

PLANTS FOR THE RUBBER
AND TIRE INDUSTRY



Rubber plants

ENGINEERING YOUR SUCCESS



Zeppelin Systems, the world leading plant manufacturer for high quality bulk material and liquids handling, has remarkably grown over the past 60 years. We cover the demands of a wide range of industries and supply all plant manufacturing services from one single source, whether basic engineering, in-house production of components, final assembly or comprehensive after sales service. Thanks to our financial strength and our global network we have long been a reliable partner for our customers.

Every Zeppelin plant is developed according to the clients' specific requirements and realized thanks to our customized innovative processes and technologies.

The knowledge we have acquired over more than 60 years of plant manufacturing and the world's largest network for bulk material handling are the key to providing ideal solutions whatever the challenge. After all, your success is our goal.

Zeppelin plant engineering – business fields

Polymer Plants

Plants for plastics producers and forwarders

Plastics Processing & Rubber Plants

Plants for the plastics processing and rubber industry

Reimelt Food Technology

Plants for the food, confectionery and bakery industry

Henschel Mixing Technology

Mixers, extruders and compounders

Liquids Processing

Plants for the beverages industry

Silos & Filters

Silo technology and filters

Components

Diverter valves, rotary feeders, separators ...

After Sales Service

Assembly, maintenance and spare parts

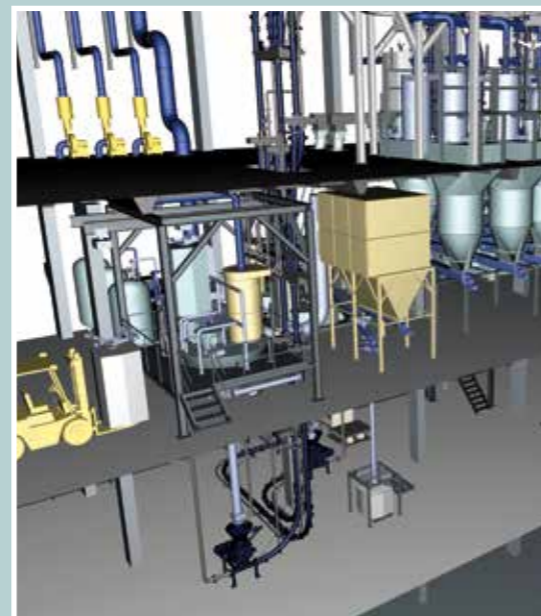
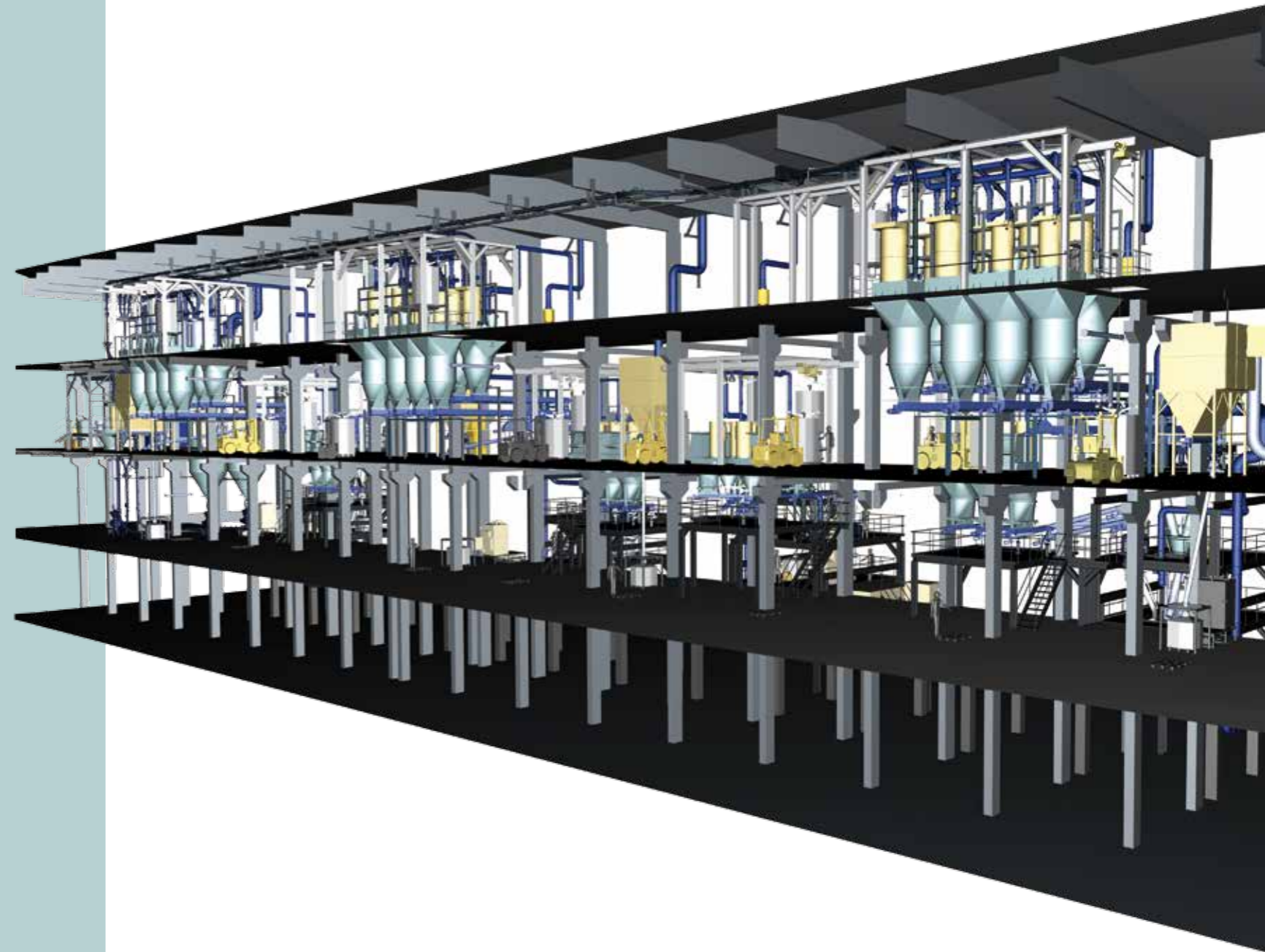
Quality Service

Services in quality management

KNOWLEDGE PAYS OFF

Rubber plants

Zeppelin relies on its own first-class technology for rubber and tire plants. More than 500 systems constructed around the world as well as a list of references with all the major companies from the industry speak for themselves within this sector.

