**Marshall**

**ACE**
Maruti Center for Excellence

&

**Marshall**
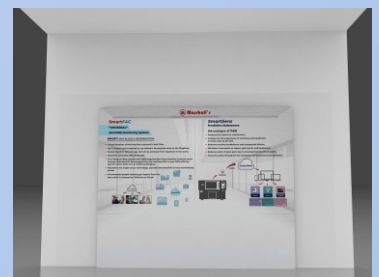
have jointly Launched India's 1st comprehensive TRAINING Program for Industry 4.0 technologies at MACE, Gurgaon.
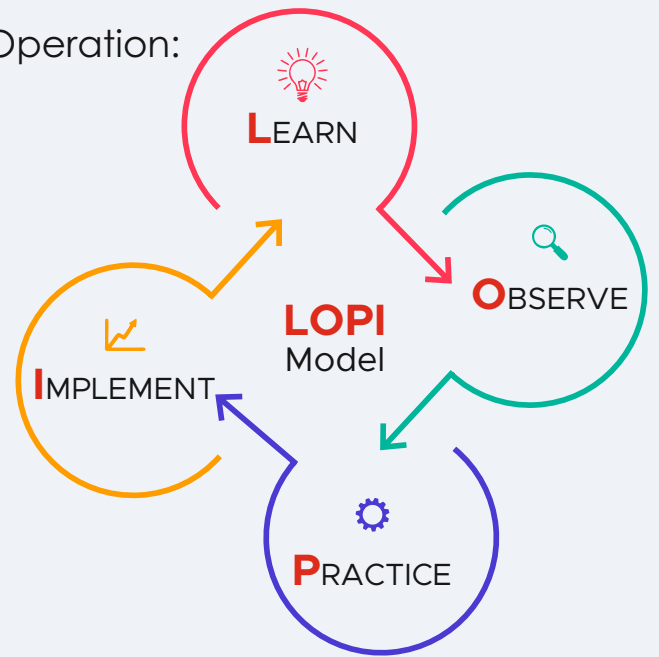
Training will cover 3 critical areas of Machine Operation:

- **PRODUCTIVITY**
- **QUALITY**
- **HEALTH**

based on **LOPI** methodology.

- ☞ **L**earn
- ☞ **O**bserve
- ☞ **P**ractice
- ☞ **I**mplement

**LOPI Model**

**L**EARN

**O**BSERVE

**P**RACTICE

**I**MPLEMENT

# Four types of machining are equipped for practicals



**VMC (Vertical Machining Center)**

**UMM**
(Universal Machine Monitoring)

**PdM**
(Predictive Maintenance)



**CNC Turning Center**

*SmartCorrect* **ECO**
Gauging Station with Auto-Correction

PdM

UMM
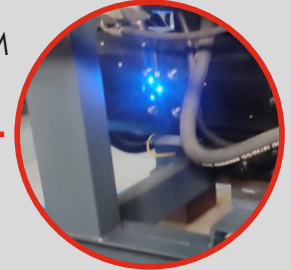
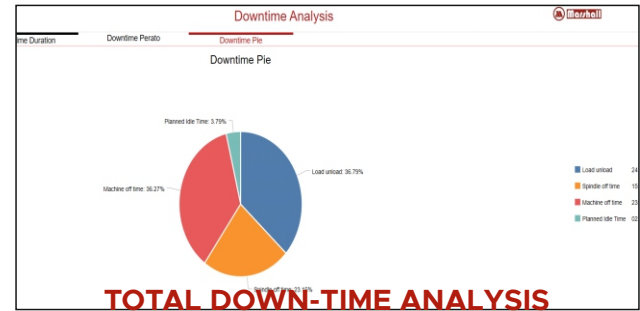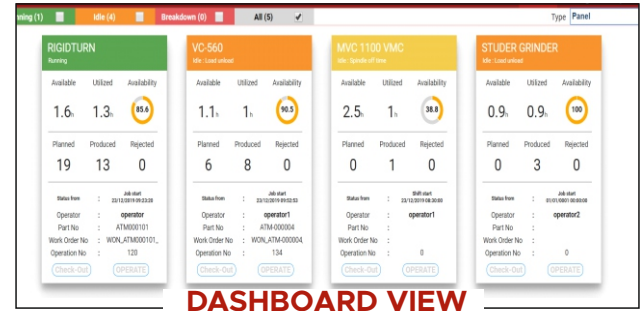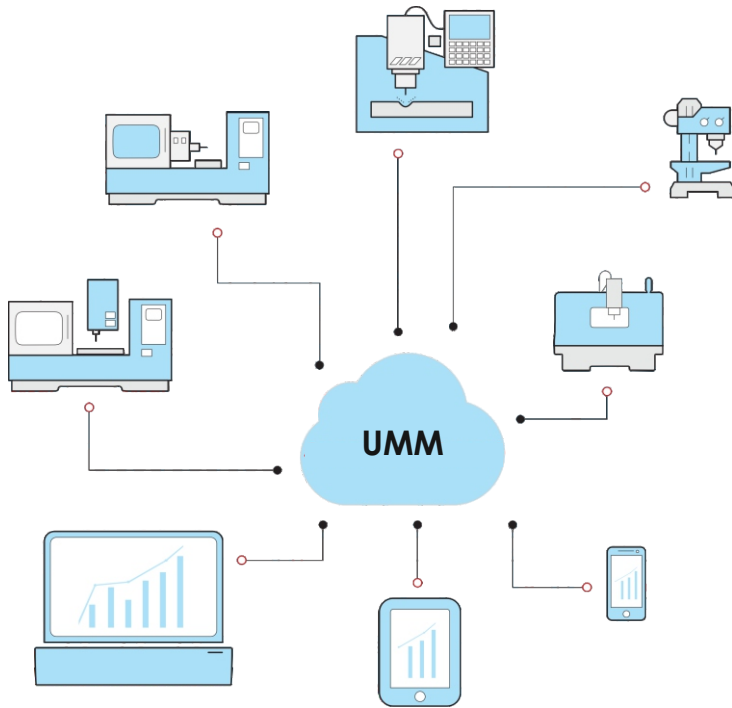**Injection Moulding Machine**

