

SMART FIXTURES SMART MANUFACTURING



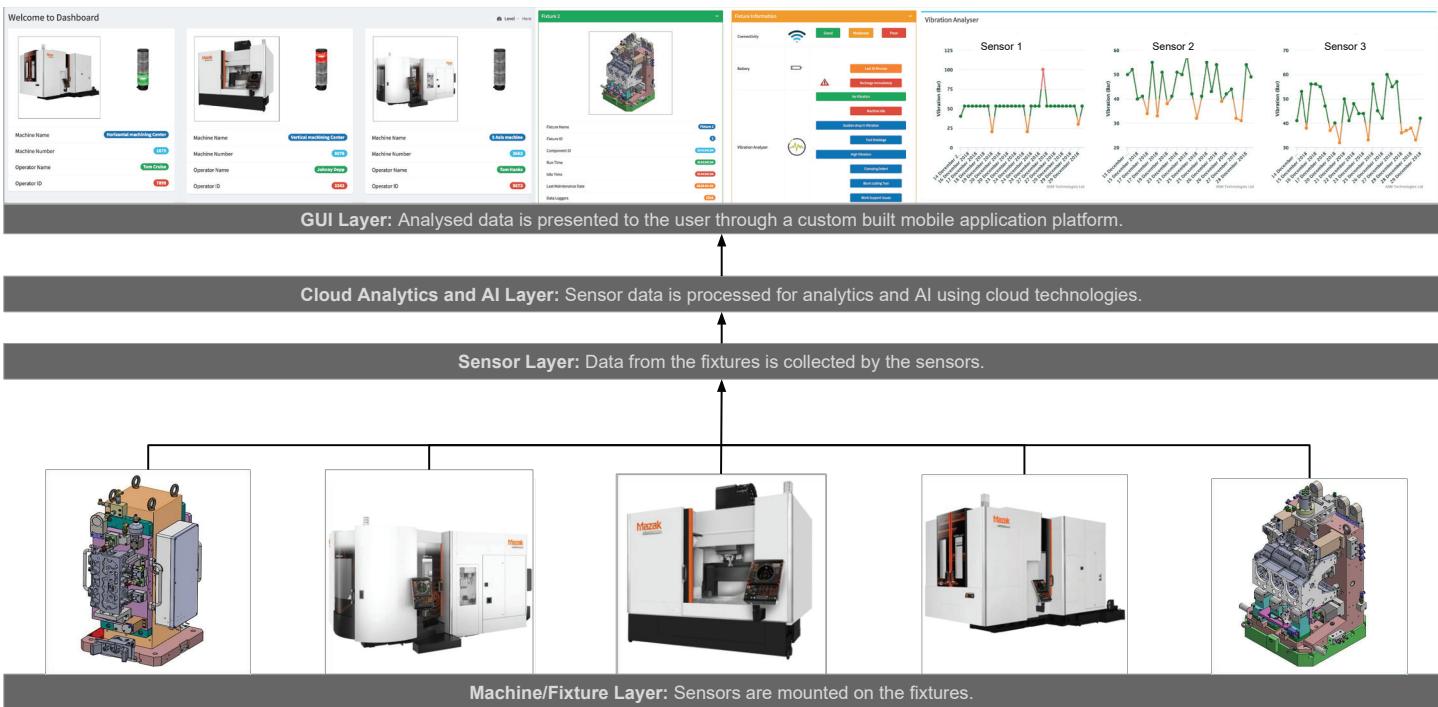
RV Forms & Gears LLP

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SmartFix4.0

Intelligent Fixtures for High Performance Machining



Smart Fixtures - The Next Revolution In Digital Manufacturing

Forms and Gears, Asia's leading fixture builder, has been on the forefront of Fixture Building technology for over 47 years.

Now Forms and Gear's Fixture building expertise, in partnership with ASM Technologies Ltd's IT, Data Analytics and Artificial Intelligence strengths brings you **SmartFix4.0** - a revolution in fixture building and work-holding.

SmartFix4.0 is a precision work-holding device with the ability to collect, transmit and analyse data in a useful format to the end user. Developed for the first time in the world, **SmartFix4.0** takes the world of Work-holding and Fixtures into the digital and cyber world.

As the fixture is in continuous contact with the component, it is the ideal device to collect and analyse data at a component level. Sensors to monitor vibration, pressure, and component sensing are mounted on the fixture. And sensors to monitor oil levels and temperature are mounted on the power-pack.

The high volume of data collected from these sensors is continuously transmitted wirelessly to the cloud where it is parsed and stored for analysis.

