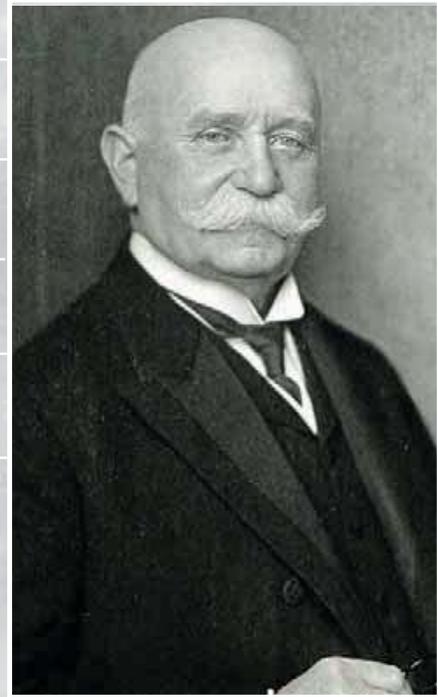


Zeppelin Systems: Provider of solutions for full spectrum of rubber and tire manufacturing

Zeppelin Systems is an exceptional German manufacturing company which is perhaps not as well known in the global rubber and tire industry as it should be. This iconic company was founded by the legendary Count Ferdinand Graf von Zeppelin in 1908 to build airships under the company name Luftschiffbau Zeppelin GmbH. He then handed over the entire company to the Zeppelin Foundation. The Zeppelin, the rigid airship created by Count Zeppelin, were developed in detail in 1893 and patented in Germany in 1895 and in the US in 1899. They were first flown commercially in 1910 but will go down in history for their key role as bombers during raids



Count Ferdinand Graf von Zeppelin



over England in the World War I. The Airships were named Zeppelin, as was the Foundation which continues to be the owner of the current Zeppelin Group.

The company is justifiably proud of its origin and, even today, aims to live up to the values of its founder, Count Zeppelin, who was a role model and inspires the company's drive to be innovative.

After World War I, the airship company Luftschiffbau Zeppelin GmbH was dismantled. With the experience gained during wartime years, the groundwork was laid for a new beginning in 1950, with the formation of Metallwerk Friedrichshafen GmbH. This company started producing lightweight structures and large vessels for the chemical industry. The company was again renamed Zeppelin-Metallwerke GmbH in the 1950s and quickly earned an excellent reputation for its products.

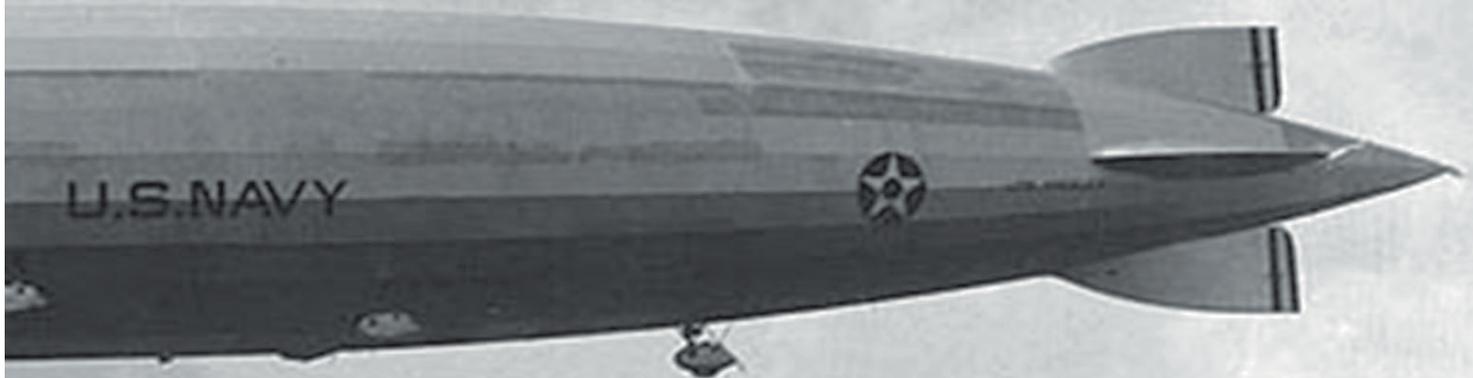
Zeppelin soon became the world's largest silo supplier due to its invention of silos made of aluminum. Since then an enormous growth and diversification into many groups took place under the group holding company called Zeppelin GmbH comprising six strategic business

units. The company has a huge impact globally on many aspects of life.

