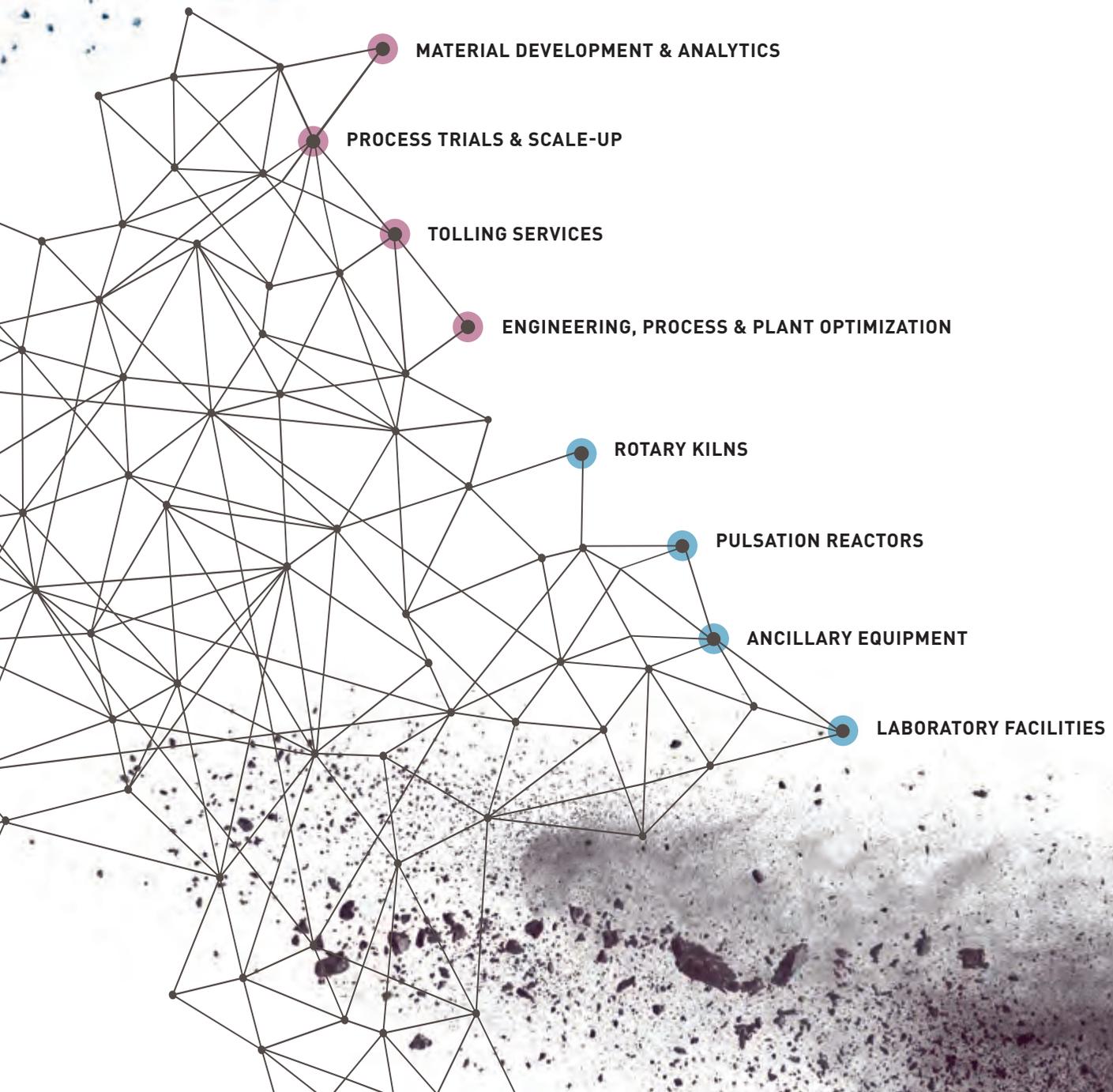


YOUR MATERIAL IN GOOD HANDS



IBU-tec advanced materials AG
**HAND IN HAND WITH OUR CUSTOMERS
FOR A SUSTAINABLE FUTURE**

02-14

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HAND IN HAND WITH OUR CUSTOMERS FOR A SUSTAINABLE FUTURE



Everything in the world is growing: population, the economy, prosperity and needs. Everything that is, with the exception of our resources. Therefore, effective resource management is key to securing a healthy ecosystem for our children and future generations.

The question of utmost importance is, "How can we secure life's needs and preserve our natural resources, while minimizing environmental impacts?" By working closely with our customers and utilizing our vast knowledge of thermal process engineering, we are uncovering answers. At IBU-tec, we are working

to create new materials, to improve material properties and to develop efficient, resource-saving processes for improving lives today without jeopardizing tomorrow.

Owing to the dedicated commitment of our experienced and highly skilled staff, in combination with our extensive technology park, we are thoroughly prepared to meet the high expectations our customers set. We help to make ideas a reality, in an environment of assured discretion.

Through this brochure we would like to invite you to get to know IBU-tec, to learn what issues motivate us and our customers. We invite you to discover our service portfolio as well as our state-of-the-art industrial facilities and equipment, which offer highly flexible technologies for customer projects.

Let us help you create a future of economic success through efficient work and technical progress, while reconciling the needs of people and the protection of the environment.

Sincerely,
Ulrich Weitz
CEO

How can we realize breathtaking growth without running out of breath?