The raw data is then analysed using Data Analytic and Artificial Intelligence tools and sent back to a custom built Dashboard of the end user, that resembles their factory floor, showing all the machines in



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action as well as a quick summary on the health of each machine, fixture and powerpack.

The user can click on each machine to get a more detailed understanding of the analysed data per fixture. Data per sensor is visualized graphically with an ability to go back and see the historical performance of the machine with this fixture.

For example, an analysis of data collected from vibration could reveal a wide variety of information like casting tolerances, vibration level comparison between tools and vibration comparison across machines in the plant. This real-time data could result in productivity increases, optimising tool life and increasing safety.

If the vibration crosses a set upper threshold limit the system can be designed to shut the machine off remotely through the emergency switch of the machine.

Sensors to monitor pressure would alert the operator via their phone or on any smart device and this can again be linked to the machine emergency switch if required to ensure that in case of a sudden pressure drop the machine is switched off.

By monitoring the clamp / decamp cycles, alerts for maintenance of fixtures, ordering of spares and seal kits would also be automatically generated by the system and alerts sent via smart phone to the concerned people.

With Artificial Intelligence and Machine Learning, **SmartFix4.0** can also help the user be more proactive on machine, tool and fixture performance as well as how machines are performing compared to each other.

Historical data can be analysed and a comparison of various parameters can be made across all machines in the plant giving the management useful information to reduce costs, increase efficiencies and improve quality.

SmartFix4.0 can be installed on even existing fixtures running in the plant.

Dashboard View

The screenshot shows the SmartFix4.0 dashboard interface. On the left is a dark sidebar with navigation links: Dashboard, Users Management, and Configuration. The main area has a blue header bar with the title "Welcome to Dashboard". Below the header are six cards, each representing a machine fixture:

- Horizontal machining Center:** Machine Name: [redacted], Machine Number: 1675, Operator Name: Tom Cruise, Operator ID: 7898. Status indicator: Green light.
- Vertical machining Center:** Machine Name: [redacted], Machine Number: 9876, Operator Name: Johnny Depp, Operator ID: 2342. Status indicator: Red light.
- 5 Axis machine:** Machine Name: [redacted], Machine Number: 3663, Operator Name: Tom Hanks, Operator ID: 9873. Status indicator: Yellow light.
- Horizontal machining Center:** Machine Name: [redacted], Machine Number: 1675, Operator Name: Tom Cruise, Operator ID: 7898. Status indicator: Red light.
- Vertical machining Center:** Machine Name: [redacted], Machine Number: 9876, Operator Name: Johnny Depp, Operator ID: 2342. Status indicator: Yellow light.
- 5 Axis machine:** Machine Name: [redacted], Machine Number: 3663, Operator Name: Tom Hanks, Operator ID: 9873. Status indicator: Yellow light.

Representation of a machines on floor along with status indicators derived from sensor data.

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- Cloud based application that monitors condition of machines on the floor based on readings collected from sensors on fixtures.
- Fixture level analytics to help isolate and troubleshoot faster.
- Graphical data visualisations for more robust analysis.

Machine Level View

The screenshot shows the 'Machine Details' section with a 3D model of a horizontal machining center. Below it, a table lists fixture details: Fixture Name, Fixture ID, Component ID, Run Time, Idle Time, Last Maintenance Date, and Data Loggers. The 'Fixture Information' section displays connectivity status (WiFi, Good, Moderate, Poor), battery levels (Low, Replace Immediately, No Voltage, Machine idle), vibration analysis (High Vibration, Clamping Failed, Work Clamped Insert, Work Unclamped Insert, High Moderate, Cylinder Failure, Link Lockout, Air Compressor Not Charged, Heat Gelling Tool, Work Support Issues), and pressure analysis. The 'Machining Sequences' section lists operations: Face Rough Cut, Face Finish Cut, Drilling_1, Drilling_2, Boring, Tapping_2, and Home, along with their feed rates (mm/min) and time targets (min).

Quick view of machine details and access to fixture level status.

Industry 4.0 is commonly referred to as the Fourth Industrial Revolution. It is the ability of machines, devices, sensors and people to connect and communicate with each other via the Internet Of Things. **SmartFix4.0** is that revolution in the fixture building business.

Powerpack View

The screenshot shows the 'Machine Details' section with a 'Oil Level Indicator' chart for Oil_1, which shows a sharp drop from 54 to 46 over a period of 10 days. To the right, there are two threshold breach indicators: 'Switch on Heater' (yellow exclamation mark) and 'Switch on Cooler' (orange exclamation mark).

Pressure and Analyser View



- Multiple sensor data visualisation to analyze performance.
- Threshold breach indicators for quick troubleshooting.
- Data collected per operation.



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