UMM

PdM



**Hydraulic Press**

UMM

PdM

## ESSENTIAL Industry 4.0 Technology #1
### for PRODUCTIVITY

## Universal Machine Monitoring (UMM)

- ✎ Actual Situation of the shop floor captured in Real Time.
- ✎ Eliminates duties of Supervisors to note hourly and daily production.
- ✎ No IT infrastructure required to use software.
- ✎ No physical wires on the Shopfloor.
- ✎ Secure Cloud for data storage and can be accessed from anywhere in the world.
- ✎ All Plants data can be stored on the common cloud platform OR in-house store.
- ✎ Real Time alerts like SMS and Emails.

**DASHBOARD VIEW**

**TOTAL DOWN-TIME ANALYSIS**

# EXAMPLE OF SUCCESS STORY

**18%** Increase in Productivity

**99%** Data Accuracy

**3** Months Return on Investment

**30%** Reduction in accidents & tool breakage in Night Shift

## ESSENTIAL Industry 4.0 Technology #2
### for MACHINE HEALTH

# Predictive Maintenance (PdM)

## PRINCIPLES:

- Symptoms are used to detect potential problem
- Detection of symptoms is system based, & independent of human judgement
- Single or multiple symptoms (variables) may be used to detect problem with the help of rules or algorithms.
- Symptoms are detected with **IoT enabled SENSORS**

## *Predictive Maintenance* Advantages

- Detection of 'Potential' problems ensures that corrective action takes place before the 'Potential Problem' causes breakdown.
- Huge saving in time and money

**CLAP** (**C**losed **L**oop **A**uto-corrected **P**roduction)
ELIMINATES THE 3 HUMAN ERRORS

## The Problem : errors by operators

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

**Error #1**
**Measurement**

Error due to non calibration or carelessness

**Error #2**
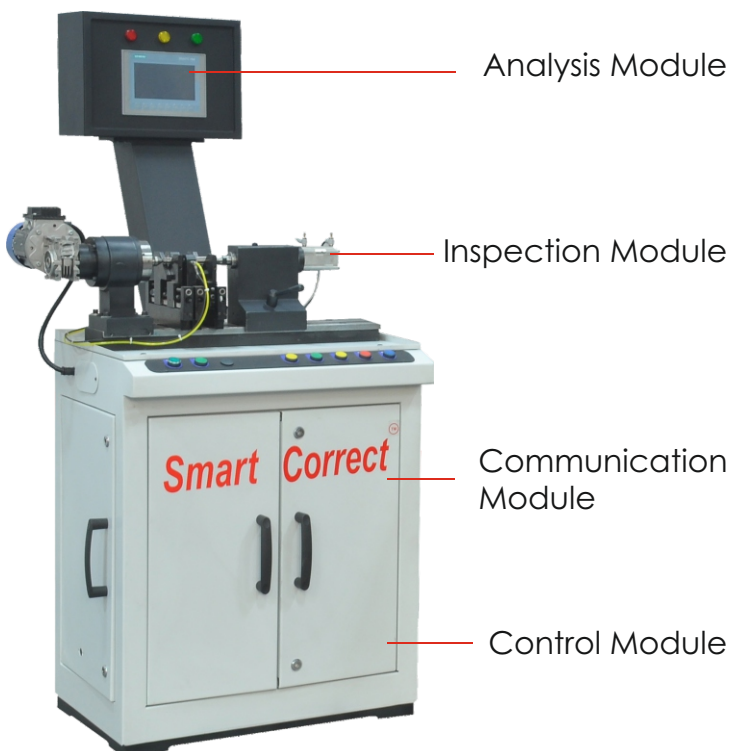**Judgement**

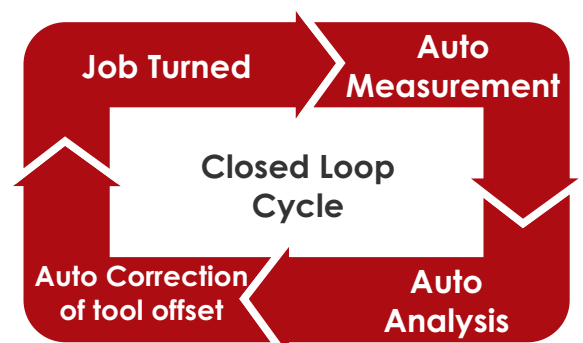Which dimension to correct & how much?