Zeppelin's global strategy has been nicely outlined by its Managing Director Rochus Hofmann. His philosophy is his thinking globally and acting locally in India. He is confident of the powerhouse that is India and to this end, he founded a joint venture with Smart Controls. With the growing importance of digitalisation as part of Industry 4.0, Smart Control and Zeppelin share a united passion for their new automation concept MiRA, a module to open automation concept. With its long tradition of more than a century, Zeppelin Systems is committed in its relationship with customers, partners and employees.



**Rochus Hofmann, Managing Director,
Zeppelin GmbH**



ZEPPELIN®

WE CREATE SOLUTIONS

Zeppe
lin
GmbH
comprises six
strategic
Business Units

As Guido Veit, Director of the Business Unit, Plastics & Rubber Plants affirms, the company has followed a systematic strategy to become a provider of solutions for the full spectrum of rubber and tire manufacturing.

Sustainability remains a key focus. This does not mean only the effective use of materials and energy in tire plants, but plant design and equipment supply for the recycling of used tires offered with its closest partners Pyrolyx in USA.

Zeppelin Systems

The Plant Engineering Business Unit has always been based in Friedrichshafen on the beautiful Lake Constance in Germany, but other different companies have also been established in Germany. Overseas subsidiaries were founded in Belgium, Italy, India, Singapore, USA, Brazil, Saudi Arabia, South Korea, England and China while the headquarters of Zeppelin Systems remain in Friedrichshafen.

As the years went by, Zeppelin extended its product portfolio to include other key components for the bulk material industry, such as rotary feeders, diverter valves, filters etc. It gradually became a specialist for the storage, conveying, mixing, metering and weighing of high-quality bulk materials.

As a technical leader, Zeppelin offers the advantage of the world's largest in-house technology centre based in Friedrichshafen for testing of various materials to verify plant design and develop new products and processes.

MiRA

Zeppelin's new automation and digitisation platform has been working successfully for some time on a new concept motivated by the current field of digitisation.

Topics such as IoT, Big Data, Machine learning and other factors play an important role. The development does not focus only on one new product, but on several new products grouped under the umbrella term MiRA.

By taking over several companies from different branches of industry and through strategic alliances, Zeppelin Systems has continuously expanded its portfolio. Today, Polyolefin Plants, Plastics & Rubber Plants, Food Plants and Mixing Technology are all handled by Zeppelin Systems. Zeppelin is now the world's leading plant engineering company for the handling of high-quality bulk materials, including the supply of mixers and automation solutions.

Zeppelin offers the original HENSCHTEL-Mixer® series, comprising Laboratory Mixers, High Intensity Mixers, Cooler Mixers and Container Mixers for a wide range of applications e.g. masterbatches, toners or chemicals. Furthermore, Zeppelin invented blending silos. This Silo blender can mix bulk materials up to 2500 m³. These mixers have proven themselves in application of mixing recycling Carbon Black and have become a part of continuous rubber mixing processes.



Zeppelin supplies complete plants from a single source from the receipt of raw materials and the storage and conveying technology, the weighing and dosing of carbon black, silica, oils as well as other additives and small components through to turn-key mixing rooms.



A variety of different mixing tasks need to be solved in the manufacture of products. Zeppelin has various types of mixers available for this.



COMPOUNDING IN SYNCHRONISATION

The requirements placed on compounding systems are on the increase. We have solutions on hand. Even the most sensitive of materials can be compounded thanks to our newly developed screw elements. Special mixing elements ensure the gentle incorporation of fillers that only have a very low shear force applied to them thanks to the unique process technology.



