2017 INDUSTRIAL HEAVY MACHINERY PULSE REPORT
ABOUT AEM
Advancing equipment manufacturers in the global marketplace; AEM’s passion is to not only see your business succeed, but to create a community where we, as an industry, can make positive and lasting change. While continuing to grow, AEM has more than 900 members, representing over 200 product lines.
In recent years, the Association of Equipment Manufacturers (AEM) has been increasingly focusing its talent and resources on capturing the disruptors affecting the industries it represents. Naturally, much of the focus has been on technological developments and the impact of big data on our members. As we seek to make sense of this fluid and rapidly changing environment, we have heard from our members regarding the challenges they face. Including, emerging markets pressure, growing domestic and international regulatory hurdles, and workforce weakness in key skilled areas on the manufacturing floor. As a whole, marketplace success for manufacturers is more fragile than ever. However, given the resilience of our members, manufacturers are charting a course for success.

While advances in technology come at a bewildering pace, they afford tremendous opportunity to increase business efficiencies. With the massive amount of data driven by growing Internet of Things (IoT) environments, businesses discover insights into where their equipment is excelling and where it requires improvement. Regulatory pressure often drives engineering innovation that further enhances a manufacturer’s value proposition to its customers. Technology enhancements sometimes provide solutions, such as through production automation opportunities that at times can alleviate the skilled worker conundrum (which in turn however often creates new skilled worker needs).

This report captures this environment extremely well. Moreover, I continue to be encouraged by companies such as Tata Technologies that facilitate engineering solutions using innovative tools, to help manufacturers re-imagine engineering processes. Product innovation, joined with investment in research and development, are key for established manufacturers to compete with upstarts or emerging market competitors who can be more flexible in production and distribution practices.

AEM was pleased to be able to assist Tata Technologies in their survey research as they seek to understand the opportunities for the companies they serve. We encourage all of our members to become thought leaders and engage in market research, revealing the trends and challenges in our industries.

I hope this report gives you some of the key insights you require to chart your own next steps for success.

Larry Buzecky is AEM’s Vice President, Business Intelligence and Strategy. He has served AEM and its members for more than 16 years in a variety of key areas including IT, safety materials, market intelligence, statistics and organizational strategy.
TABLE OF CONTENTS

Foreword

Introduction

Factors Driving Product Development & Innovation

Competing with Lesser Regulated Manufacturers

Supply Chain Integration

Manufacturers Staying Put for Now

Addressing the Skills Gap

Predicting the Industry’s Next 5-10 Years

Resources
INTRODUCTION

Tata Technologies enables ambitious manufacturing companies to design and build better products through engineering services outsourcing and the application of IT to product development and manufacturing enterprise processes.

We partnered with AEM to conduct a survey on the challenges heavy machinery manufacturers are facing in the marketplace, and how they plan to drive product development and innovation in an increasingly competitive global environment.

The survey targeted engineering professionals from global organizations with more than 500 employees, that manufacture construction, mining and agricultural equipment. The survey results indicate:

- There is significant pressure to build products for emerging markets and increasing competition with lesser regulated manufacturers.
- Manufacturers continue to invest in technology tools such as computer-aided design (CAD), computer-aided engineering (CAE), customer relationship management (CRM), product lifecycle management (PLM) and enterprise resource planning (ERP) to support research and development (R&D) and new product introduction (NPI).
- Product innovation efforts will focus on electrical systems/electronics along with special attachments.
- Supply chain standardization and homologation is a priority for the majority of manufacturers.
- Mergers and acquisitions, new facility builds and relocations are not in the cards for most organizations in the near term.
- The engineering skills shortage is a real problem; manufacturers are plagued with not being able to fill open positions with qualified candidates.

We hope you find the survey results and information contained within valuable. Feel free to send your feedback and comments to us at IHM@tatatechnologies.com.
FACTORS DRIVING PRODUCT DEVELOPMENT & INNOVATION

External forces heavily influence the strategy, focus and allocation of financial and human resources within any organization. In recent years, the industry has contended with weak economic growth in developing markets, inflated projections in China, Tier 4 emissions regulations, a global decrease in equipment demand, plant closings, product consolidation and a reduction in the workforce. Add in the impending uncertainty around our new presidential administration and the recent Brexit vote, and it’s no surprise that equipment manufacturers are tightening their belts and focusing on a conservative approach to 2017.

