

Innovation

In the changing business environment, with competition from alternate materials and increasing regulatory risks, Tata Steel is leveraging capabilities in the areas of Research, Technology Development and Digital Initiatives. While our research and technical capabilities focus on manufacturing innovative products with lower environmental footprint, our digital initiatives ensure integration of Information Technology (IT) with our operational processes for productivity, safety, transparency and cost optimisation.



enGENE: The first-ever biotechnology laboratory established by a steel producer in the world



R&D facility, Jamshedpur Works: Pushing the frontiers of R&D

133

New products
launched

₹181.64 Cr.

Spent on R&D

Innovation

SE2, SE3, SE4

**KEY
AREAS**

- Research & Development
- Product Technology
- Process Technology
- Advanced Materials
- Digital

Key Enablers and Initiatives

1. Research and Technology Development

Our R&D and Technology projects are spread across the value chain and the key research areas include Raw Material Research, Coal, Coke, Iron and Steel-making Research, Product and Product Application Research and Environmental Research, among others. Our research is continuously focussed on optimised usage of natural raw materials and developing high-end products. Some of the key research areas include coatings, high-strength auto grade steels, leveraging low-grade raw materials, and value from by-products.

2. New Product Development

Our product development activities are focussed on making various grades of steel products that are lightweight and high-strength HR or CR steels for both the Automotive and Construction segments. We have collaborated with leading institutes such as the Cambridge University, University of Science and Technology, Beijing and Indian Institute of Science, among others, for the execution of lab-scale research into manufacturing facilities.

To augment automotive and construction steel production, we have entered into a 50:50 joint venture with Nippon Steel and BlueScope steel for producing a wide range of automotive steels, Galvalume and colour-coated sheets. Tata Steel Kalinganagar has further enabled us to enter new segments.

There are other steel grades that we are developing and they are at different stages of their development cycle.

Item	Application	Status
Pilot scale development of API X-80 for non-sour and API X-65 for sour application	Line pipe	Pilot trial done. Plant trial to be taken up
Pilot scale development of abrasion-resistant steel with 400 BHN for L&E application	L&E	Pilot trial done. Plant trial to be taken up
Development of polymer-coated steel (Poly Steel) for eliminating the cumbersome seven-stage pre-treatment process for powder coating	White goods and furniture	Commercial trial made. Supplied to customers
Cost-effective production of metallic glass powder, which is characterised by very high hardness (10X than steel) and good corrosion resistance	Liners in steel plant	Pilot trial is in progress

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In FY 2017-18, we launched 133 new products* for different markets. On this front, we undertook the following initiatives:

- Developed and commercialised HR high-strength grade HS 800 for long-member application of commercial vehicles
- Commercialised the production of coloured Galvanised Iron (GI) barbed wire with organic coating for extra corrosion protection

*New product is defined as product developed at Tata Steel through new processes and technology and then commercialised.

3. Process Technology Improvement

In iron making, our process technology improvements focus on blast furnaces, which are major contributors to carbon emissions and wastewater discharge. Some of the key improvements we have undertaken during the year include in-house technology development for measuring blast furnace stove thickness, development of a novel compound for cyanide removal from wastewater and increase in the consumption of solid waste, resulting in reduced consumption of virgin raw materials.

IMPACT CREATED

- **The carbon rate at our blast furnaces at Jamshedpur has been reduced by 10 kg/tonne of hot metal**
- **Increase in the consumption of solid waste from 79 kg/tonne of sinter to 97 kg/tonne of sinter in one of our sinter plants**

4. Advanced Materials

With an increasing threat to our business from alternate materials, it is important for us to be proactive in researching advanced materials. Our Graphene Development Centre (GDC) completed a year in FY 2017-18. During the year, the centre produced corrosion-resistant graphene paint and supplied graphene powder to renowned tyre companies. It also demonstrated the potential of Graphene Inks (Gink).



Graphene development centre

5. Digitalisation

The opportunity presented by the emergence of Digital Technologies is one of the key strategic enablers to our sustainable growth. Confluence of information and operational technologies has helped us create safer, simpler and smarter operations.