Compounding in
synchronisation

COMPOUNDING IN SYNCHRONISATION



CUSTOMER SERVICE

The company's global network and subsidiaries ensure that it is always close to its customers and can support them by providing the necessary services at all times. Many of its global subsidiaries also have production facilities which enables them to conform to Zeppelin's designs and thus it is not only providing services in various customer countries and time zones, but also project management, site services or deliveries partly based on local production or from selected suppliers.

its vision and strategy of thinking globally and acting locally. Building on its impressive heritage of over a century of innovation, Zeppelin's spirit of partnership in its relationship with customers, partners and employees ensures its future beyond another century, as it expands its rubber plant business to support the success of its customers. Zeppelin's customers across the world can always rely on this consistently high performing company to provide the full spectrum of services for rubber and tire manufacturing.

India

Zeppelin Systems India Pvt. Ltd. is the Indian subsidiary, while Smart Controls India Ltd. is a joint venture partner. Both these companies are managed by very capable CEOs viz. Gaurang Joshipura and Ashutosh Chincholikar respectively.

Having built so systematically and robustly on its impressive heritage, Zeppelin Systems, led by Managing Director Rochus Hofmann and Business Director Guido Veit, has successfully implemented



Gaurang Joshipura , Managing Director, Zeppelin Systems India Pvt. Ltd



Ashutosh Chincholikar, Smart Controls India Ltd.

Zeppelin Global Strategy : Rochus Hofmann, Managing Director, Zeppelin Systems GmbH, Germany

Recognising India as one of the world's fastest-growing economies, from 2009 onwards, Zeppelin started to strategically develop its subsidiary in Vadodara and utilise the immense talents and resources for Engineering, IT and integration readily available in India. The Zeppelin philosophy of thinking globally and acting locally is truly in place in India with both onshore and offshore supply of new and innovative technologies and effective digitalisation from Zeppelin to meet the ever-increasing manufacturing process demands.

Zeppelin has further reinforced its commitment and ambitions to the powerhouse that is India by forming a joint venture with the innovative Indian process automation company Smart Controls. With the growing importance of Digitalisation as part of Industry 4.0, Smart Controls and Zeppelin share a united passion for their new automation concept – MiRA, a module based 'open' automation concept that is truly flexible. This partnership is already evolving rapidly not only in India but in all corners of the world.

Zeppelin Systems has systematically extended its network all over the world for many years. It plays a leading role in the rubber and tire industry, as well as in the plastics production and processing industries and the food industry.

The company, which is represented by subsidiaries throughout the world, is perceived as an "architect of complex

The Zeppelin philosophy of thinking globally and acting locally is truly in place in India



Rochus Hofmann, Managing Director,
Zeppelin Systems GmbH

system solutions". Zeppelin produces and manufactures the integral key components for storing, conveying, mixing, dosing and weighing high-quality bulk materials. For the engineering of the complete plants Zeppelin has a proven track record in demonstrating cost savings in buildings, civil work and solutions through utilisation of their pre-engineering packages.

Zeppelin has a long tradition of more than a century. It is committed to a sustained spirit of partnership in our relationships with customers and partners as well as our employees.

Strategic Development of Plastics & Rubber Plants, Zeppelin Systems GmbH: Guido Veit

Zeppelin has more than 30 years of experience in the engineering of plants for rubber and tire production providing a backbone of process knowledge and expertise in the company. Its leading technology for the reliable pneumatic conveying, dosing, weighing and precise and fast mixer feeding of carbon black and silica is the foundation of Zeppelin's excellent reputation. For years we have followed a systematic strategy to become a provider of solutions for the full spectrum of rubber and tire manufacturing.

More and more customers all over the world appreciate our expertise for the upfront development of the plant design right from the outset of the project. They have recognised that a good design will save costs and a well-engineered plant can be built and commissioned much more quickly and according to schedule. This, together with our 3D engineering competence, allows us to offer optimal solutions for greenfields as well as the modification of brownfield projects from scratch. Global tire industry majors have benefited from faster project implementation and optimised plant design.

