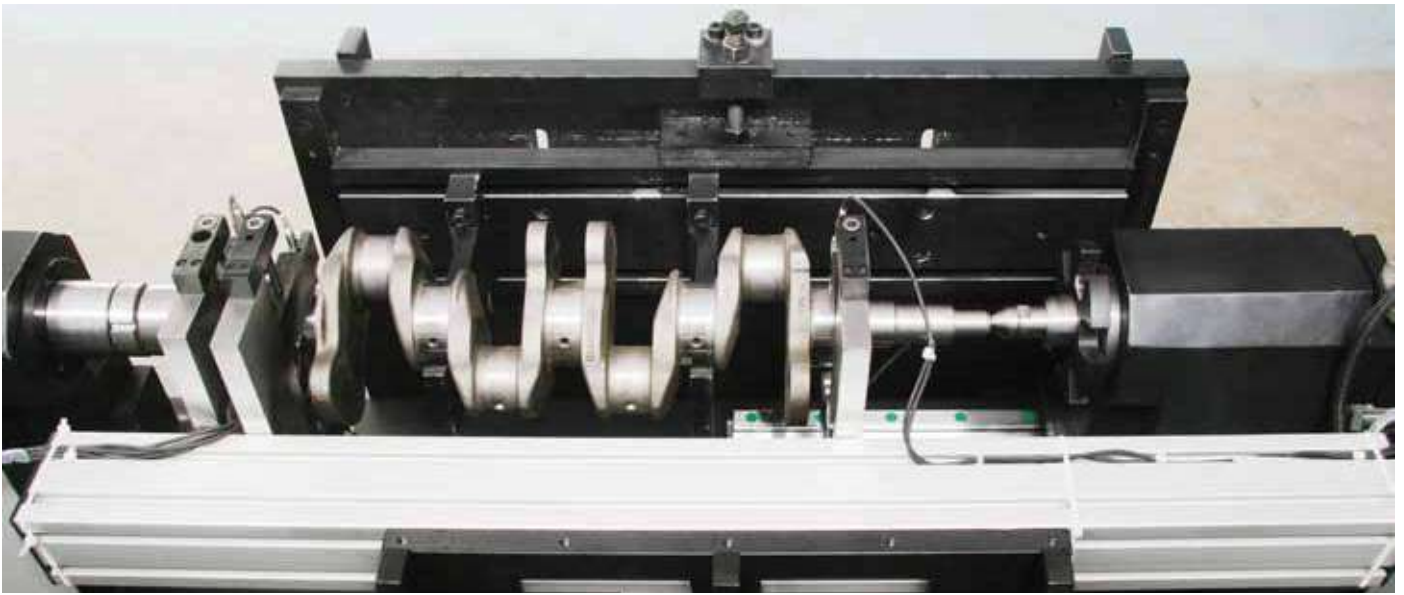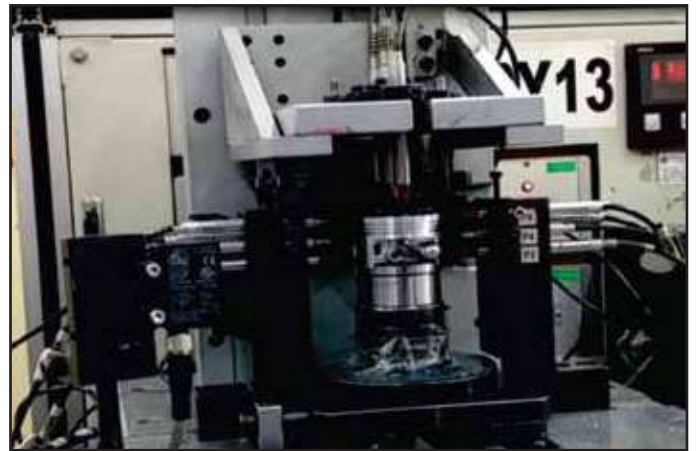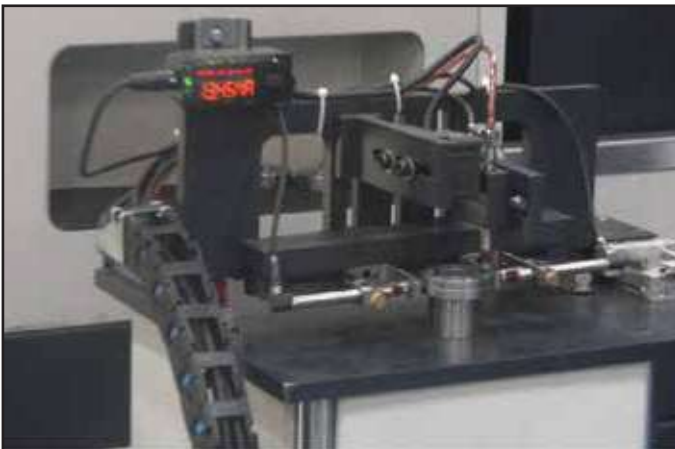