Despite the challenges and slowdown, there is optimism heading into 2017. In an interview at the recent AED/AEM Equipment Economic Forum, Chief Economist Ken Simonson of the Associated General Contractors of America stated that “the economy will keep growing, construction will keep growing, we’ll continue to see good growth in office construction, apartment construction, selected areas for power construction – including pipelines, renewables, gas-fired power plants – and overall private non-residential construction will be positive.”

ConstructConnect, an organization that provides construction industry professionals with complete, accurate and actionable pre-construction data, forecasts total construction in place for 2017 is $1,234.5 billion, a 6.3 percent increase over 2016. The improved growth is expected to carry over into 2018 where construction spending will improve another 7.2 percent. Total residential construction spending is expected to grow 7.4 percent in 2017 to $501.7 billion and total non-residential is forecast to increase 5.5 percent this year to $732.8 billion.

The PwC Manufacturing Barometer™ business outlook report from April 2016 states that during the downturn, R&D and NPI are remaining a focus for industrial manufacturing companies. While companies strategize on how to reduce costs, investments should be made to ensure operations are running as efficiently as possible, and that innovative and competitive products are available when the economy picks up. Our survey asked:

What are the significant external drivers that are likely to impact your organization’s product development efforts in the next 12 months?

1. Increasing pressure to build products for emerging markets.
2. Increasing competition with lesser regulated international equipment manufacturers.
3. Increasing demand for autonomous equipment.
4. Stage 5 emissions and environmental/regulatory compliance.

Manufacturers today are dealing with a variety of market demands, namely increased competition, that are requiring them to do more than ever, faster than ever, and better than ever before. They must increase their capacity to develop more products, harness the best practices and technology on the market to support the creation process, and connect their product development processes to the wider enterprise.
HEAVY EQUIPMENT MANUFACTURERS ARE UNDER PRESSURE TO:

- Increase manufacturing productivity and throughput
- Reduce time-to-market or increase the number of iterations
- Improve quality and compliance while mitigating risk
- Reduce costs (do more with less)
- Enable decision making and robust change management
- Create intelligent products in a connected world
- Provide engineering capability and capacity
- Increase product features and performance
- Increase portfolio, revenue and market share

SO HOW WILL THEY DO IT?
The majority of manufacturers told us they will implement better product development communication and collaboration tools to improve their product development efforts. This comes as no surprise as more than 50 percent of survey respondents admitted to manufacturing to a wrong revision. Harnessing the power of sophisticated product data management or product lifecycle management software ensures designers are always working with the “right version” of a model by offering built-in revision and version control. It’s just one way OEMs can avoid costly manufacturing mistakes, preserve design integrity and accelerate time-to-market.
What internal initiatives will have the most impact on your organization’s product development efforts in the next 12 months?

Investments in testing and validation, both virtual and physical, are also an area of focus. With computer-aided engineering (CAE) or finite element analysis (FEA) software, manufacturers can setup real-world environments to virtually test their products before manufacturing and introduce a broad range of parameters during the design process. Physical models allow for testing of product proportions, functionality and aesthetics using a variety of materials. Manufacturers can reduce tooling costs and speed up production by using additive manufacturing (3D printing) to create functional prototypes.

Lower down on the list of internal initiatives is a focus on IoT and Industry 4.0. For industrial manufacturing companies, the next generation of IoT technology should go well beyond real-time monitoring to connected information platforms that leverage data and advanced analytics to deliver higher-quality, more durable and more reliable products. A hint of this can be seen in wind turbines manufactured by General Electric. This equipment contains some 20,000 sensors that produce 400 data points per second. Immediate, ongoing analysis of this data allows GE and its customers to optimize turbine performance and proactively make decisions about predictive maintenance and parts replacement schedules.

Before investing in IoT, however, industrial manufacturing companies must determine precisely what data is most valuable to collect, as well as gauge the efficacy of the analytical structures that will be used to assess the data. In addition, next-generation equipment will require a next-generation mix of workers, which should include employees who can design and build IoT products as well as data scientists who can analyze output.

...more than 50 percent of survey respondents admitted to manufacturing to the wrong revision.
STAGE 5
It seems the industry has taken a sigh of relief since Tier 4 emissions standards have been developed and are on their way to production. While some manufacturers who export to Europe are planning for Stage 5 emissions standards, most are de-prioritizing this as the compliance challenges are minimal. “It’s not yet known whether Stage 5 requirements will be introduced in North America, however it would be an inefficient situation if a manufacturer were forced to build two different models, one for Europe and one for America,” said Tim Hamers, Technical Advisor at CEMA. 5

Over 50 percent of respondents are not taking any planning steps now for Stage 5, but rather are waiting for regulation parameters and timelines to be determined. Even though the “wait and see” attitude is most common, it’s not stopping nearly 40 percent of respondents who continue to investigate alternate energy sources, such as CNG, hybrids or electric powered vehicles.