As technological requirements have increased due to the growing complexity and number of recipes and ingredients, Zeppelin has accepted the challenge. It has developed more flexible and sophisticated technology for the mixing room as well as a new open automation platform called MiRA for more flexible control and digital integration of plants to be ready for Industry 4.0. The development of the Liquid Dosing System and Bolt-Tec silos also prove our strength when it comes to

Zeppelin has followed a systematic strategy to become a provider of solutions for the full spectrum of rubber and tire manufacturing



Guido Veit: Director Business Unit
Plastics & Rubber Plants

innovation.

Sustainability is also a key focus for Zeppelin. This not only means the effective use of materials and energy in rubber and tire plants but also specific plant design and equipment supply for the recycling of end-of-use tires offered with our process partner, Pyrolyx.

Zeppelin continues to drive the industry forward and is set to be a major force in the industry with ambitious plans for growth. So, Zeppelin has a long-term commitment for the rubber market and intends to expand its rubber plant business systematically in the future in order to give customers continued support for their success.

New Zeppelin Technology Centre Liquid Dosing System for precise dosing of liquids

As a technological leader, Zeppelin offers the advantage of the world's largest in-house Technology Centre, located in Friedrichshafen, for trials of various materials, in order to verify plant design and develop new products and processes. The new Liquid Dosing System (LDS) from Zeppelin has been set up in our Technology Centre and is available for trials in our new test house. Customers are welcome to test their liquids to see for themselves the numerous advantages of the new system.

The LDS is a robust closed-loop modular system that allows for accurate injection of liquids at high injection flow rates, regardless of the viscosity. Through a specially-designed injection valve, it can accommodate six different liquids at each injection point of the mixer, offering a wide variety of benefits.

The system uses volumetric or gravimetric dosing to ensure extremely high levels of accuracy and dosing speed, consistent properties and better quality of the compounds with high repeatability of test parameters.

By doing so, this eliminates the need for overdosing, which is occasionally considered while using traditional systems in order to compensate for consequences out of poor repeatability. This increases the quality of the compound and repeatability of the entire process and brings down raw material costs and material losses.

The speed of dosing and the ability of feeding the liquids precisely and in



Liquid Dosing System

The new Liquid Dosing System (LDS) is a robust closed-loop modular system that allows for accurate injection of liquids at high injection flow rates

sequence could save, on an average, 3 – 4 seconds per batch, thus one can achieve up to 20 additional batches in a day.

Zeppelin offers a modular design Starter Kit for LDS, so customers can test it without any risk. The kit consists of four modules and is ready for instant use, allowing clients to test the system before making that big investment. Designed according to state-of-the-art technology, the LDS does not leave any questions unanswered. It is simple, easy to install, Plug and Play, pre-configured and suitable for one liquid. The starter kit is a complete pre-arranged system and can be applied to any mixer. Supervision of assembly and training of customer's specialists is included.

Now, starting with the Zeppelin Liquid Dosing System is easier than ever. And in addition to the Starter Kit, Zeppelin's Technology Centre is available to support clients for their success.

New recycling plant for tires in US, Terre Haute

Zeppelin is building a large-scale tire recycling plant for Pyrolyx in the United States. The first sod was turned in September 2017 and despite harsh weather conditions in winter in Terre Haute, USA, work is on schedule. The complete structure of the building is ready and start of production (SOP) will be in the first half of 2019. The plant in the US that Zeppelin builds together with their technology partner, Pyrolyx, is designed to produce approx. 4 million end-of-use tires per year. This will yield approx. 13,000 tons of recovered carbon black (rCB) which will be used for the production of new tires. At present, this tire recycling plant will be the largest of its kind, globally.