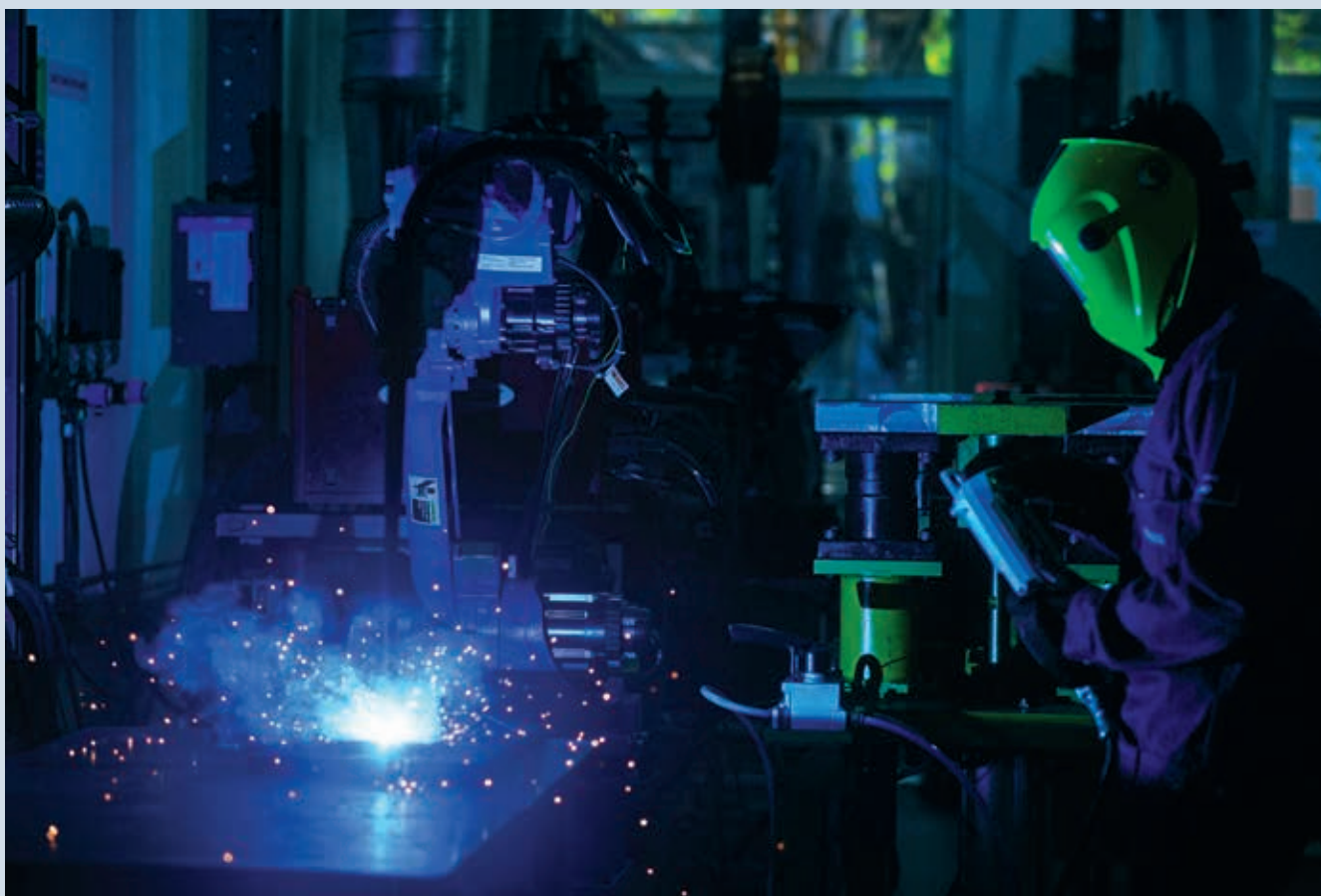
We co-developed, with external consultants, custom e-learning modules on various digital technologies, which have been undertaken by more than 10,000 of our employees, cutting across levels and geographies.

As a step towards process simplification, integration and speed, we have implemented the SAP S4 – HANA platform, thereby becoming the first integrated steel plant in India to do so. This has enabled the organisation with a single source for costing, financial accounting and asset accounting through its 'Universal Journal' architecture. We have been enhancing stakeholder experience and mobility through various applications and embedded analytics over business layers. This forms the foundation for our future process improvement journey and builds the right momentum for our journey towards being an Industry 4.0 company.