Clean air is essential for a healthy life. Yet with a rapidly growing global population, demanding increasing levels of prosperity, the world is witnessing an increase in fossil fuel consumption and experiencing the subsequent problems associated with air pollution. Improved catalysts provide a partial solution. Through their development and use for cleaning exhaust gases, harmful emissions are greatly reduced. When applied in chemical processes, catalysts increase the efficiency of the reactions and at their best, provide higher yields, generate lower emissions and reduce raw material consumption all at the same time. As an IBU-tec customer, you have access to state-of-the-art technology, such as

rotary kilns for inert conditions and unique pulsation reactors for the development and production of custom catalytic supports and highly reactive catalytic materials. The result: innovative solutions for the customer and better air quality for everyone. For the development and production of catalysts, we offer our customers a full portfolio of services and cutting edge technologies. We have a full range of rotary kilns, including some that can operate with inert atmospheres. Our one of a kind pulsation reactors are used to produce highly active catalytic materials by means of thermal shock treatment. The end result: innovative solutions for our customers and better air for all of us.

How do we move from today to tomorrow?



In the future, when we have to get from point A to point B, the method we use must be environmentally friendly and resource-efficient, yet comfortable and convenient. Renewable energy sources are already here, all that is needed now for the transition from fossil fuels to cleaner tech is efficient electric storage, which is practical and safe to use, sustainably produced and affordable. That makes Batteries the key to electro-mobility and to an environmentally friendly energy revolution.

At the core of every new generation of batteries are innovative materials with special characteristics. For example, in modern

lithium-iron-phosphate batteries nontoxic iron phosphate replaces the conventionally used hazardous nickel and cobalt oxides, while also ensuring greater safety, longer lifespan and superior protection of the environment. With our expertise in thermal processing and a wide range of rotary kilns, IBU-tec works closely with customers to develop and scale up optimized production processes specifically designed for this type of material.

As part of our process development service; IBU-tec can carry out pilot production runs to minimize time to market for its customers' products

How can we use rare earth resources multiple times?

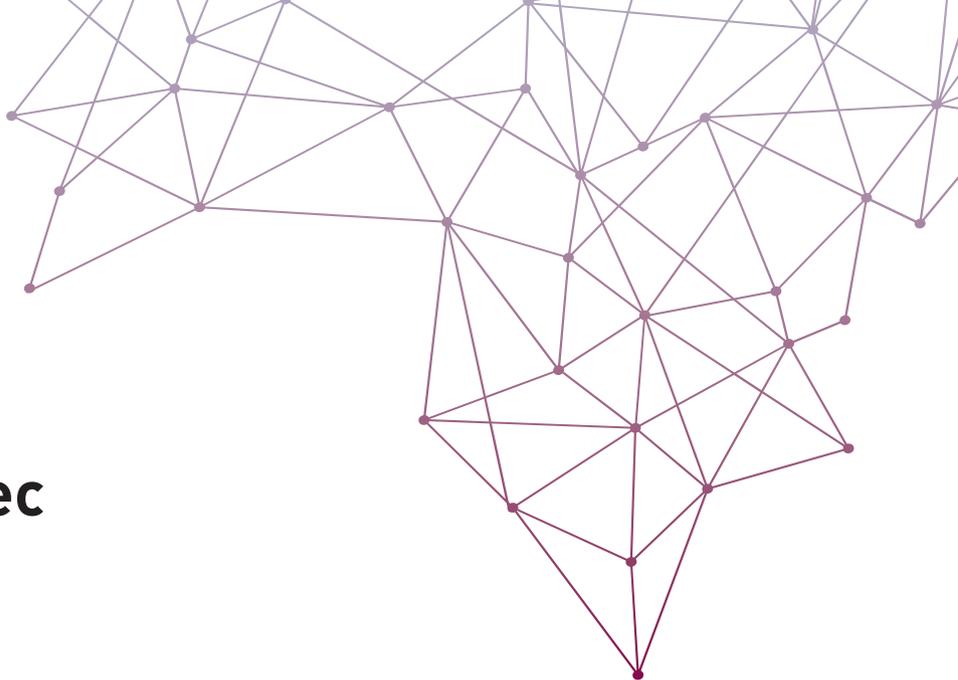
Rare earth resources, modern life is inconceivable without them. Whether Smartphone, computer or flat screen, virtually all IT products contain rare earth. From wind turbines, camera lenses and hybrid cars, from fuel cell electrodes to magnesium alloys in airplane construction, rare earth elements are everywhere. Some refer to rare earths as the oil of the future. However, rare earths are often difficult to access and their mining is costly and environmentally problematic.

So how can we use these sought-after and expensive substances more efficiently? Working together with our customers, IBUtec has developed processes that allow us to recover and recycle rare earth elements. This gives customers clear advantages; it secures stable, predictable material costs regardless of current commodity prices and significantly reduces their dependence on new raw material imports. Of course, more efficient use of rare earth elements also saves natural resources and helps to protect the environment.

How do we build for the future without obstructing it?

We all need our own four walls. With population growth and rising global prosperity, the ever increasing need for buildings of every sort and subsequent demand for construction materials to build them is increasing. Chief among those materials is cement. World-wide, four billion metric tons of it is produced every year. Cement production consumes enormous amounts of energy. Aside from the massive energy use, the burning of the lime in the production process releases massive amounts of CO₂; this single process accounts for about five percent of annual global CO₂ emissions, one of the primary greenhouse gases.

At IBU-tec, we are working with our customers and research institutes to develop new material mixtures for cement that help make the production process more environmentally friendly. For example, limestone is increasingly being replaced by ash and slag – waste products of steel production and coal-fired electricity generation. By using less limestone, we can not only help to reduce the CO₂ emissions but also to use resources more efficiently



The World of IBU-tec

As an international full-service provider in the field of thermal process engineering, we help our clients improve their materials, conserve energy and to increase resource efficiency from the production process to the final product. Whenever predominantly inorganic materials have to be treated thermally, IBU-tec is a reliable, trusted partner.