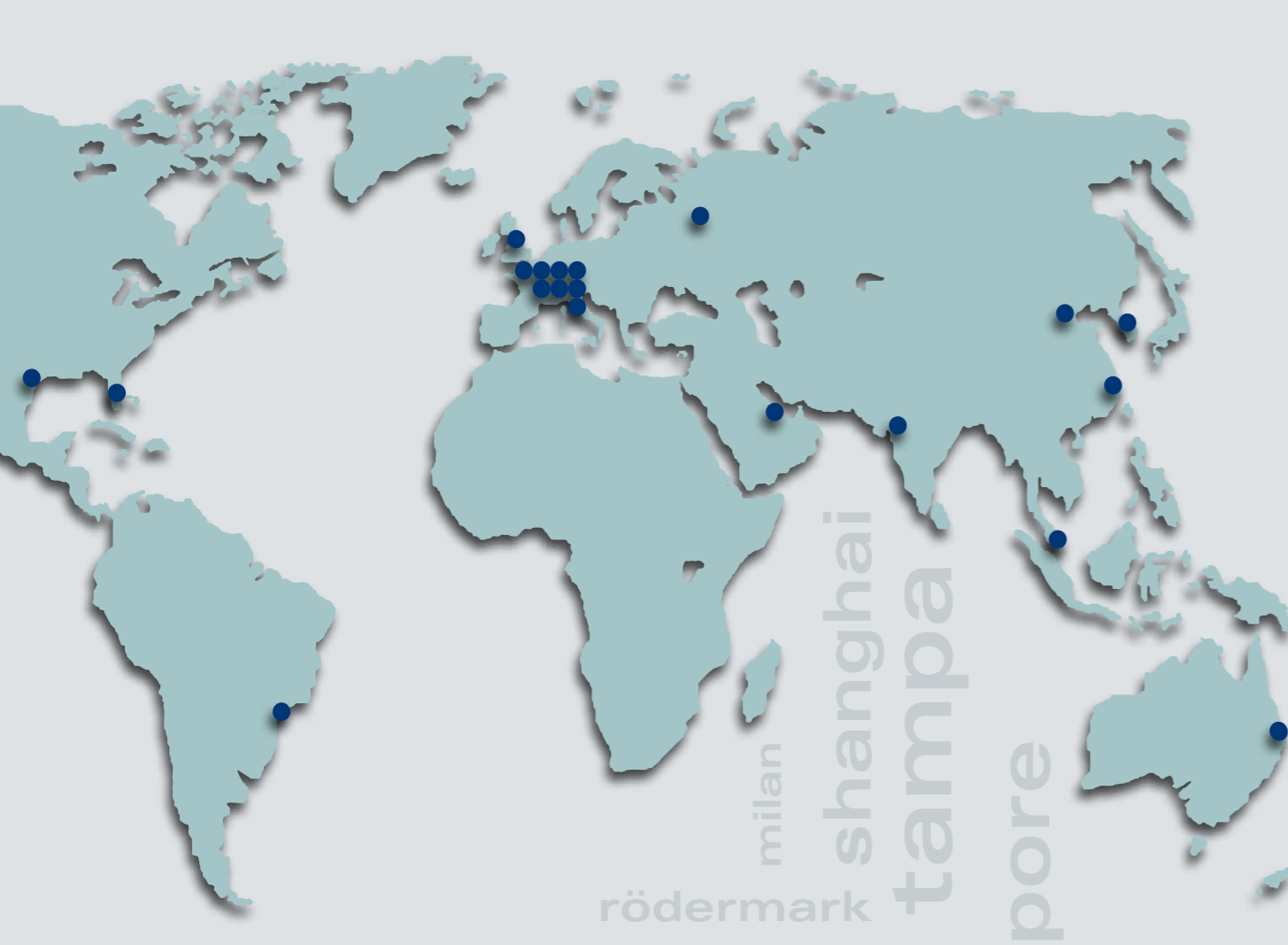


In a modern mixer feed system, raw materials with very different properties have to be incorporated at any time and in variable quantities into the process reliably, quickly, accurately, and preferably in closed systems. They have to comply with the recipe, and be free of dust, loss and contamination. A modern feeding system automatically reacts to changes in conditions and ensures the supply of raw material into the mixing process, e.g. by using intelligent air quantity control for pneumatic conveying.

Zeppelin delivers efficient systems for raw material intake, storage and conveying technologies, weighing and dosing of rubber, carbon black, silica, fillers as well as other additives, minor chemicals and even complete mixer feed systems from a single source.

Technical innovations such as our patented conveying process for a gentle transport of beaded carbon black and silica are trend-setters in the rubber industry and stand for Zeppelin's outstanding reputation worldwide. For such complex systems, we always rely on in-house capabilities for all the key functions – development, production, quality management and installation are performed by our own experienced Zeppelin specialists.

However, a complex system is more than the sum of its individual parts. In order to achieve the highest possible efficiency in the mixing process and therefore in the complete mixer feed system, an intelligent automation solution in line with the core process reliably supplies the necessary raw material into the process without any downtime.



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friedrichshafen

YOUR MARKETS ARE OUR MARKETS

The head office in the home country, the production abroad: this is a common model in our global world. Whatever market you are targeting when constructing or expanding a production facility, we will be there with you. In fact, we are often already there. With over 20 subsidiaries, we can serve the most important markets locally. We know the local conditions and technologies available as well as the legal requirements and adapt these to our engineering concept.