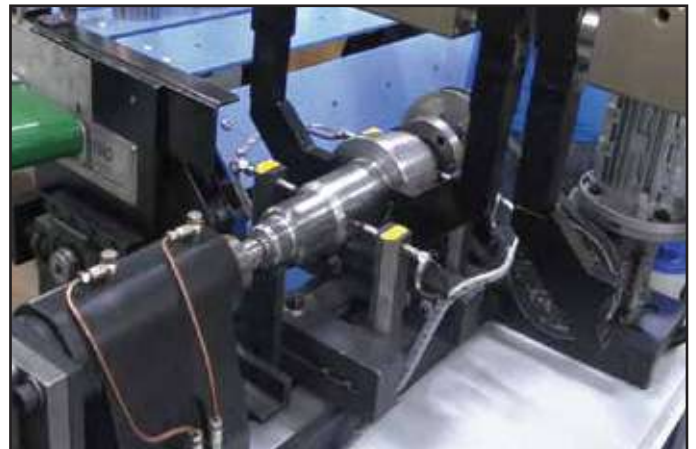**4 CYLINDER CRANKSHAFT INSPECTION MODULE**



**OUTER GEAR INSPECTION MODULE**



**PISTON INSPECTION MODULE**



**INSPECTION MODULE FOR GEAR BLANK**



**INSPECTION MODULE FOR PINION SHAFT**

## 1. S Series (Shaft type Job)

### Selection Example

**S 2 - 20 - 6 - R**

Shaft Type Job
No. of dimenions to be measured
Max Job Length
Max Dia
Rotation Required

Max Dia 1.85"
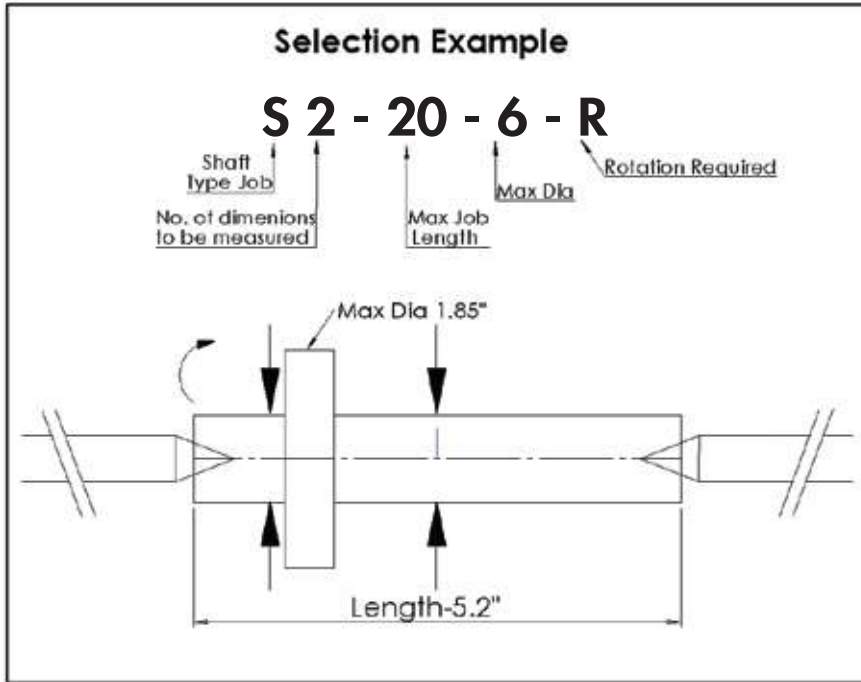
Length-5.2"