Our Services

MATERIAL DEVELOPMENT & ANALYTICS



PROCESS TRIALS & SCALE-UP

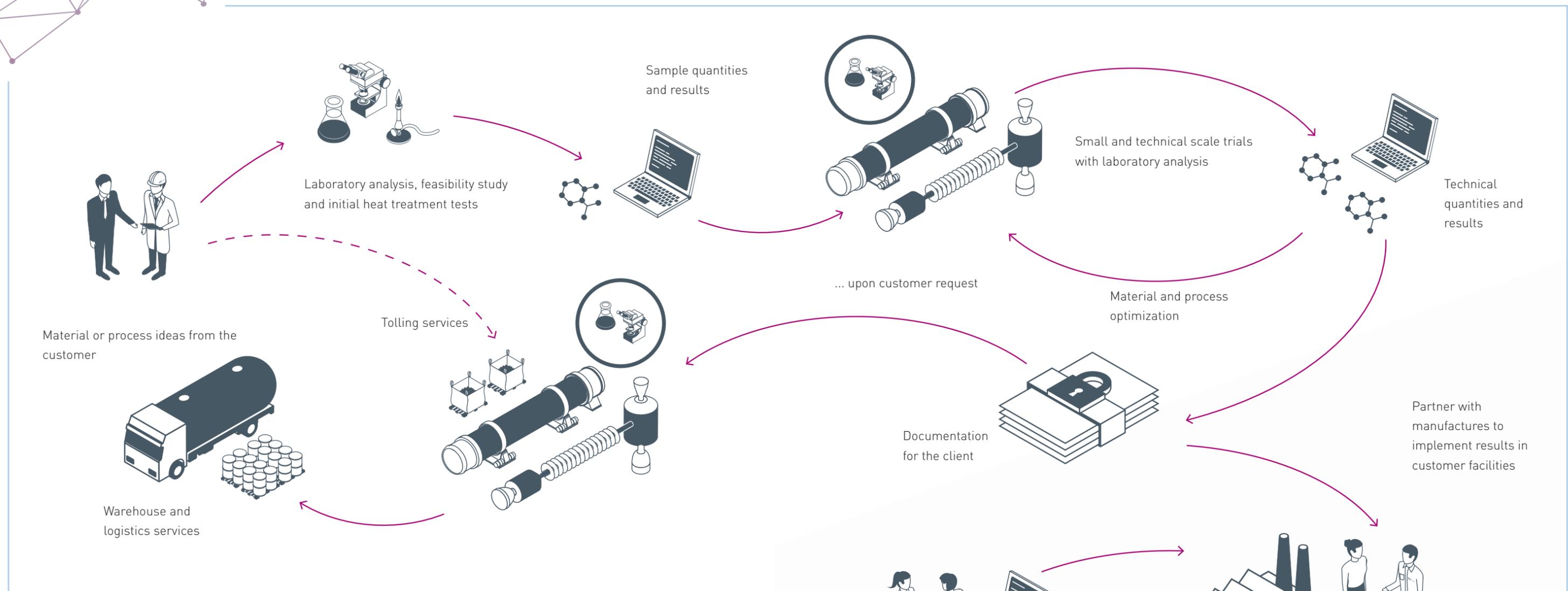


ENGINEERING, PROCESS & PLANT OPTIMIZATION



TOLLING SERVICES





Our Technology Park



16 Rotary Kilns

- ▶ 4 Direct heated kilns
- ▶ 12 Indirect heated kilns



8 Pulsation Reactors

- ▶ 3 Test reactors
- ▶ 5 Production reactors



Laboratory for Development & Quality Assurance

- ▶ Elemental analyses
- ▶ Pyroprocessing systems
- ▶ Laser granulometry
- ▶ XRD
- ▶ SSA (BET)
- ▶ ICP-OES
- ▶ AAS
- ▶ Wet laboratory
- ▶ Milling facilities