We set standards – worldwide

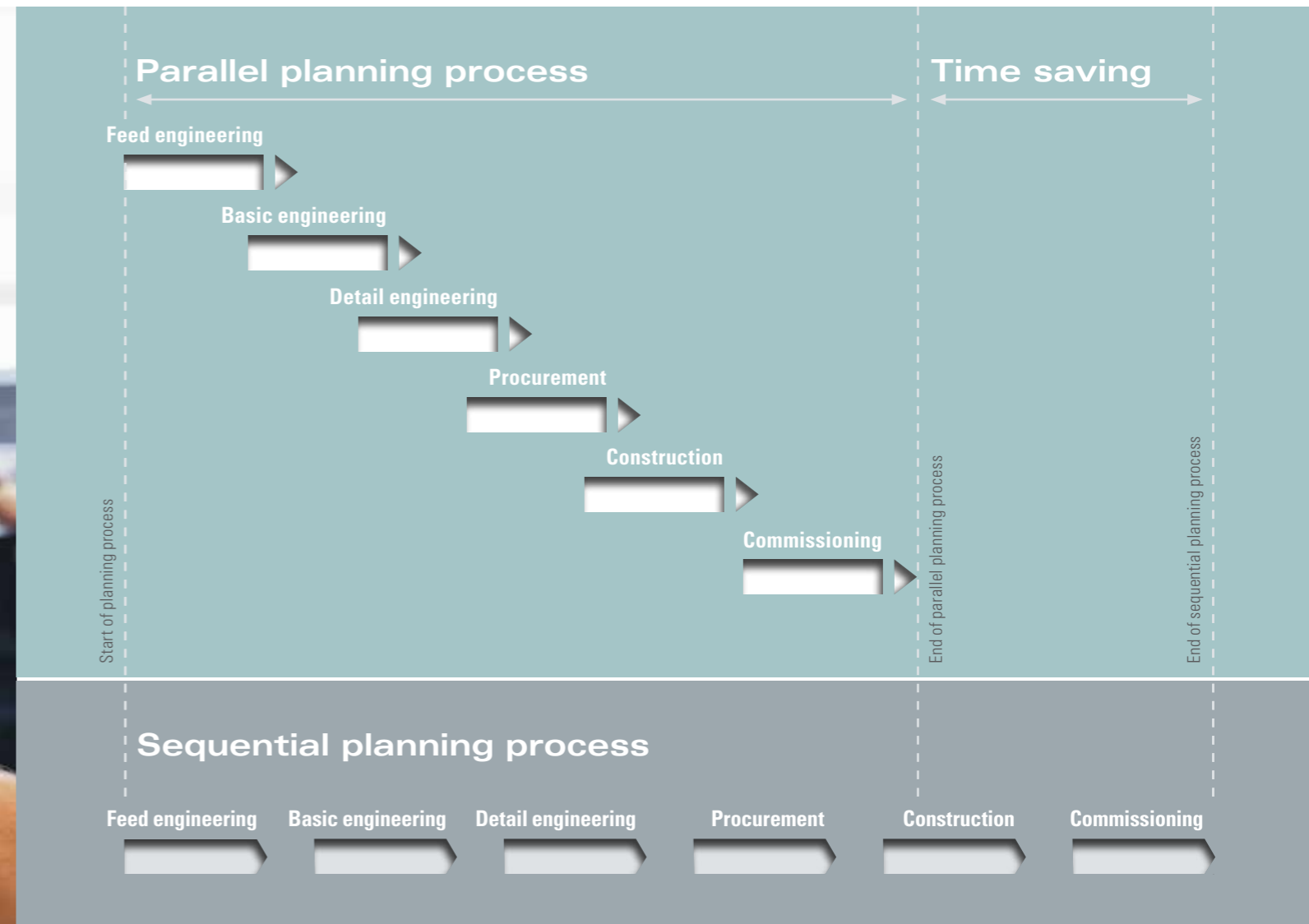
If you have several sites, you benefit from our worldwide uniform concepts in many ways. Your plants are designed and realized according to these concepts – global standards combined with local knowledge are the basis of your success.

You can communicate with us in the local language and always meet us in the right time zone. Invoicing in the local currency is another advantage of working with us. Take advantage of our know-how and experience as the worldwide leading plant manufacturer – a strong partner who really knows your business.

YOU DON'T HAVE TO TAKE MAJOR DECISIONS ALL ON YOUR OWN



Phase model of a project



Optimally planning processes while saving time and money – Zeppelin's Value Engineering ensures first-class project management. We are your competent partner from the development phase on as we provide you with all relevant data for optimal decision making.

We increase the scope of the project right from the start in order to shorten the implementation phase and significantly reduce the number of modifications required. A quicker time to market is just one of the benefits of this process. Your advantage: your plant will be operational faster and you will be earning money sooner with it.

We create the PFDs of the complete plant, determine the energy required and support you in the dimensioning and specification of the main components. The more accurate the costs, volumes, deadlines and workload can be, the more effectively a project can be driven forward so that your investments pay off from the very outset.

You can use the time saved for other important matters such as employee training, developing safety concepts or audit planning. All of this using a 3D model realistically representing your plant even before going operational.

YOU KNOW WHAT YOU WANT – WE KNOW WHAT YOU NEED

The magic word is Front-End Engineering Design (FEED) from Zeppelin – although this has really nothing to do with magic. It actually has to do with the modern planning of your plant and also safeguarding your investment decision. We develop for you the technical specifications of your plant – you get a conclusive concept with all quantities, dimensions, key figures and processes. Your plant can therefore be optimized even before the first construction machine goes to work.