Nearly 40 percent of respondents are investigating alternate energy sources such as, CNG, hybrids or electric powered vehicles.

What steps are you taking, or what challenges is your organization facing, with Stage 5 emissions standards?

- Investigating alternate energy sources (CNG, electric drive, hybrid, etc.) [38%]
- Allocating resources to energy recovery and reuse to allow for smaller power source [28%]
- Pushing responsibilities to supplier base to dictate the needed changes in technology [26%]
- No steps now. Waiting until regulation parameters and timelines are determined [52%]
NEW TECHNOLOGY INVESTMENTS

Reflecting on the fact that manufacturers remain focused on R&D and NPI despite the economic downturn, we asked survey respondents which technologies their organizations plan to invest in within the next 12 months. Technology enablement is key to optimizing product development, ensures manufacturers stay at the forefront of breakthroughs that help them create more, better and faster, and underpins the product creation process.

The majority of respondents will invest in computer-aided design (CAD), computer-aided engineering (CAE), customer relationship management (CRM), product lifecycle management (PLM) and enterprise resource management (ERP) software.

Which of the following technologies, if any, does your organization plan to invest in within the next 12 months?

- Application Lifecycle Management (Microsoft®.NET™, Java®, etc.) — 12.2%
- BI Software (Dundas BI™, Sisense, Tableau®, etc.) — 9.8%
- CRM (Microsoft Dynamics®, NetSuite®, Salesforce®, etc.) — 36.6%
- Parts Catalog (Autocat+, documoto, etc.) — 24.4%
- Dealer Management Software (ADP®, Oracle® Siebel, Reynolds and Reynolds, etc.) — 19.5%
- MES – Manufacturing Execution Systems — 22%
- ERP – Enterprise Resource Planning — 34.1%
- PLM – Product Lifecycle Management — 34.1%
- CAM – Computer Aided Manufacturing — 31.7%
- CAE – Computer Assisted Engineering — 39%
- CAD – Computer Aided Design — 56.1%

INNOVATION

“Innovation is the only way to win.”
— Steve Jobs

Equipment manufacturers operate in an industry that requires continual innovation. Companies must not innovate just for the sake of it, however, they need to determine which innovations will make them more competitive, produce the highest return on investment, or ideally, both.

Over 70 percent of respondents are prioritizing electrical/electronics in terms of product innovation. This is no surprise as it’s the first step in developing autonomous equipment and integrating the demands required by IoT.
Communication between drivetrain components is all done electronically, and the architecture for these data pathways continues to improve in capacity and reliability, but the biggest change in electronics is the number and type of sensors involved.

For example, Komatsu implemented a team of driverless, robotic excavation vehicles that are guided by drones, which create a real-time 3D map of the area to track the work site. All of the communications were done through innovations in electrical systems.

Exactly 50 percent of respondents are prioritizing special attachments in their product innovation strategy. The special attachment industry has recently shifted in importance to OEMs for many reasons. The most prevalent is that it’s an alternate revenue stream when equipment sales are down. By creating new and improved special attachments, end-users and rental companies are able to utilize their equipment for different functions without having to invest in multiple units of equipment.

Nearly 50 percent of respondents are prioritizing powertrain and ergonomics improvements. Focus on the powertrain will lead to continued improvements in fuel consumption, energy recovery and overall cost of equipment operation. An emphasis on ergonomics tells us that the end-user is still important in design and purchasing decisions.

In terms of product innovation, which of the following areas will receive top priority within the next 12 months?

- **Electrical/Electronics**: 71.4%
- **Special Attachments**: 50%
- **Ergonomics Improvements**: 47.6%
- **Powertrain**: 47.6%
PLATFORM CONSOLIDATION
Most industrial heavy machinery is built on a platform or architecture that defines the core engineering of the vehicle, much like the automotive industry. The more unique platforms an OEM manufactures to, the more expensive it is to design and produce equipment. Each individual platform carries with it a unique infrastructure that includes design parameters, manufacturing methods, tooling, assembly, spare parts and a host of additional specifications that are relevant to only that platform. An article by Automotive World, “Platform consolidation will drive OEMs into the future,” states that common global platforms will be flexible enough to achieve large-scale part commonality and modularity of design, and flexible enough to support global product innovation, development and mass production. These flexible platforms will allow OEMs to not only share common engineering across brands or partners, but also to develop products across price and size segments.