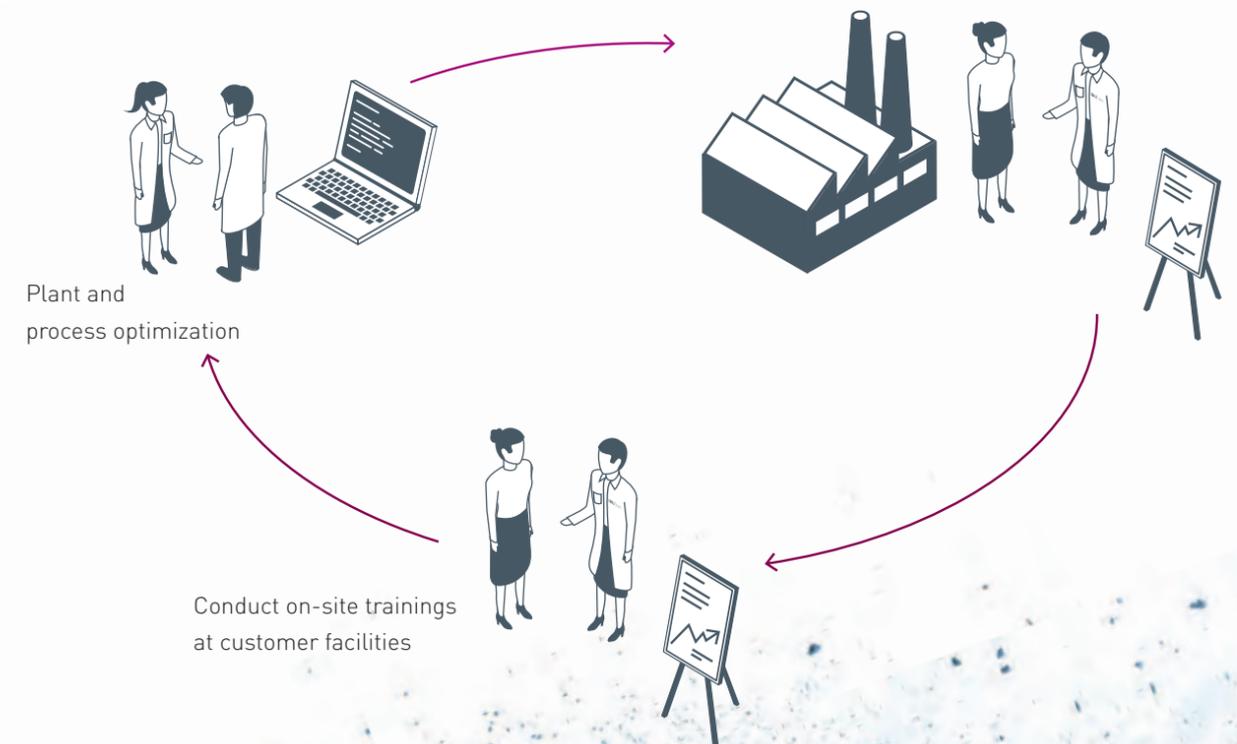
Peripheral Equipment

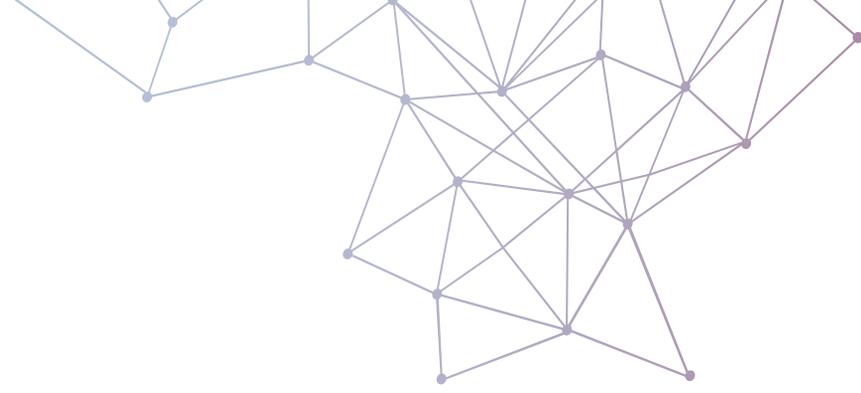
- ▶ Conveying & dosing
- ▶ Mixing & granulating
- ▶ Sorting & screening
- ▶ Exhaust gas treatment systems



Maintenance & Workshop

- ▶ Customization
- ▶ Maintenance
- ▶ Repairs





Examples of Materials and Typical Applications

IBU-tec works with a wide range of materials for their customers. Over the years, the company has garnered vast expertise in processes to refine and produce those materials, which are needed for many different applications.



Typical Applications

- ▶ Catalysts and catalyst carriers
- ▶ Technical ceramics
- ▶ Adsorbents
- ▶ Abrasives and polishing agents
- ▶ Proppants
- ▶ Battery materials
- ▶ Pigments
- ▶ Additives and fillers
- ▶ Cement and other building materials

Material Groups

| Silicates | Carbonates and Nitrates | Oxides, Hydroxides and Mixed Oxides | Other Materials |
|---|---|--|--|
| <ul style="list-style-type: none">▶ Aluminum silicate:<ul style="list-style-type: none">-Kaolin-Mullite▶ Calcium silicate▶ Clays▶ Mica▶ Zeolites | <ul style="list-style-type: none">▶ Calcium carbonate▶ Lithium carbonate▶ Dolomite▶ Metal nitrates (incl. precious metals) | <ul style="list-style-type: none">▶ Aluminum oxide<ul style="list-style-type: none">-Gibbsite-Boehmite▶ Titanium oxide▶ Zirconium oxide▶ Copper oxide▶ Iron oxide▶ Silica▶ Rare earth oxides▶ Spinel | <ul style="list-style-type: none">▶ Phosphates▶ Sulphates▶ Carbon▶ etc. |

Our Staff – expertise for our customers

What makes us special? Our employees possess immense process knowledge and years of experience working with equipment for thermal treatments. At IBU-tec, we connect customer ideas and industry know-how to make your innovations a reality. We have skilled and committed experts on board, ready to transform your ideas into success. With our team, we provide tailored advice and efficiently develop customized client solutions. We believe that motivation is the key to good performance, as such we are committed to offering excellent working conditions and to promoting individual development.