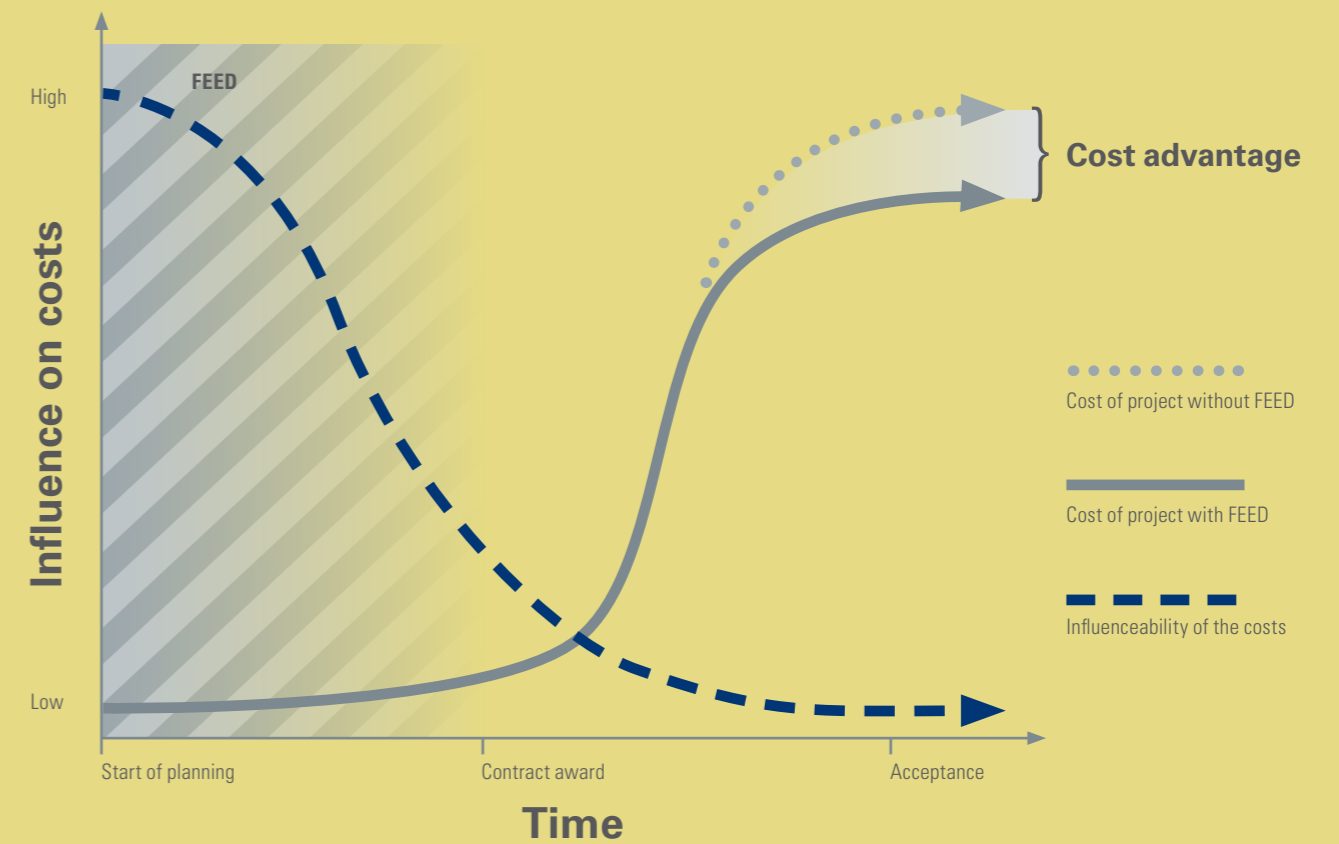
In this phase, the main components are integrated into an overall layout plan. The planning guidelines are compiled, the energy requirement determined and the plant undergoes an optimization phase virtually at the first dry run. You know the recipes – we know how to build the perfect plant.

Your advantages at a glance:

- Revamping and increased efficiency of existing plants
- Complete analysis of mixer feed systems and optimization through the creation of individual concepts
- Production optimization, increase of energy efficiency, installation of recycling systems
- Process optimization thanks to decades of experience and process technology know-how
- Concept studies for brownfield and greenfield sites

Duration of the project

Planning and design phase



Project costs can only be significantly influenced in the initial phase. Once the project is in execution, the costs can simply be controlled.

TAKE A LOOK AT WHAT THE FUTURE HOLDS: WE MODERNIZE IN A SIMPLE CLICK!

