

# BUILT TO LAST

It's a unique milestone for Forms and Gears as it finishes 50 years of fixture building. It thus makes for an opportune time to capture the feats accomplished, honor its past, and look forward to its innovations in the future...



Large Sized Component Fixturing

Source: Forms and Gears

**T**his year marks the 50<sup>th</sup> year of one of Asia's oldest and best-known fixture building company Forms and Gears. A pioneer on the fixture building front, it has been at the forefront of a number of landmark projects in India and abroad for over five decades.

The company was founded in 1972 by RT Varghese, a Mechanical Engineer from IIT Kharagpur. After his passing away in 2001, the company has been run by his son and daughter Reji and Annu Varghese.

## Three generations of employees

Reji Varghese, Managing Director, Forms and Gears, says, "When I joined the company in 1987, my father put me on the Burkhart Jig Boring machine. I worked as an operator on this machine for a few years. As Tool Room is a highly specialized profession, we have a robust apprenticeship system, and most of our senior management including me have come up through this apprenticeship training."

"One of our strengths is our loyal, skilled, and experienced workforce, and we have people whose fathers and grandfathers worked with us. In this day and age, having three generations of employees working with one company is rare and is a testament to the company and its culture," he adds.

Director of Special Projects, Annu Varghese, a Masters in Mechanical Engineering from the University of Texas at Austin, USA, shares, "I joined the

POONAM PEDNEKAR  
Chief Copy Editor  
Magic Wand Media Inc  
poonam.pednekar@  
magicwandmedia.in





Source: Forms and Gears

“One of our strengths is our loyal, skilled, and experienced workforce, and we have people whose fathers and grandfathers worked with us. In this day and age, having three generations of employees working with one company is rare and is a testament to the company and its culture.”

**Reji Varghese**  
Managing Director  
Forms and Gears

company in 1993, and I have been in the Design and Engineering division ever since. Forms and Gears’ design IP and the skilled workforce is one of the reasons why we have been in the business for 50 years.”

“In fact, for around 47 of those 50 years, we did not even have a sales department; not even one person in sales. All sales were by referrals and repeat clients,” she adds.

### **Joint venture with ASM Technologies**

In 2018, a majority stake in Forms and Gears was acquired by ASM Technologies, a publicly listed Engineering Services and Design company. It has 1,200 engineers in Bangalore and there is now a separate dedicated design team for Fixtures, Special Machines, etc. at Whitefield.

Rabindra Srikantan, Managing Director, ASM Technologies, says, “We, at ASM Technologies, have seen both – promising growth as well as opportunities



Source: Forms and Gears

“At Forms and Gears, we have built fixtures that have helped our clients foster innovation, increase productivity and save costs for five decades now. The award signifies the indispensable role of fixture building companies on the modern-day shop floor. Smart fixtures, in particular, have the potential to catalyze the next revolution in the digitalization journey of manufacturers.”

**Annu Varghese**  
Director of Special Projects  
Forms and Gears

into new industries – with Forms and Gears joining our fold.”

He adds, “Forms and Gears are pioneers in making workholding devices. It is a company that is built on a strong design by an amazing team with a great experience. The impressive customer list developed over the past fifty years is a testament to the same. Their domain knowledge and value engineering capabilities have been leveraged to expand business from the Automobile and Engineering industries to other verticals like Electronics and Semiconductor. Additionally, the foray into Industry 4.0 with our very own SmartFix 4.0, which is a product built by the best in manufacturing, hardware, software, and analytics, places us at a desirable vantage point. We look forward to carrying this momentum to expand to the western markets by engaging with world leaders of these industries.”

### **World-class facilities**

Forms and Gears has two state-of-the-art factories at Guindy, in the heart of Chennai, housing one of the best-equipped private tool room facilities in the country. The company exports fixtures to over 10 countries now. It has recently added a large number of Japanese Machining Centers and allied equipment in phase 1 of a four-phase expansion plan.

### **Smartfix 4.0**

In 2018, Forms and Gears launched ‘SmartFix 4.0’, which is the world’s first-ever Industry 4.0 solution for Fixtures and Workholding. Industry 4.0 is commonly referred to as the fourth industrial revolution and is the ability of machines, devices, sensors, and people to connect and communicate with each other via the Internet of Things. SmartFix 4.0 has been jointly developed by Forms and Gears and ASM Technologies and is a Precision Workholding Device with the ability to collect, transmit, and analyze data in a useful format for the end-user. Developed for the first time in the world, it takes Workholding devices and Fixtures into the digital and cyberspace.

As the Fixture is in continuous contact with the component, it is the ideal device to collect and analyze data at the component level. Sensors to monitor vibration, pressure, sequence of clamping, component presence, etc are mounted on the fixture. And sensors to monitor oil levels, oil contamination, and temperature are mounted on the powerpack. 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 analyzed using Data Analytics and Artificial

**SmartFix 4.0 has been jointly developed by Forms and Gears and ASM Technologies and is a Precision Workholding Device with the ability to collect, transmit, and analyze data in a useful format for the end-user.**

**To keep up with the advancements in the Machine Tool and Cutting Tool technology, Workholding technology has also to keep pace so that the capability of the machines and the tools can be fully utilized.**



Source: Forms and Gears

Industry 4.0 is the ability of machines, devices, sensors and people to connect and communicate with each other via the Internet of Things. SmartFix 4.0 is that revolution in the fixture building business.

Intelligence tools and sent back to a custom-built Dashboard of the end-user, which resembles their factory floor, showing all the machines in action as well as a quick summary on the health of each machine, fixture, and powerpack.