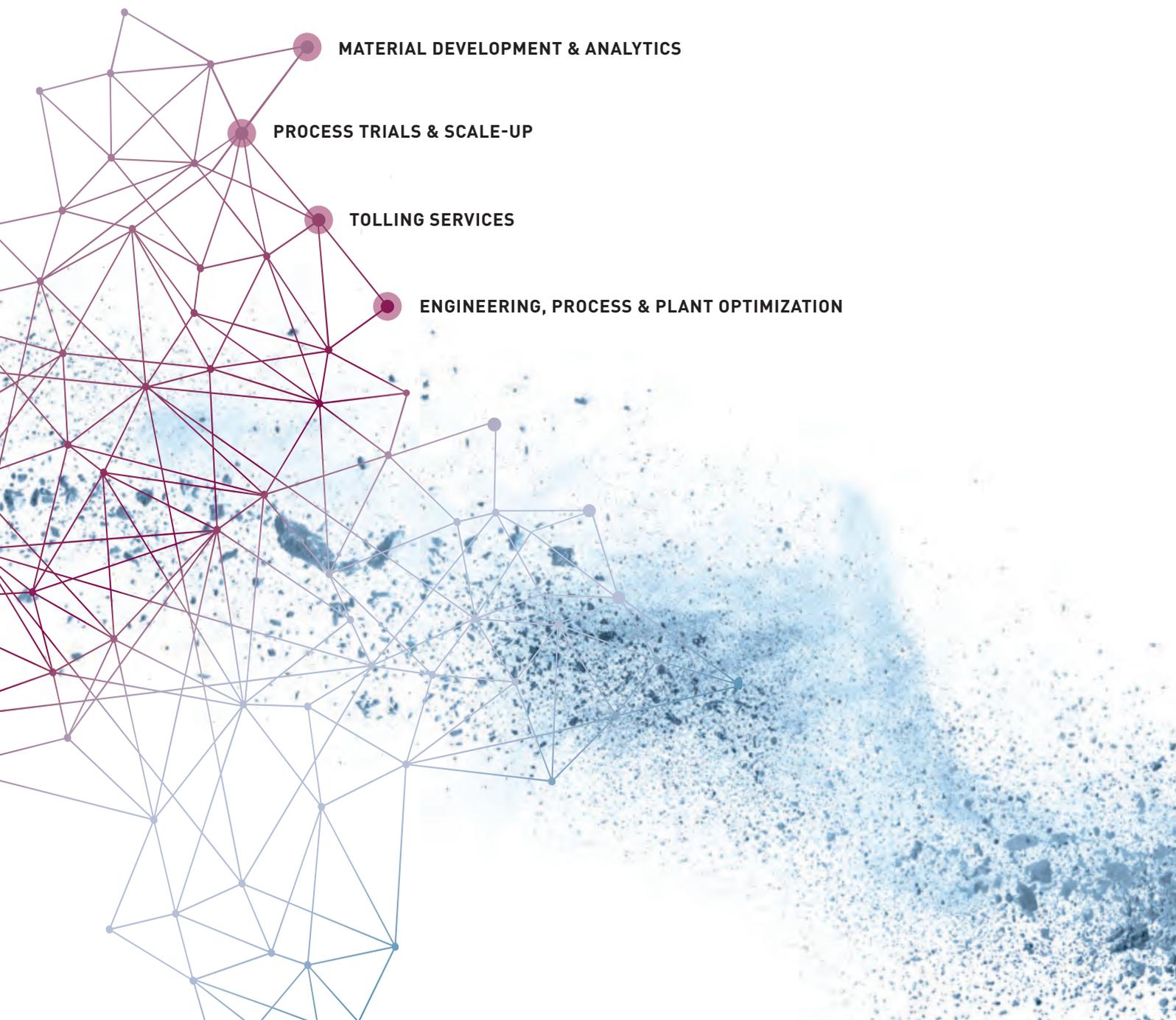
Our Historie

Thermal processing began at our location in Weimar more than a century ago. What started as a masonry, is today a global company with development and manufacturing capabilities for the production, processing and refinement of powders and granulates.





FULL SERVICE FOR THERMAL PROCESSING



MATERIAL DEVELOPMENT & ANALYTICS

PROCESS TRIALS & SCALE-UP

TOLLING SERVICES

ENGINEERING, PROCESS & PLANT OPTIMIZATION

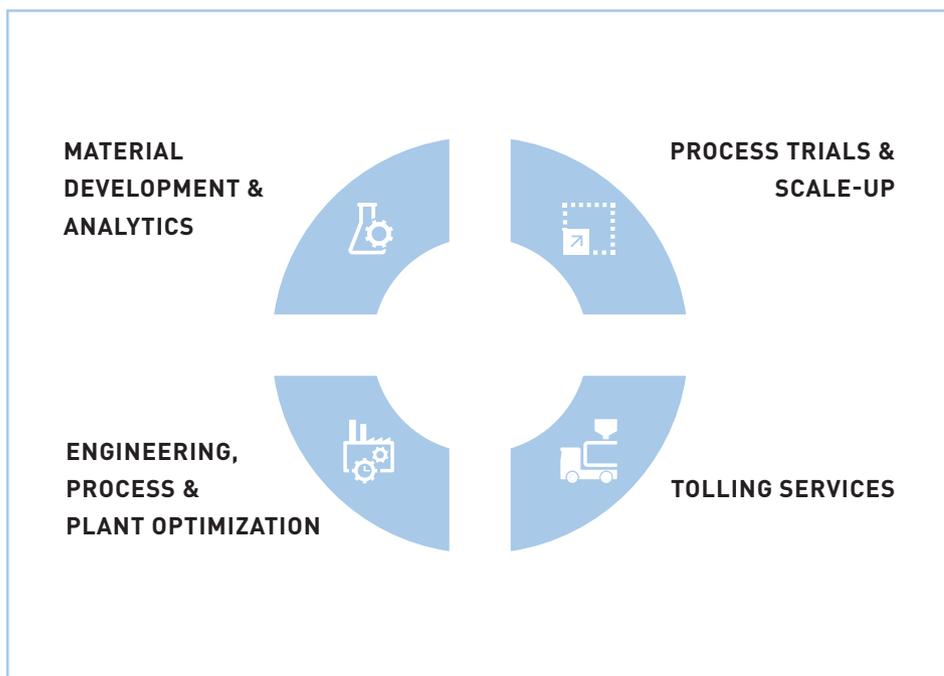


Your Materials – our process expertise

You can shape the future with new materials, innovative processes and improved material properties that make new products and applications possible. As a client, you provide the inspiration; then working together with you, our experts will develop an innovative solution. You can trust our team of experienced professionals with your every project, and your access to our technology park grants you an extensive range of options, including highly flexible thermal systems with modular peripherals as well as a well-equipped, state of the art laboratory.

The expertise of our staff is invaluable. Every day, they will use their experience and process know-how to help bring your next innovation to light fruition. The individual support they provide will exceed your expectations, from initial development to market readiness. Whether piloting, commercial scale-up and/or optimization, we can offer you improvements along the entire life cycle of your material.