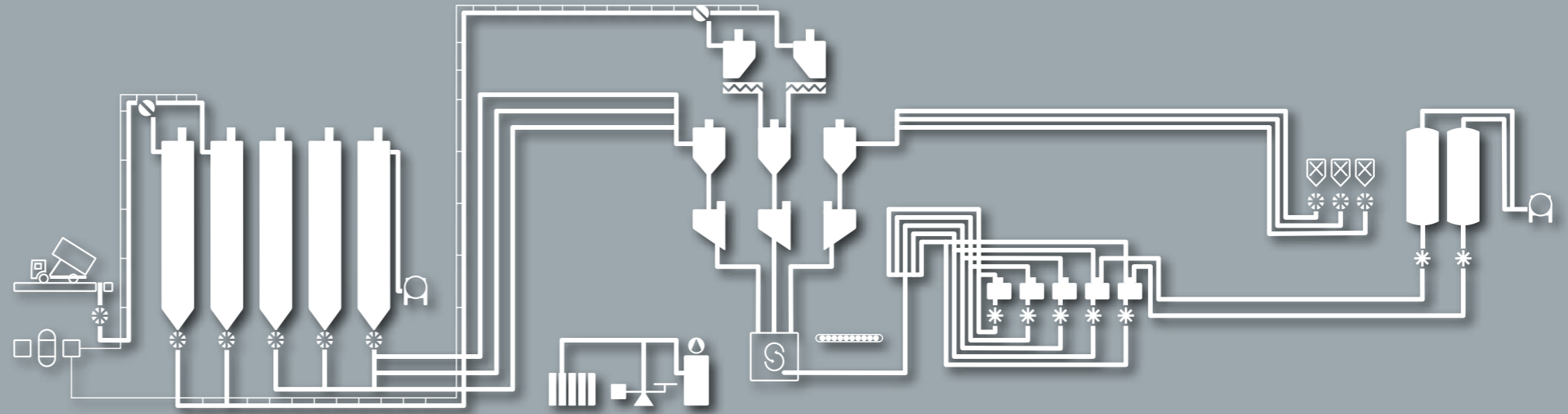
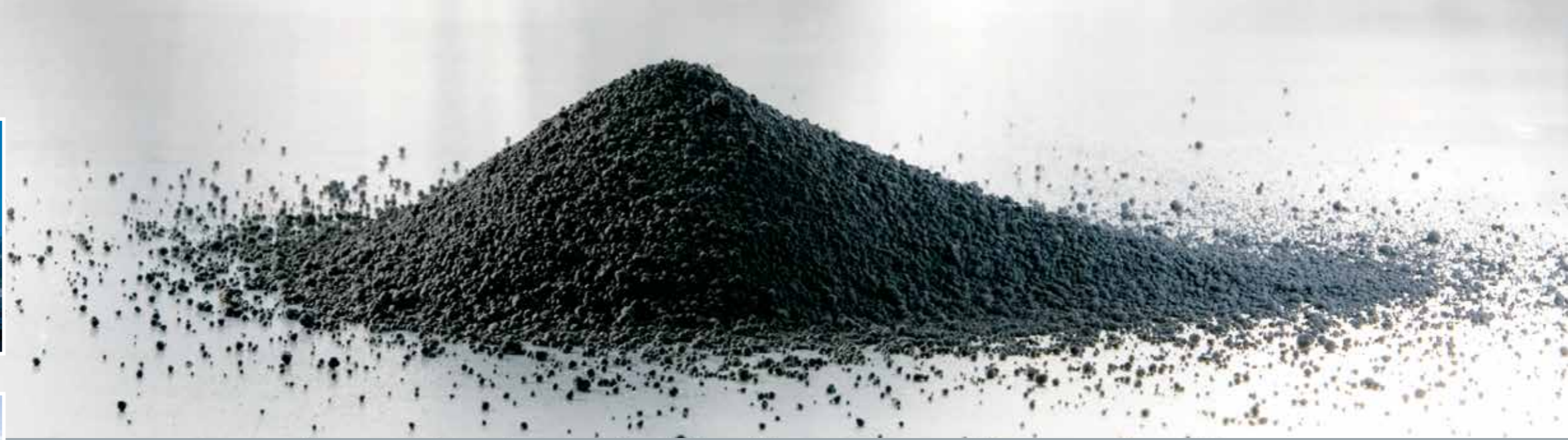


You also benefit from Zeppelin's innovative technology for brown-field projects (modernization or adaptation of existing plants): we create a model of your plant using laser scanning.

This modern tool enables a quick compilation of all relevant plant data, complete surveying and, thanks to the precise data acquisition, quick visualization of the plant down to the smallest detail – with an accuracy of ± 2 mm! Laborious, inaccurate manual measurements are now a thing of the past.

The database for an optimal expansion of your plant is therefore virtually one click away. Plant optimizations with aspects such as easy access for maintenance work and service or optimal use of space taken into account can be implemented quickly and reliably by using 3D models of the steel structure, all components and pipework.

You can therefore rely on us to retrofit your plant based on accurate planning and with minimal production interruptions.



PROCESS COMPETENCE IS AT THE HEART OF PLANT CONSTRUCTION

A chef who only uses three seasonings will find it difficult to produce lots of different top quality dishes. A plant builder who can only fall back on standard process technology will find it difficult to respond well to individual customer requirements. We have a wide range of innovative processes and process technologies at our disposal, which we adapt and apply to our customers' needs.

Our activity in different sectors is an advantage here. We have in-depth knowledge of the chemical industry, the food and liquids sectors, we supply systems for the rubber and tire industry, we are experts in mixing and compounding and much more. This enables

us to transfer technologies, which have long been used in one sector, to other sectors in which they are considered innovations.

Thanks to the experience we've gained over the years, we are also familiar with all the process steps used in our customers' raw materials and products processes and are optimally positioned as 'chefs' to handle their 'recipes'. We also develop completely new procedures for processing and manufacturing sensitive raw materials, both for and with our customers. To help us to do this, we have the world's largest network of technology centers for bulk material at our disposal.



EVERYTHING FROM ONE SINGLE SOURCE. AND ALL FULLY AUTOMATIC!

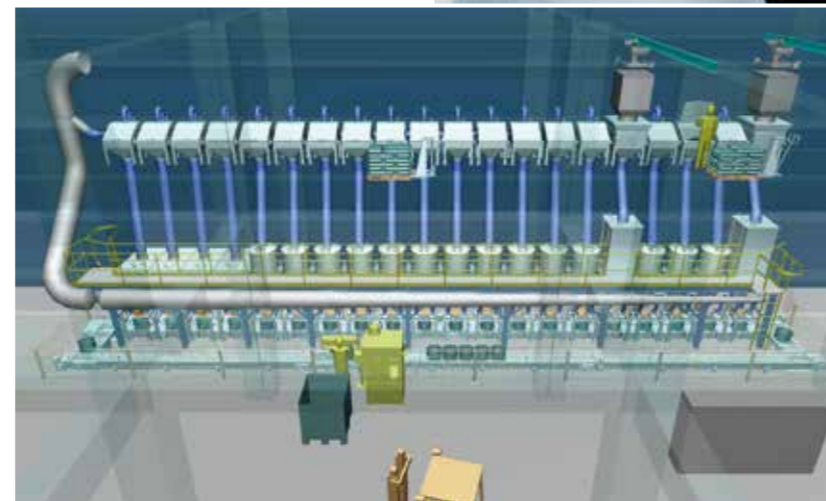
Automation technology plays an important role in plant operation. All processes have to be perfectly matched and all functions have to be executed fully automatically. We bring together what belongs together: optimal plant layout, Zeppelin quality first-class components, process technology know-how and innovative automation technology – everything from one single source.

Modern control systems, such as those from Zeppelin, are able to meet the highest requirements, while open architecture ensures that the plant can be easily adapted to future challenges.

To do so, we are guided by your recipes and requirements right from the start. We respond to different types of containers and material qualities in the delivery of raw materials with flexible and reliable raw material management.