As the industry strives to achieve economies of scale and more efficient product launches, platform consolidation is becoming more prevalent. Consolidating platforms can greatly reduce complexity, therefore reducing costs. However, as attractive as platform consolidation sounds, there is a downside. For starters, it’s not cheap. If an OEM decides to develop a new platform to replace several existing ones, it can take years and millions of dollars to bring to fruition, putting a massive financial and human resource burden on the organization. Consolidation also negatively affects the supply chain, with more business going to fewer suppliers. Regardless of the drawbacks, the concept of platform consolidation is here to stay.

65 percent of organizations have considered platform consolidation in their product design and manufacturing process.

What challenges are you facing in terms of platform consolidation?

- Lack of engineering resources: 70.4%
- Too much capital investment: 59.3%
- Not feasible with current IT tools: 18.5%
- Limited supplier visibility: 18.5%
- Not a corporate priority: 18.5%
COMPETING WITH LESSER REGULATED MANUFACTURERS

OEMs are under increasing pressure to build products for emerging markets in an environment where they are competing with lesser regulated manufacturers. Traditionally, western manufacturers have product launch cycles that include rigorous and lengthy testing and validation. Their competitors have compressed their launch schedules by limiting testing and validation to cater to the lower price point buyers. Customers are increasingly drawn to these products.

Another fundamental challenge in the lesser regulated marketplace is the shift away from the cost of operation simply to the cost of the equipment. This is a paradigm shift for most western manufacturers that traditionally design and build to the cost of ownership. Lower priced models are gaining preference in lesser regulated regions. Quality and durability are still valued, but they are not as heavily weighted in the decision-making process. At the same time, customers may be more tolerant to the reduction of testing and validating in exchange for getting the equipment to the job site at a lower cost.

We asked survey respondents how they expect to compete globally with their lesser regulated counterparts. More than 75 percent said they are investing in product R&D and enhancing innovation. About 70 percent are reducing internal operating costs, and more than 60 percent plan to adopt new manufacturing technologies to drive production innovation and efficiency.

“Anyone waiting for a slow-down in the level of competition coming from Asia will be disappointed.”
– Doug Gates, Global Sector Chair, Industrial Manufacturing and Head of Aerospace and Defense

How does your organization plan to compete globally with lesser regulated equipment manufacturers?

- 76.5% – Invest in product R&D and enhance innovation
- 70.6% – Reduce internal costs
- 62.7% – Adopt new manufacturing technologies to drive innovation
- 45.1% – Create a line of lower-priced equipment for select global markets
- 29.4% – Plan to build offshore production/infrastructure in lesser regulated countries
SUPPLY CHAIN INTEGRATION

Supply chain management is the oversight of materials, information, and finances as they move in a process from supplier to manufacturer to wholesaler to retailer to consumer. It involves coordinating and integrating these flows both within and among companies.10

The automotive industry has been incorporating supply chain homologation and standardization into their manufacturing plants for years with shared chassis and assembly lines for multiple vehicle models. Automotive OEMs have also incorporated their parts suppliers into their overall integration strategy.

The heavy equipment industry has struggled to incorporate this practice into its manufacturing and production strategy. While more than 60 percent of respondents identify supply chain standardization as a current priority or strategy, overall implementation has been challenging.

Many OEMs are finding that homologation of designs, and by extension, standardizing the supply chain to execute those designs, can save development time, money and reduce manufacturing costs.11

“...supply chain executives are enhancing their priorities from traditional cost-cutting to growth, capacity and improving demand signal alignment initiatives.”

— Erich L. Gampenrieder, Head of KPMG’s Global Supply Chain Center of Excellence12
What challenges are you experiencing, or do you expect to experience, while planning or integrating your supply chain?