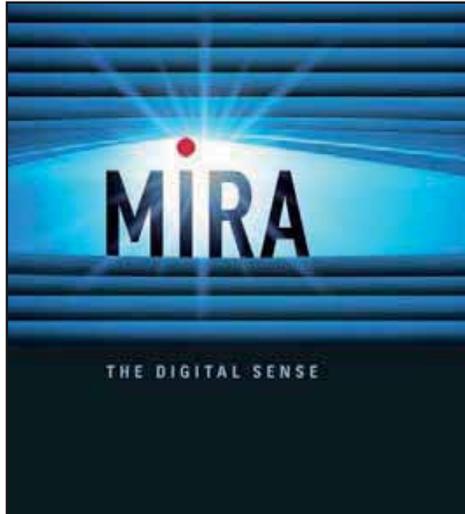
As a perspective for the future, Zeppelin has the vision of a zero-waste tire production facility. We already use sustainable concepts in order to reduce waste in the production of tires and recycle it. The tire recycling plant of the future could include a system so that materials gained from it can be introduced back into the process as valuable raw materials. Furthermore, recyclates could be offered on the market as sought-after products, perhaps as pre-compounds or prepacks.



Zeppelin's large-scale Tire recycling plant Pyrolyx in Terre Haute, USA

It will still take some time until recyclates of this quality are available in the market in major quantities but we think this is the trend for the future.

MiRA: Zeppelin new automation and digitisation platform



Mg. Director Rochus Hofman

MiRA is the future new automation and digitisation platform of Zeppelin Systems. Zeppelin has been working for some time on a new concept motivated by the current requirements in the field of digitisation. Topics such as IoT, Big Data, Machine Learning and others play an important role. The development does not focus on “one” new product, but on several new products that are grouped together under the umbrella term MiRA. An example of one of these products is the Zeppelin PLANT.GATE, another example today is Smart Mix.

In order to further complete the portfolio, Zeppelin also works on the MES (Manufacturing Execution System) level. The aim is to equip entire production lines in the future and thus be able to offer customers an overall solution from the field level via the PLC and Scada level to MES.

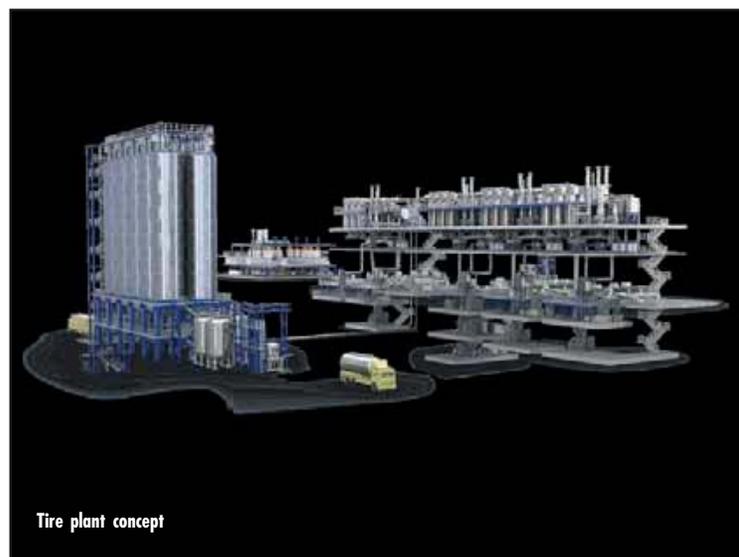
In addition to the existing core business, automation and digitisation are fundamental elements of Zeppelin’s strategy. In this context, PoCs (proof of concepts) in the IoT platform area have already been successfully planned and performed with customers.

The advantages of MiRA at a glance:

- Open platform with standardised modules which map out all the processes in the plant
- Uniform “language” in the documentation and recording, using standardised modules
- Basis for the “artificial intelligence” for plant operation
- Independence from the plant provider
- Freely configurable
- Streamlined architecture
- Lower costs
- Fast and safe introduction to digitalisation of plant operation

- Location-independent analysis and optimisation of plant performance at any time due to remote access to all relevant dates

Zeppelin, as a company which masters all the processes and procedures in complex systems, is also a trend-setter when it comes to automation. For digitalisation is the next milestone on the road to a smart factory – perhaps there will even be a plant which works completely autonomously in the future, constantly optimising itself. Zeppelin has created the basis for this with the automation concept MiRA. The concept paves the way for an easy, safe introduction to digitalisation for the industry and ensures long-term planning reliability due to its open and streamlined architecture.



Tire plant concept

Zeppelin Systems India Pvt. Ltd.