All kinds of liquids and solids are transported smoothly and seamlessly using innovative conveying methods. Dosing and weighing are carried out accurately and without contamination.

The materials are fed into the mixers without any material loss. We have also developed innovative manual and automatic solutions for minor chemical components.



Manual weighing is a thing of the past: at Zeppelin, minor chemical components are automatically weighed. The individual components are dosed directly into the bag without needing any other intermediate vessel. This means: highest precision in the recipe, no impurities and no human error. Naturally, the bags can be printed on directly for later processing.

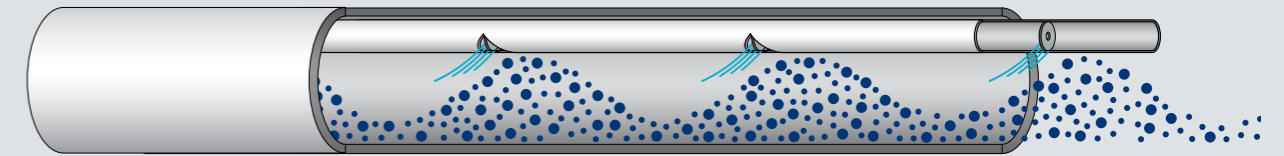


PRODUCT-GENTLE CONVEYING

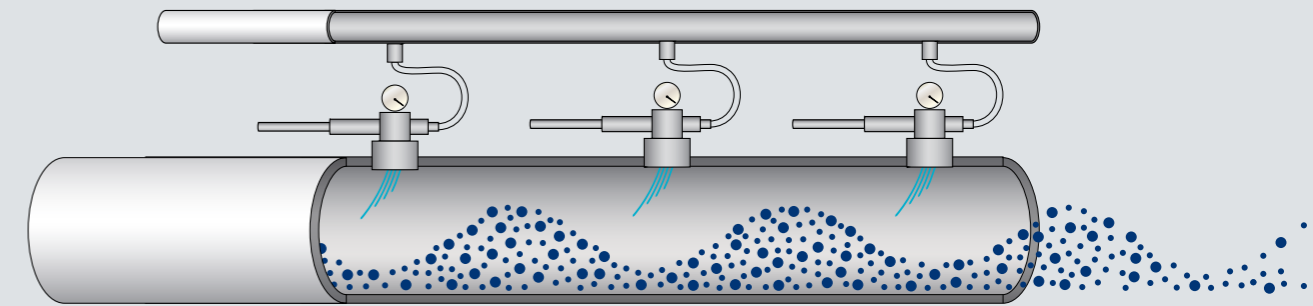


For the gentle conveying of sensitive bulk material such as carbon black and silica, the lowest possible conveying velocity is essential. To ensure a dust-free environment in and around the plant, the powdery raw material has to be conveyed pneumatically in closed systems.

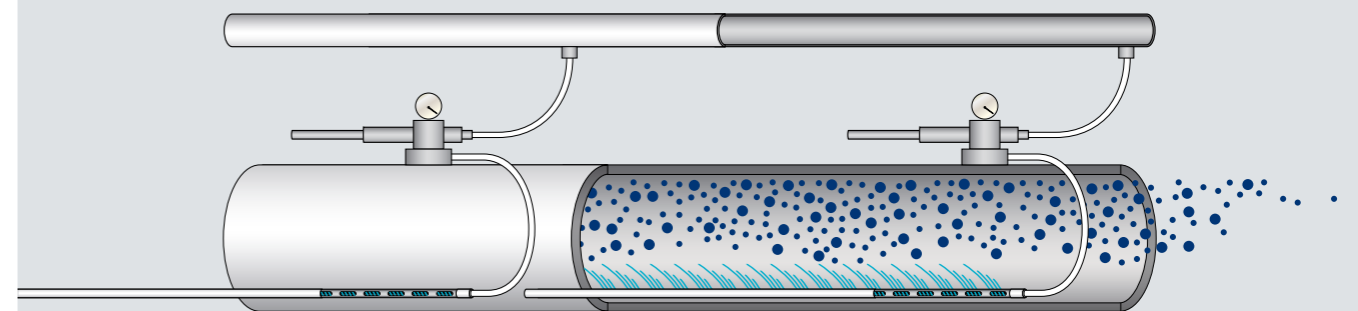
Zeppelin uses its patented by-pass conveying systems (Overflow) where a controlled quantity of secondary air is injected into the pipe at defined intervals, preventing material plugs from blocking the line. An intelligent air management system is used to regulate air supply. This optimizes the system to suit the flow characteristics of the carbon black and silica grades for a gentle and safe conveying. Fine particle quantities are therefore kept at a minimum to enable shorter mixing times.



Intraflow: internal bypass system in aluminium or stainless steel pipes for conveying mineral bulk materials such as PTA/CTA, etc.



Overflow: PE or stainless steel pipes; air injected at points every 0.5 to 1.0 m distance. For sensitive powdery products such as carbon black, etc.

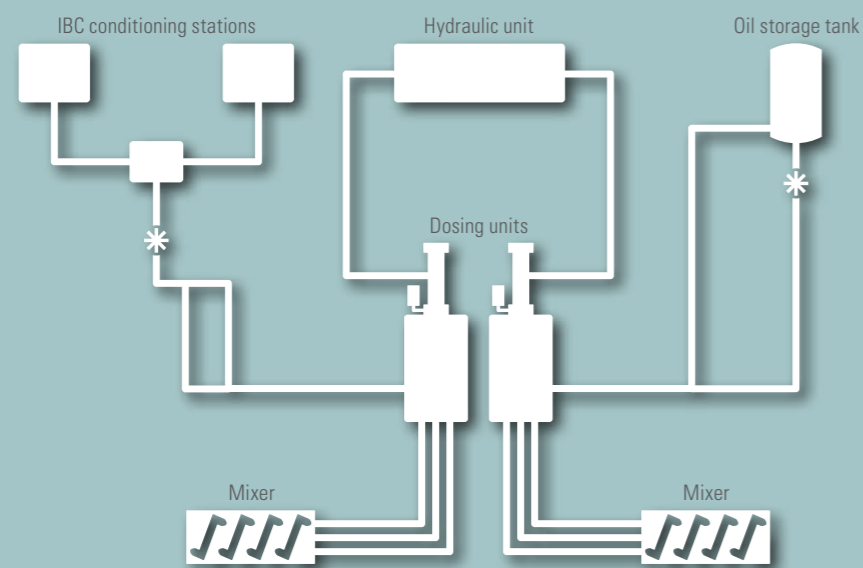


Airfloat: stainless steel pipes; air injection through slots to avoid dead spots in the conveying of critical products such as silica.