**Error #3**
**Input**

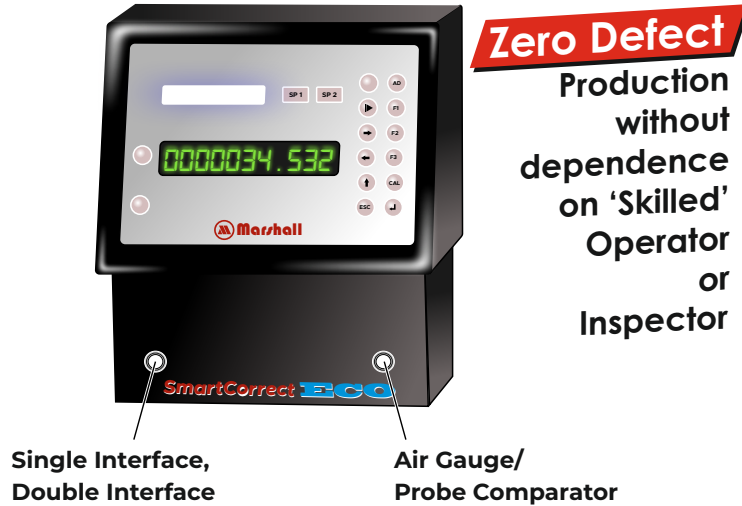e.g. 0.04 value given in place of 0.004

## Result: Defectives

# The Solution

*SmartCorrect*® Gaging Station for Autocorrection of machine offsets

Analysis Module

Inspection Module

Communication Module

Control Module

Smart Correct®

**Job Turned**

**Auto Measurement**

**Closed Loop Cycle**
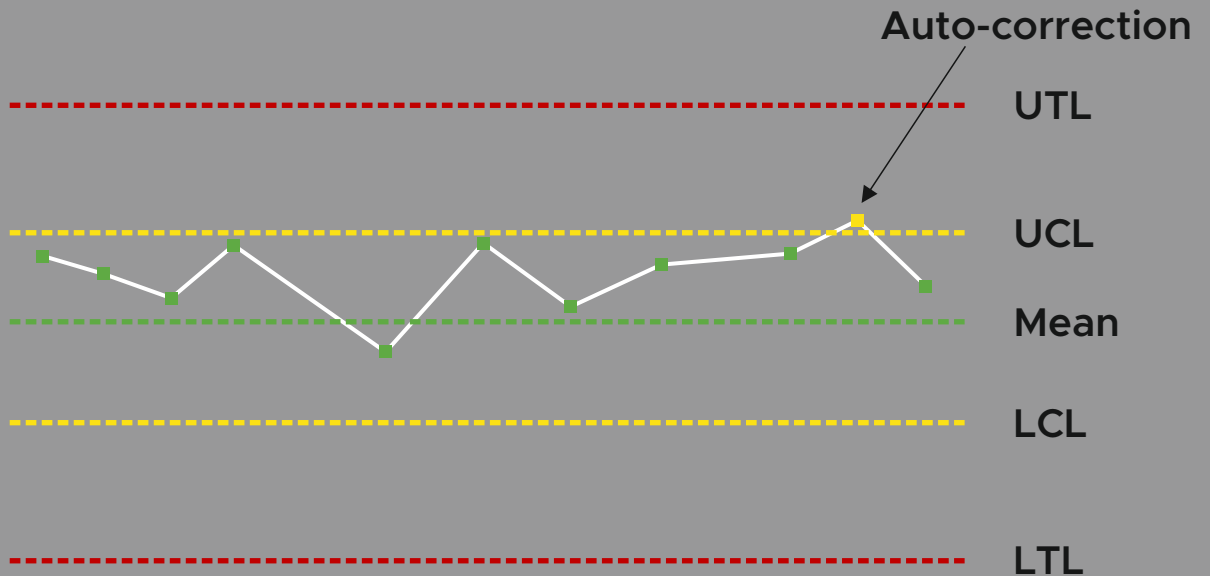
**Auto Correction of tool offset**

**Auto Analysis**

# *SmartCorrect* ECO
## Gauging Station with Auto-correction

- **SmartCorrect-ECO** is an economical auto-gauging station which checks one most important dimension of a job and auto-corrects the CNC to produce **'near ZERO'** defectives.

**0000034.532**

**Zero Defect**
Production without dependence on 'Skilled' Operator or Inspector

**Single Interface, Double Interface**

**Air Gauge/ Probe Comparator**

The advanced ALGORITHMS in **SmartCorrect-ECO** software calculate **and** automatically correct tool **wear** offsets to keep size close to the Mean of tolerance **limit**

Auto-correction

UTL

UCL

Mean

LCL

LTL

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