- 65.4% – Limited resources to manage process
- 50% – Limited visibility into suppliers’ operations
- 15.4% – Not a priority in product development
- 15.4% – Corporate structure impedes implementation
MANUFACTURERS STAYING PUT FOR NOW

PwC’s "Global engineering and construction M&A deals insights: Q3 2016 update," states that global engineering and construction mergers and acquisitions (M&A) deal values continued to reflect softness in 2016 versus prior years, but masked healthy deal volume. While both value and volume declined in Q3 2016 compared to comparable 2015, on a relative year-to-date basis 206 deals through Q3 2016, outpaces 2015 and 2014 (187 and 103, respectively) demonstrating heightened activity for smaller transactions.13

Global Industrial Manufacturing M&A deal values for the first nine months of 2016 decreased 10 percent compared to the same period in 2015. This was driven by a 22 percent decrease in volume period over period.14

The most notable recent M&A movement in the industrial heavy equipment industry was Komatsu America Corp.’s acquisition of Joy Global Inc., valued at $2.8 billion, announced July 2016. This was an effort by Komatsu to strengthen its core mining equipment business and achieve sustainable growth. The largest deal announced in Q3 2016 was the deal between Emerson and Pentair PLC-Valves & Controls Business ($3.2 billion).

Fewer than 20 percent of survey respondents have gone through a merger or acquisition in the last six months or plan to in the near future.

A merger or acquisition is a sure-fire way to bolster technology offerings, skill sets, market share, global footprint and performance while decreasing costs. However, the sheer volume of work created often means executives and top management shift their focus away from day to day business operations. It’s one reason many companies solicit outside consultants and services providers to facilitate the consolidation efforts of in-house systems.

For those who have gone through, or plan to go through a merger or acquisition in the near future, nearly 40 percent used, or plan to use, a third party to help with IT optimization, organizational restructuring, talent management and plant consolidation.

Several big-name manufacturers have announced expansion and relocation efforts over the past 12-24 months. Kubota announced plans to increase production capacity in the US by building a new manufacturing plant and expanding its existing operations in Gainesville, GA. Caterpillar Paving Products expanded its production facility in Brooklyn Park, MN. And Caterpillar’s surface mining division announced a relocation to Tucson, AZ, to take advantage of substantial tax benefits.

Only 23 percent of respondents reported plans to build a new facility, occupy a brownfield site or relocate in the next 12 months.
In which areas are you seeking outside consultation to manage the challenges associated with the merger or acquisition?

- IT Optimization: 12.5%
- Organizational Restructuring: 25.0%
- Talent/Learning Management: 25%
- Plant Consolidation: 25.0%
- Stage-gate/Project Management: 37.5%
- Supplier Consolidation: 37.5%
- Quality Process Standardization: 38%
- Change/Configuration/Requirements Management: 37.5%
ADDRESSING THE SKILLS GAP

The engineering skills gap was first highlighted a decade ago and has been the topic of much debate ever since. While it’s now widely recognized as an issue of global proportions, current indicators suggest that efforts to address the problem have fallen short. Even the most recent reports continue to paint a gloomy picture, predicting that by 2020 the global gap between supply and incremental demand for qualified engineers will be as high as 74 percent. To date, efforts by the government, educators and industry have focused on the supply side of the problem, “make more engineers.” This strategy alone won’t resolve the problem. A different perspective is required to bridge the pervasive skills shortage, not just in the US, but around the world.

The global war for talent will continue, causing companies to consider where to place manufacturing, research and development, and distribution facilities.

IS THERE REALLY A PROBLEM?
The facts speak for themselves. More than 72 percent of survey respondents state they have difficulty in sourcing skilled engineering candidates.

WHAT’S CAUSING THE PROBLEM?
The global population is demanding and consuming more products than ever before, while expecting those products to be heavily customized and personalized. This trend is pushing manufacturers to cut product development cycles, and affecting their ability to create, innovate and execute at scale, pushing design and engineering resources to the limit.

A study in the US revealed hard evidence of the financial impact on businesses struggling to find engineering talent, which was estimated at a reduction in revenue of 11 percent.

More than 90 percent of survey respondents stated that on average, there are up to 30 engineering positions open in their individual unit, that’s not even company-wide.

Given the scale of the skills gap and the disruption it brings to the supply chain, what can manufacturers do to address their immediate needs?

Tata Technologies’ research has shown that on average, up to 80 percent of an engineer’s day is spent on non-engineering tasks like program management and administration. We call these “Essential but Non Value-Added” (ENVA) tasks. They are essential to the design and development process, but don’t require an engineer to perform them.

More than 72 percent of survey respondents state they have difficulty in sourcing skilled engineering candidates.
The majority of survey respondents, nearly 42 percent, report that their engineers spend 41-60 percent of their time on non-engineering tasks. Nearly 35 percent say their engineers spend 21-40 percent on ENVA activities. At a point where market demand for new products is higher than ever and manufacturers are struggling to recruit and retain engineering talent, qualified engineering resources are being utilized at a fraction of their professional capacity.