WE MASTER COMPLEX MIXING PROCESSES WITH UPMOST DOSING ACCURACY

We offer custom-made turn-key systems for liquid additives. The core component of a liquid dosing system is our in-house

developed liquid scale for the preparation of plasticizers, oils, melted waxes, stearic acid and other liquid additives.



You hold all the aces with Zeppelin's newly developed liquid dosing system: quick assembly, versatile, customized to your requirements, safe operation and highest degree of cleanliness in daily use.

The dosing cylinder is the main component of the new liquid dosing system for use primarily in the field of rubber production (master and final batch). This specially designed volumetric cylinder enables a very precise, flexible and fast dosing of several oils and silanes for complex mixing processes with high dosing

accuracy requirements. The product temperature can be set up to 80°C.

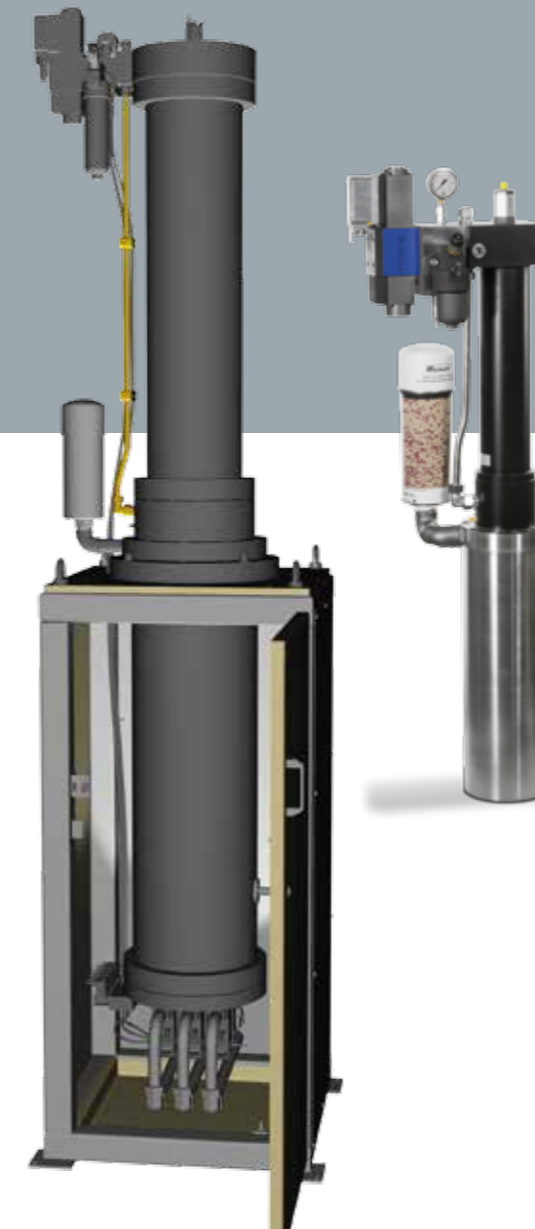
The liquids to be dosed are stored in tanks or intermediate bulk containers where they will be fed into the dosing cylinder from a ring main pipe with feed pump. From the cylinder, the liquids are injected into the mixer through one or more injection pipes and a special injection valve equipped with a maximum of 6 connections. The liquids are dosed quickly and accurately by volumetric dosing.

Your advantages

- Product variety
Dosing of highly viscous liquids up to 6500 mm²/s
- Automation
Fully automated injection of all liquids into one mixer
- Precision
Highly accurate dosing ensured by intelligent error compensation

Your benefits

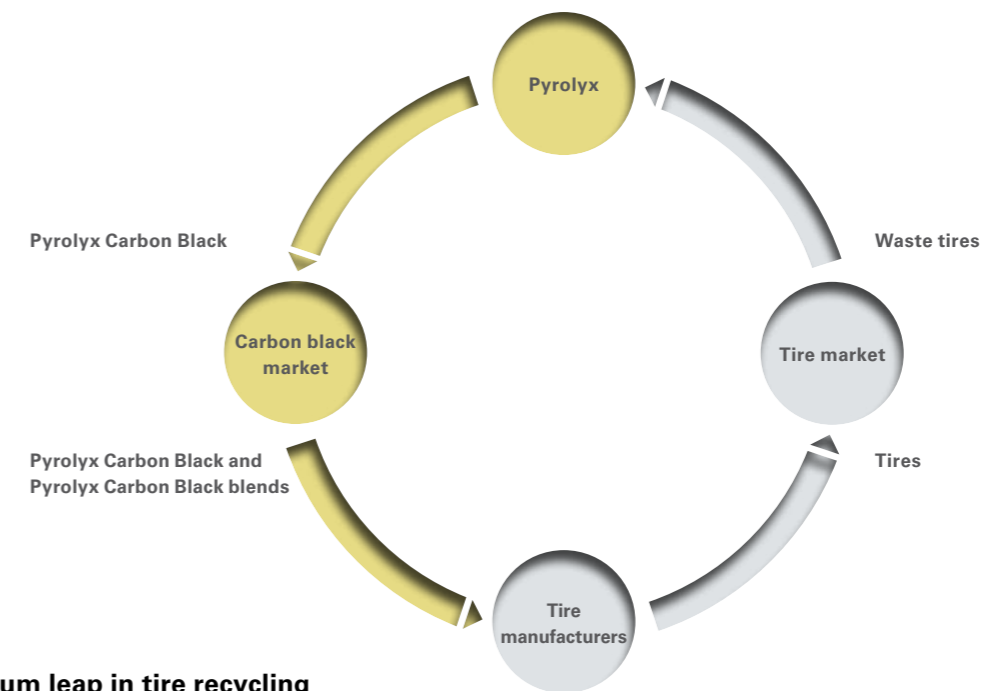
- Modularity
Any number of dosing units can be combined
- Ease of maintenance
Compact design and easy access for maintenance
- Safety
Handling of hazardous liquids in a closed system
- Cleanliness
No penetration of dirt or dust into the closed system
- Quality
Valve design free of dead space prevents cross contamination
- Batch tracking
Through fully automated controls and recipe management
- Operating costs
Reduced by applying bypass technology