**SmartCorrect® selection example**

| Measured Diameters | 1/2/3/4 |
|---|---|
| Max. Length | 20/40 |
| Max. Dia. | 6/12 |
| Rotation or not | R/ |

**all dimensions are in inches**

## 2. C Series (Chucking type Job)

### Selection Example

**C 2 - 1 - 1 - 8**

Chucking B-Type
OD
ID
Height
Max Job Dia (Inch)

Ø 6.75"
Resting Surface
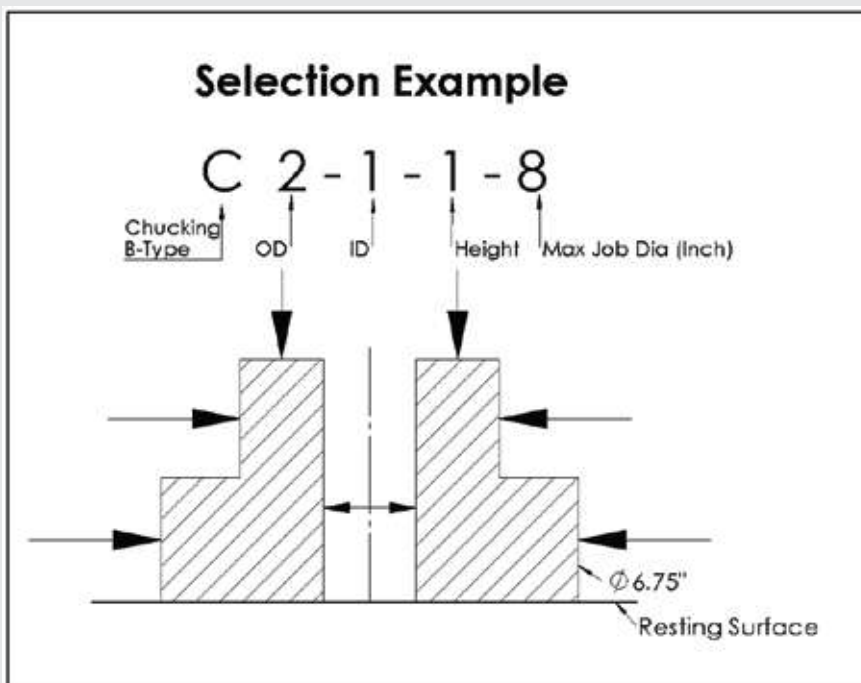
**SmartCorrect® selection example**

| OD | 1/2/3 |
|---|---|
| ID | 1/2 |
| Height | 1/2/3 |
| Max. Job. Dia | 6/12/18 |

**all dimensions are in inches**

# Our Clients Who Use SmartCorrect™ Supply Parts to:



ZF · BOSCH · FEDERAL MOGUL · EATON · Honeywell · Mando⁺ · CATERPILLAR · oerlikon graziano · GKN Driveline · SKF · BLACK & DECKER · HONDA · DANA · MERITOR · DAIMLER · SUZUKI

## Factories & Works:



**Headoce & Works**
**(Ludhiana, India)**



**Automation Unit**
**(Ludhiana, India)**



**Industry 4.0 center**
**(Delhi, India)**



**Tech Center**
**(Atlanta, USA)**

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**Dealers**