The answer is not to hire more engineers. The answer lies in the redistribution of the ENVA tasks that highly paid, highly qualified engineers are performing to non-engineering roles, thus freeing up critical engineering talent to take on new projects and programs. This approach works if you have the available resources to take on the ENVA tasks. Many manufacturers choose to outsource the administrative, low level work to an engineering services provider (ESP), taking advantage of the cost savings provided by the global distribution and delivery model many ESPs provide.

THE EVOLUTION OF ENGINEERING SERVICES PROVIDERS

Once strictly cost arbitrage centers performing non-critical functions like staff augmentation and single discipline CAD projects, engineering service providers have evolved over time. ESPs can now offer more value to the market with higher-end services like product development and new technology research. Companies like Tata Technologies are developing stronger expertise and expanding competencies to become more strategic partners to the manufacturing industry.

India continues to be the preferred destination for engineering, research and development (ER&D) outsourcing, as it offers the right blend of cost competitiveness, a large engineering supply base and the English language advantage.

In addition to leveraging offshore engineering teams in India, Tata Technologies boasts a team of more than 400 engineers across three delivery centers in Romania. The focus of this group is primarily on industrial heavy machinery design and engineering for global clients. Over 50 percent of the Romanian team has more than 10 years of experience with heavy equipment manufacturing and attrition is less than half the industry standard: 6 percent versus 10-12 percent.

COUNTRY PREFERENCE FOR OFFSHORING ER&D SERVICES

<table>
<thead>
<tr>
<th>Country</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>3.4</td>
</tr>
<tr>
<td>China</td>
<td>3.1</td>
</tr>
<tr>
<td>Brazil</td>
<td>2.9</td>
</tr>
<tr>
<td>Poland</td>
<td>2.8</td>
</tr>
</tbody>
</table>

Tata Technologies’ capabilities in the industrial heavy machinery market include full machine development and systems integration for leading manufacturers of construction, mining and farming equipment. Focus areas include structures, interiors, power systems, electrical, electronics and embedded systems, closures and exterior trim, chassis, virtual vehicle integration, manufacturing engineering, CAE and hydraulics.
PREDICTING THE INDUSTRY’S NEXT 5-10 YEARS

We asked survey respondents to tell us how they see their business or the overall industry changing in the next 5-10 years.

“Price and supply pressure from low-cost producing countries will continue to drive price down.”
— C-level Executive

“We will become cost-effective or we will disappear.”
— Project Manager

“A more price competitive market and manufacturers should make an effort to reduce production costs.”
— C-level Executive

“More automated controls, and processes to improve productivity, reduce maintenance and increase safety.”
— Marketing/Sales Management

“Product lines to become increasingly customized. Higher specialized content in each machine. Moving toward individual machine customization.”
— C-level Executive

“Continued research/development will lead to cutting edge equipment that reduces time and cost.”
— Project Manager

“Customers are asking for solutions to help them manage their construction site. There is greater customer value in site improvements than in reducing machine owning and operating costs.”
— Engineering Manager

“Higher electronic content including knowledge driven predictive maintenance.”
— Chief Engineer

“More government regulation.”
— Manager, Manufacturing Engineering - BIW

“Industry consolidation. Fewer players, fewer customers, less margin.”
— Project Manager
RESOURCES


15. NASSCOM Perspective 2020; McKinsey Analysis.


18. 2014 ER&D demand side survey and interviews, Strategy& intelligence community, and analysis.
ABOUT TATA TECHNOLOGIES
Tata Technologies, founded in 1989, enables ambitious manufacturing companies to design and build better products through engineering services outsourcing and the application of information technology to product development and manufacturing enterprise processes.

With more than 8,500 professionals, representing 28 nationalities, Tata Technologies focuses on the manufacturing industry – covering every aspect of the value chain from conceptualization, manufacturing, aftermarket and maintenance repair to overhaul support. Tata Technologies supports clients through engineering and research services outsourcing, product development, product lifecycle management, connected enterprise IT services, and technical workforce staffing, PLM software and training solutions.

Tata Technologies serves clients in 27 countries, with a delivery model specifically designed for engineering and IT engagements, offering a unique blend of deep, local expertise integrated with 16 global delivery centers across Europe, North America and Asia Pacific.

For more information, visit tatatechnologies.com today.