RECYCLING – ENVIRONMENTALLY BENEFICIAL Economically essential

Whether it is the reuse of waste, the recycling of oil at the kneader, the recirculation of filter dust into the production process or the use of the generated energy to operate the plant: innovative technologies ensure reduced production costs and responsible management of resources.

Production waste is reduced to a minimum thanks to high recipe accuracy and low scrap rate. Unavoidable production waste is immediately redistributed at the right step into the production process – e.g. recycling of rubber, integrated oil recycling or recirculation of filter dust. These innovative concepts and the plant's high energy-efficiency and availability will reduce your costs and increase the performance of your plant.

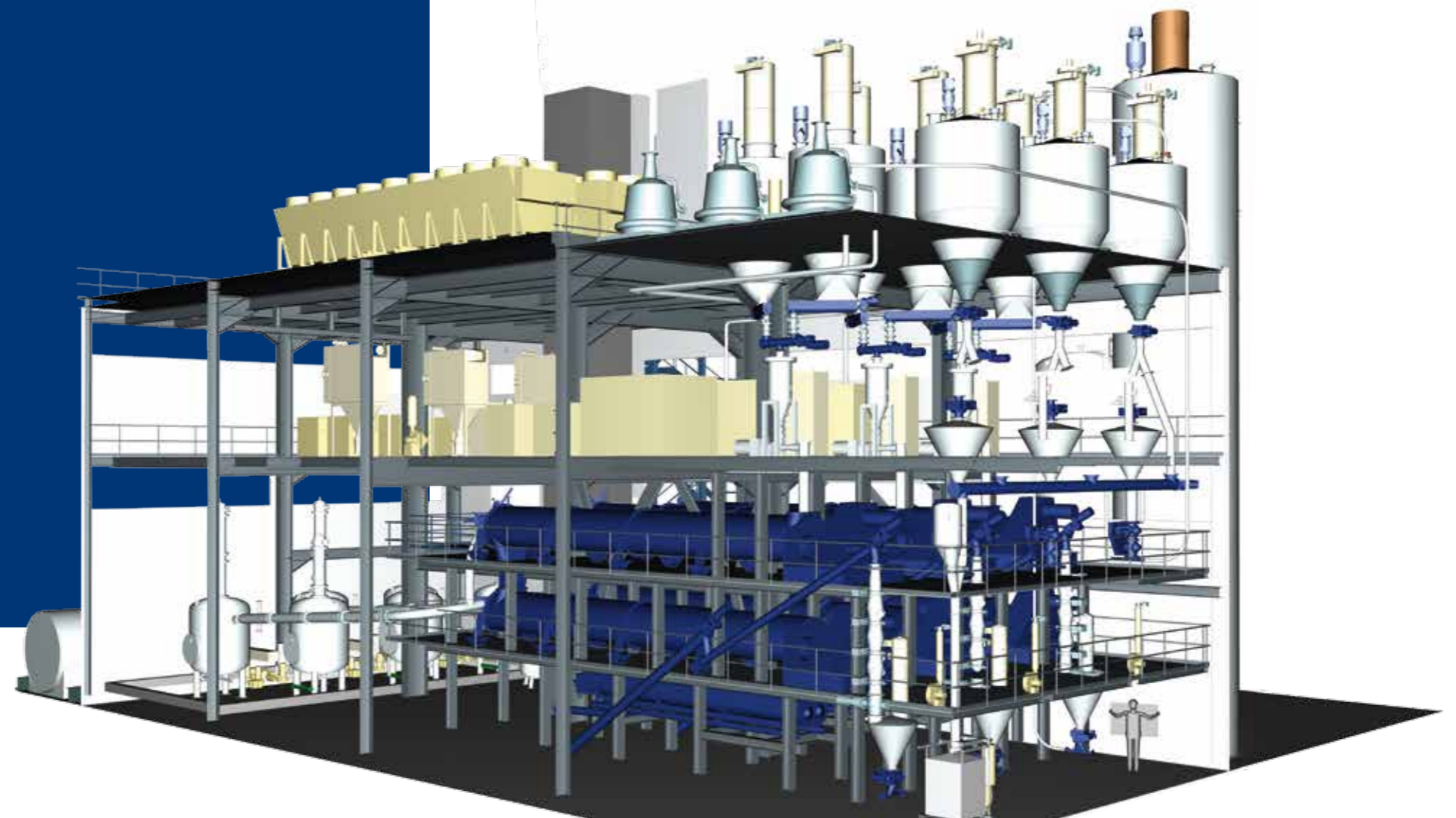


A quantum leap in tire recycling

Everyday, hundreds of thousands of old tires worldwide are thrown away. The rubber pellets obtained from these tires can be reintegrated into the loop. Zeppelin is the world leading manufacturer of tire recycling plants. Rubber waste processed into rubber flour can be recycled and reused right away in the production of tires by using an "activation" process.

Together with its project partner Pyrolyx AG, Zeppelin developed and implemented a system for the production of high-quality carbon black retrieved from old tires.

This process breaks organic compounds in vulcanized rubber pellets at temperatures between 350°C and 700°C and under oxygen exclusion. In addition to oil and pure gasses, which can be used for generating energy and heat, the world's first CO₂-neutral carbon black remains. It meets the highest quality standards – approved by reputed and independent laboratories and institutes.





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