Zeppelin Systems India Pvt. Ltd. is a wholly-owned subsidiary of Zeppelin Systems GmbH, Germany and is active in India since 1989. The operations, which started as a JV and a Sales office, has developed into full-fledged operations with Sales, Engineering, Project management, Installation and after-sales spares & service organisation. Since 2009, the company has established its operations at Vadodara, Gujarat, where it has its Corporate Head Office and Operating offices as well as a Manufacturing unit near Halol. It also has Area Sales Managers located in all regions. In 2017, a JV was formed with Smart Controls India to strengthen complete Mixing room Automation solutions from Zeppelin.

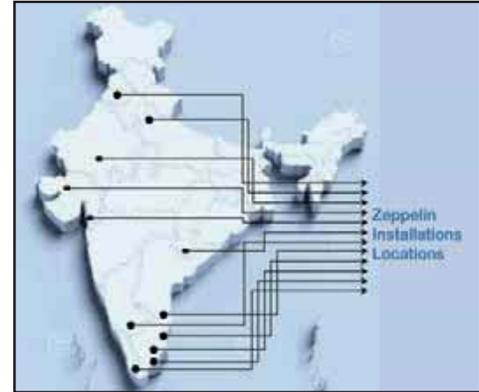
Gaurang Joshipura, Managing Director of Zeppelin Systems India, states, "The constitution of the Company as a wholly-owned subsidiary ensures seamless access to German technology for the Indian Market. Through this, Zeppelin has brought a Superior alternative, with efficiency in terms of Energy & Material consumption and environmentally-safe handling practices for various ingredients of Rubber compounding. With further JV and acquisitions globally, we are working on solutions which will be even more adoptable to Indian Industries."

The Company has a right blend of experienced professionals and a young energetic team of engineers, which provides the company, a strong broad base to serve their clients. The team has worked for joint international projects and received training in Germany. The infrastructure at Vadodara has the same tools and processes as used by Zeppelin's worldwide network. The company has an experienced Site team, including highly-qualified Aluminum welders.

Zeppelin has been spreading the



Gaurang Joshipura, Managing Director of Zeppelin Systems India, Pvt. Ltd



The Company as a wholly-owned subsidiary ensures seamless access to German technology for the Indian market

footprints of the Plant Systems set up by them across industries and geographies, within India.

The Systems and services offered for the Rubber & Tire industry by Zeppelin include the Mixer Feeding Systems, complete with, Unloading and intake, Pneumatic Conveying, Storage, Weighing & Batching, Small Chemical, Liquid dosing, Antitack system, Dust extraction system and completely integrated Controls and Automation. The storage systems include Large Silos as well as Day Bins.

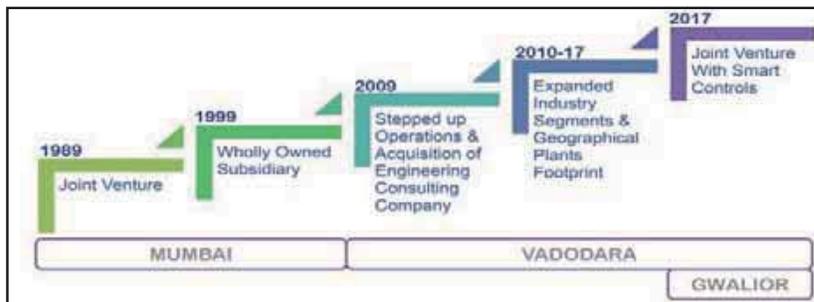
The Projects in India are implemented jointly from Zeppelin, in Germany and in India. The Sales as well as implementation teams at both offices are fully integrated. The project structure has Central Project Manager from Germany, local contact Project Manager from India and engineers

from both the offices. Complete Technology, supply of Key Components and Commissioning are by Germany whereas detailed engineering, all other Material supplies, installation and supervision are done by India. The complete Plant design is carried out in 3D on PDMS software. This 3D model is developed jointly at Germany and in India, which brings a distinctive advantage to the Customer.