Moreover, through collaborations, we have developed and deployed advanced analytics, design thinking and agile methodologies.

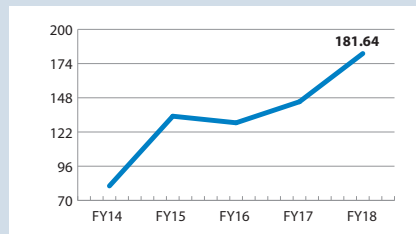
IMPACT CREATED

- **As a part of our efforts towards Smart Asset Management, we have deployed an online Fleet Management System to improve the utilisation of Heavy Earth Moving Machinery (HEMM) at our iron ore mines located at Noamundi and Katamati. The solution will get horizontally deployed at our other mining locations**
- **DigiWheels is a shared platform for our in-plant transport vehicles. The solution is being extended to the Kalinganagar plant and to raw material locations. RakeDrishti, a project with the Indian Railways, enables visibility of rakes in closed-circuit and improves loading or unloading planning**



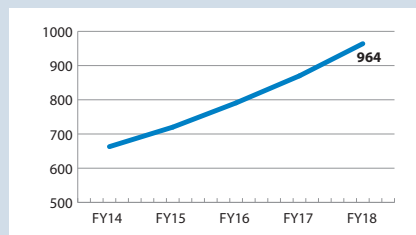
SeFondre: State-of-the-art centre for advanced welding and joining

Our Performance



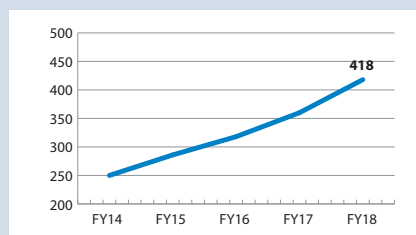
R&D spend

(Cr.)



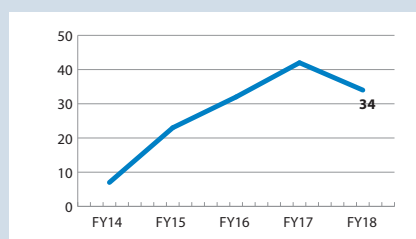
Patents filed (cumulative)

(Nos.)



Patents granted (cumulative)

(Nos.)



Collaborations/membership (technical institutes)

(Nos.)

[Number of projects requiring external collaborations has reduced from the previous FY]

Innovation

Awards

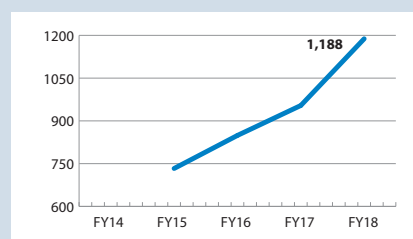
Following are the awards and recognitions won by Tata Steel representatives in various areas of innovation and technology developments:

- Award by Tata Motors in their annual supplier conference for developing and supplying HS 800 grade
- CII Environmental Best Practices Award under the Most Innovative Project category
- National Metallurgist Award (Industry)
- Winner and runner-up at the seventh Innovation Practitioner's Summit organised by All India Management Association (AIMA)

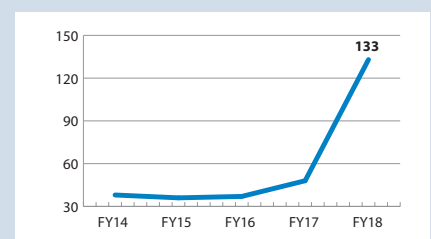
Way Forward

We will continue our efforts on all dimensions of research, technology development and digitalisation, while focussing on the following aspects:

- Make investments in Information Technology to be an agile and mobile organisation, and in the process, uncover greater cost savings across the value chain.
- Grow our Graphene business by becoming a reliable and quality producer of Graphene products
- Develop a strong product portfolio in advanced materials, while converting the concept proofs into potential business cases



Revenue through services and solutions business (incl. Profit Centres) (Cr.)



New products launched

(Nos.)