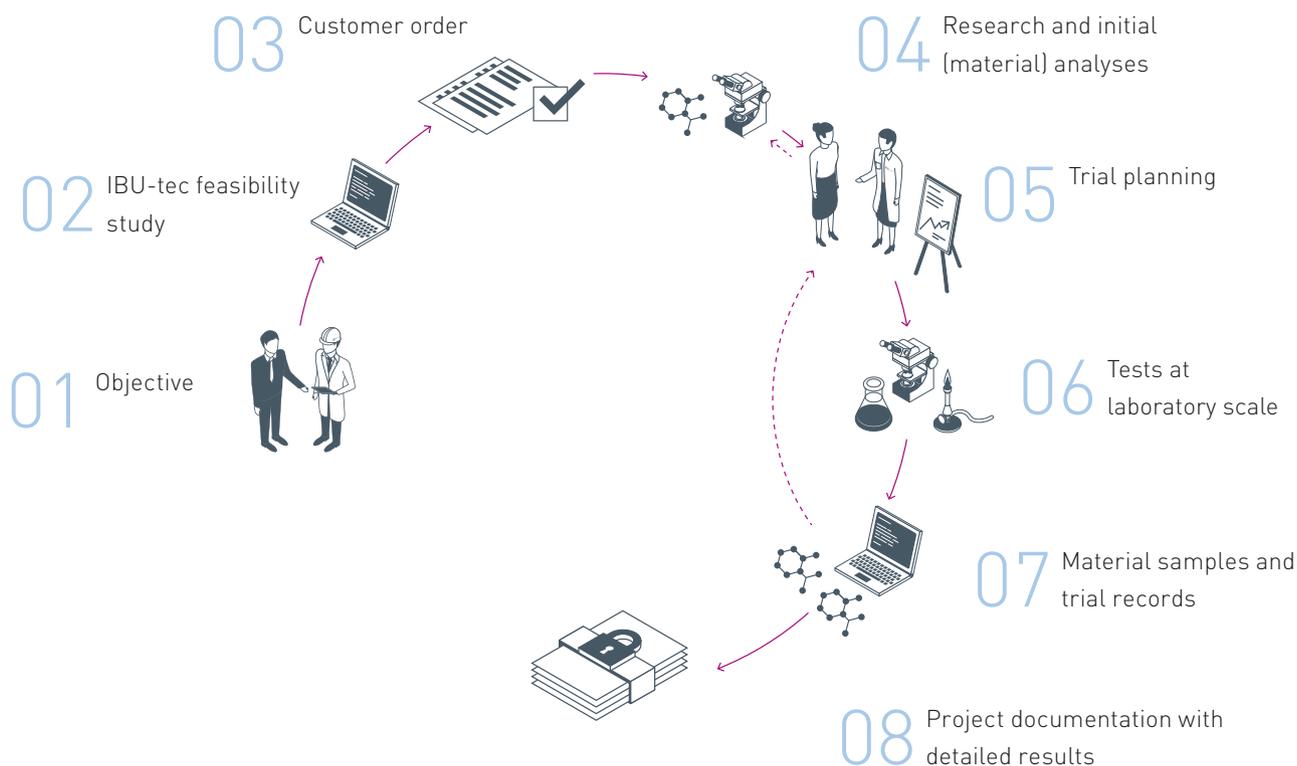
Our Services





We help to make your material innovation a reality

Be it catalyst support, battery materials, or building materials; using new feedstock or recycling a product – with IBU-tec, your ideas and materials are in good hands. At Ibu-tec, our greatest endeavor is to do everything possible to optimally implement your project. We use our vast expertise to develop materials according to your specifications, by analyzing the raw materials needed, and by designing, planning and executing experiments. Then we conduct lab-scale trials to test the thermal process and define the reaction conditions. Our findings will provide you a detailed overview of your project's feasibility and all the required parameters for reproducible product quality.





We can simulate almost anything for you



Testing ideas and trying them out – it sounds easy enough, but when it's a case of developing materials with precisely defined properties or scaling up processes, then the opposite is more likely to be true. Trials and repetitions can quickly become time consuming and costly endeavors. Moreover, the required investment in thermal facilities and other equipment may rapidly render a project uneconomical.

IBU-tec has everything you need for your material and process trials: Many years of experience in operating thermal systems, highly adaptable rotary kilns and pulsation reactors, as well as a wide variety of tools and equipment for material preparation and post-processing, allowing us to fulfill even the most challenging project requirements. A state-of-the-art laboratory and the expert knowledge of our staff complete the portfolio. All of which are available from a single source at a single location!

Outsource trials, minimize risk, launch production quickly and efficiently

Have you already developed a process or have a sample available? Then let us give your project a boost toward industrial scale production. From your proposed process parameters, defined product specifications and agreed upon test regime, we can carry out the necessary scale up trials, as well as any pilot production at our facilities.

If solid process parameters are still lacking, we will define them as part of the project. We will quickly validate your process idea using our experience in thermal treatment, then define and carry out tailored trial programs. Our mission: to help you get marketable product as soon and efficiently as possible. After completion of the trials and successful scale up, you will have all the essential parameters needed for your investment in thermal processing systems and for your own production, thus saving you time and money.

Together, we will create your individual program for process development by:

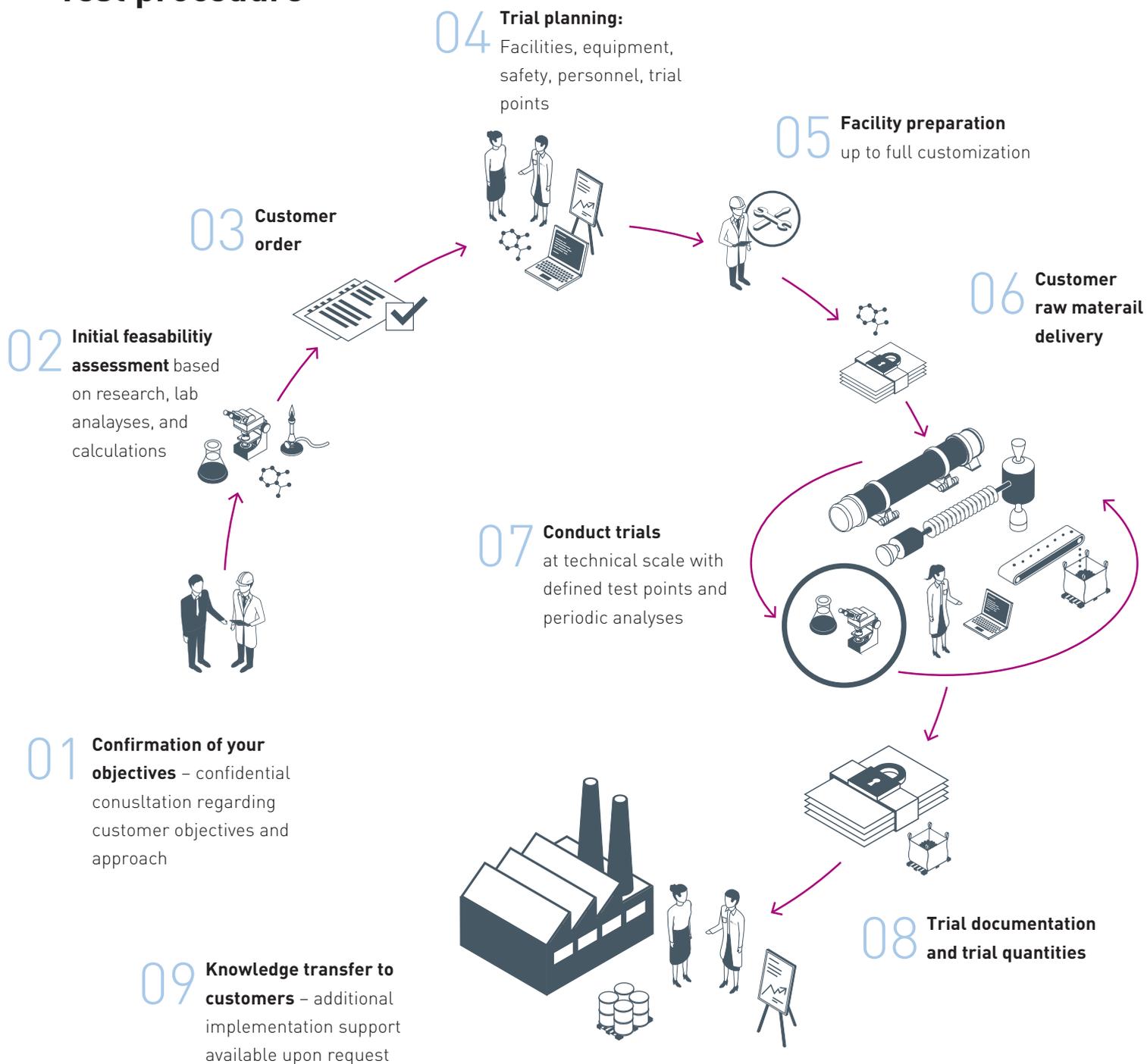
- ▶ Defining the steps of the (thermal) process, as well as the corresponding parameters for achieving desired product specifications
- ▶ Designing and conducting experiments in lab-scale, to demonstrate process control and product quality
- ▶ Scaling up the process and reproducing lab results in technical and/or commercial scale

Your Advantages:

- ▶ Lower investment risk
- ▶ Fast assessment of project feasibility
- ▶ Data collection of the behavior of your material in (thermal) processes
- ▶ Capacity for small sample quantities without needing your own facility
- ▶ Detailed reports with all the important parameters for each project
- ▶ Access to a well-equipped laboratory for a variety of analyses and continual quality control
- ▶ Access to expert advisers to help with implementation



Test procedure





Our Tolling Service – as versatile as your requirements

Calcination, reduction and pyrolysis are the most common of our various thermal processing options. Our knowledge of process engineering, chemistry and material science, combined with the efficiency of our equipment, create the best possible production conditions for your material. If you do not as of yet have the technical process parameters for industrial scale, we will establish them for you in a test program.

Whether material handling or dosing systems, mixing and granulating devices, sieving or classifying technology – our facilities are adaptable to a wide variety of special production requirements. Even problematic off-gases can be safely contained with professional treatment.



When you are short of capacity, we can help

If quality was non-negotiable in your material development stage, then you should also expect it in later stages. Be it just a few kilograms or up to 40 metric tons per day, we can produce your quality in quantity. To ensure compliance to specifications during the tolling operation, as well as on-time delivery, our team will strictly monitor the process and is absolutely dedicated to providing superior personal support throughout the project. This includes lab testing to whatever degree is necessary and aligned with you to ensure the quality of your product. Additionally, if your warehouse capacity is insufficient, we can provide storage options for you.

→ [Learn more about our facilities](#)

Learn more about the features and capacities of our 16 rotary kilns and 8 pulsation reactors.

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An Overview of our Services – from baseline measurement to optimization:

PROCESS MEASUREMENT – CREATE TRANSPARENCY

- ▶ Measurement of volume flows, dust levels, gasses, as well as material and wall temperatures, even in high temperature ranges
- ▶ Measurement of gas concentrations (e.g.: O₂, CO₂, NO, NO₂, SO₂, HCl, HF) in the flue-gas and within the equipment
- ▶ Determination of filter separation efficiency, thermal losses and false air volumes
- ▶ Analysis of corrosive off-gases (e.g. acid dew point measurement)
- ▶ Design and build up of measuring systems
- ▶ Inspection and calibration of measuring equipment

FACILITY AND PROCESS OPTIMIZATION – FINDING PRAGMATIC SOLUTIONS

- ▶ Analysis of existing thermal systems to detect potential weaknesses and to identify hidden capacity reserves and possibilities for capacity expansion
- ▶ Conclusive findings regarding the optimization of feed rate, throughput, residence/dwell time and material quality
- ▶ Development of recommendations for reducing raw materials usage, improving energy efficiency, and for reducing the amount of undesired by-products or emissions
- ▶ Calculation of material/mass and energy balances of entire plants or sections thereof
- ▶ On-site plant assessments or trials at IBU-tec, e.g. with specific kiln internals