With this Project Structure, Zeppelin brings Global technology and close market local support at the same time, to the Indian Rubber & Tire Industry. The Industry has recognised this value proposition and hence Zeppelin systems India has set up Mixer Feeding Systems for their prestigious clients across India. The Systems are supplied for the complete range of Tire Manufacturers from Bicycle / 2 wheelers tiers to Passenger Vehicle tiers to Off-highway vehicle tires, including some being exported. In the Technical Rubber industry, the systems have been supplied for a wide range of plants.

Zeppelin foresees long-term growth potential for the Indian Tire market which will, in turn, induce additional manufacturing capacities. With the current economic policies and environment, it is expected that the tire industry would double its installed capacity in the coming decade.

Zeppelin will bring to Indian customers the latest technologies from their continuous development, some of which are MIRA, Smart Components and Liquid Dosing System, etc. These are bound to create disruptions and change our view on the Mixing Room. Further, Zeppelin plans to bring other value-added service offerings in area of FEED-Engineering, 3D Laser Scanning of existing plants for brownfield expansions and complete integrated Mixing Room solutions.



Smart Controls: Member of Zeppelin Group

Smart Controls India Limited, now a member of Zeppelin Group, was founded in 1999 by Ashutosh Chincholikar, an Electronics Engineer, who always dreamt of creating an innovation-driven company in the space of Industrial Automation.

The journey created many major milestones and some of the finest solutions for many industry verticals like Rubber & Tire, Polyester, Automobile, Metals, Infrastructure and Energy. The most salient part of the solutions were a strong flavour of Information Technology. Almost all Automation solutions were connected to the Business Platforms like ERP.

Realising the strength of Smart Controls, Zeppelin decided to walk along this journey by forming a Joint Venture (JV). It was time to transform the business from Industrial Automation to Digital Solutions for the Manufacturing Industries. Flair of Industry 4.0 and Industrial IoT can be seen in almost every solution or product that is being rolled out now.

Automation contributed largely in the third industrial revolution, thus helping the productivity of the industries to grow. No one realised that with growing industrial outputs, life of people, which means the quality of life, was somewhat ignored. That's where the need of Cyber Physical Systems came in, the industry was witnessing the fourth revolution, nothing but Industry 4.0.

There was a need for the machines to talk to each other and also to the product being manufactured. The



Ashutosh Chincholikar

Smart Controls was one of the pioneer companies in the whole world to bring this strong flavour of digitalisation to the tire industries

need was to view the industry as a whole, not connected through the human beings. Thus, Digitalisation started playing a major role in the industry. The whole idea was to make the industry more visible and certain, without the intervention of people. Once this happens, it is believed that people working with the industry can have a better work-life balance.

Smart Controls was one of the pioneer companies in the whole world to bring this strong flavour of digitalisation to the tire industries. Solutions like Mixing Room, Curing SCADA, Tire Genealogy and MES are some of them.

The strategy ahead

Smart Controls along with Zeppelin now targets to develop Digital Solutions for the Plant Engineering Business in the areas of Rubber & Tire, Plastics, Food and Polyolefin. Along with this, Smart Controls shall continue giving Digitalised Automation Solutions for Polyester Plants.

Roll out of IoT solutions for the entire manufacturing industry has already started with the PoC for Polyester Staple Fibre Line and development of products like Smart Sense Air Quality Index (AQI) measurement system and Plant Gate.

SmartSense AQI (Air Quality Index) measurement is based on IoT technologies. Sensors measure air parameters like Temperature, Humidity, Pressure, So₂, Co₂, CO, Ozone, PM_{2.5} and PM₁₀ to calculate the AQI. The measurement data is directly transferred to the cloud and is then available on Mobile Applications. This product can be installed on the Carbon floor and can be used for real-time measurement of leakages and also the quality of air to which the operators are exposed to. Under extreme conditions, the Carbon transportation process can be stopped automatically through the cloud service. After all, it's the question of the health of the operators.

Plant Gate is yet another product that is likely to be rolled out in 2018. Take the example of Rotary Valve. In the

future, it will be possible to pair the rotary valve with an iPhone or an iPad over Bluetooth and get all data sheets about the product from the cloud. It will also be possible to start an online chat with Zeppelin service department to get support on this product.