Reji says, "Over the last 50 years, we have seen seismic shifts in manufacturing. We used to do Workholding for conventional machines in the 70s which slowly transformed into Fixtures for indigenous Machining Centers and then to advanced Workholding solutions for high-speed imported Machining Centers. To keep up with the advancements in the Machine Tool and Cutting Tool technology, Workholding technology has also to keep pace so that the capability of the machines and the tools can be fully utilized. Over the last few years, we have come to the conclusion that the next revolution in Workholding would be to make fixtures smarter by making them IoT- and Industry 4.0-enabled and that's how we have come up with SmartFix 4.0. Smartfix 4.0 can also be used on existing fixtures, test rigs, and special equip-

ment, making it a highly flexible and easily adaptable system."

#### **Winning accolades**

In December 2020, Forms and Gears was awarded the prestigious Confederation of Indian Industry (CII) Industrial Innovation Award 2020 under the 'Top 25 Most Innovative Companies' category for having developed Smartfix 4.0.

Talking about the award, Annu Varghese says, "At Forms and Gears, we have built fixtures that have helped our clients foster innovation, increase productivity and save costs for five

decades now. The award signifies the indispensable role of fixture building companies on the modern-day shop floor. Smart fixtures, in particular, have the potential to catalyze the next revolution in the digitalization journey of manufacturers."

"The award is a validation of the capabilities of our expert development team and deep understanding of fixtures, which is the reason why the world's best companies trust Forms and Gears. Our solutions leverage emerging technologies such as cloud computing, artificial intelligence data analytics, and



Source: Forms and Gears



Industrial Internet of Things to power the Industry 4.0 journey of manufacturers,” says Nikhil Rabindra, Head of SmartFix 4.0. The awards were announced in a virtual ceremony hosted by CII during the India-Portugal Technology Summit. In the event, the apex industry body felicitated the top 25 companies across large, medium, and small segments for their innovation prowess.

**Built to last**

Whether it’s the machine grade castings and other input specs used or the way the fixture is processed, Forms and Gears fix-



Source: Forms and Gears

“We, at ASM Technologies, have seen both – promising growth as well as opportunities into new industries – with Forms and Gears joining our fold. Forms and Gears are pioneers in making workholding devices. It is a company that is built on a strong design by an amazing team with a great experience. The impressive customer list developed over the past fifty years is a testament to the same. Their domain knowledge and value engineering capabilities have been leveraged to expand business from the Automobile and Engineering industries to other verticals like Electronics and Semiconductor.”

**Rabindra Srikantan**  
**Managing Director**  
**ASM Technologies**

tures once installed run for decades maintaining the tolerances the fixture was designed for. Hand scraping, for example, is a technique that was first introduced during the industrial revolution in England for finishing sliding or datum surfaces.

Due to technical advancements and quality improvements, processing machines have taken the place of this old technique.

Reji Varghese says, “When you want sub-ten-micron accuracies on a 1-meter fixture with around 40 to 50 elements on it, we need to control the accuracy of each single element at each stage of processing. Our fixture bases are still finished using hand scraping. This technique is used by manufacturers of ‘mother machines’, which are super high-precision machines used to build other machines. For example, Yasda Jig Boring machines guideways are still mounted on the meticulously hand scraped surfaces. This not only results in high precision and high rigidity but also influences the long service life of the machine and maintains the accuracy of every machine.”

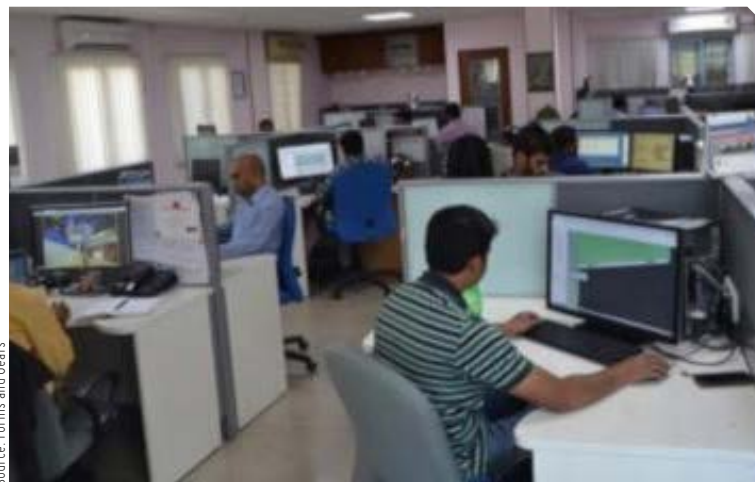
To achieve the required level of precision and rigidity, Forms and Gears fixtures are designed and built in ways that set them apart from typical fixtures. They feature components that are designed and manufactured with tighter-than-normal tolerances, as well as improved rigidity, stability, and vibration-damping capabilities to ensure accuracies and long life.

The company, in its small way, has left an indelible mark on the Manufacturing industry in India. For 50 years, it has survived the ups and downs of the industry – recessions, slowdowns, technology changes, disruption, boom, and bust.

Many people think of legacies in material terms including big factories, windfall profits, technological achievements etc. Leaving an impact, though, can be a more powerful legacy. Sometimes what you leave behind is not what is engraved in stone monuments, but what is woven into the lives of others. At Forms and Gears, they have done just that.



**Many people think of legacies in material terms including big factories, windfall profits, technological achievements etc. Leaving an impact, though, can be a more powerful legacy. Sometimes what you leave behind is not what is engraved in stone monuments, but what is woven into the lives of others - and at Forms and Gears, they have done just that.**



Source: Forms and Gears