ENGINEERING – COMPREHENSIVE ADVICE FROM IDEA TO REALIZATION

Feasibility studies

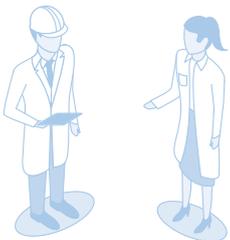
- ▶ Development of initial concepts for thermal processes and systems
- ▶ Identification and assessment of process risks
- ▶ Evaluation of thermal process efficiency and systems performance

Basic engineering

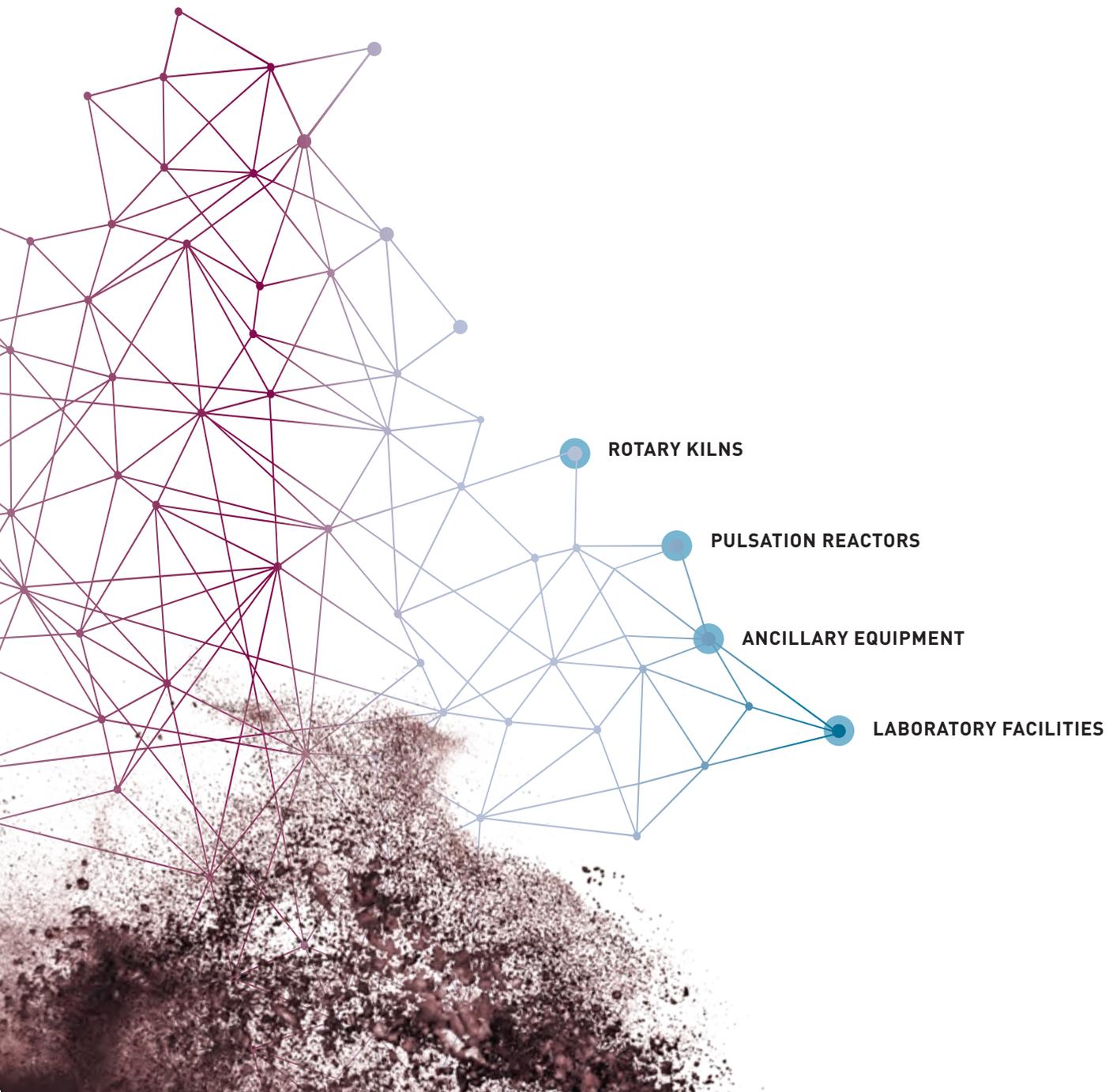
- ▶ Preparation of plant installation diagrams and P&IDs (piping and instrumentation diagrams)
- ▶ Pre-dimensioning and rough layout of plant installations and equipment
- ▶ Process development including definition of all required process steps

Start-up assistance

- ▶ Start-up assistance for larger installations and plants
- ▶ Evaluation of system/equipment performance compared to guaranteed specifications
- ▶ On-site training of operators



WELCOME TO THE IBU-TEC TECHNOLOGY PARK



A Variety of Possibilities – flexibility for you

Our rotary kilns can produce your material – up to 40 tons per day, at temperatures up to 1,550 °C. In total, our 16 kilns offer you a variety of options for product and process development, process optimization as well as production.

Our facilities feature great flexibility and versatile application. They are ideal for thermal treatment for a variety of inorganic materials. Thanks to multiple sizes and modifiable configurations, we can respond to individual customer requirements and thermally treat your materials under different process conditions, using either directly or indirectly heated rotary kilns.

For directly heated rotary kilns, the burner generally extends right into the kiln. The materials are directly heated by the thermal radiation from the flame, and by the hot gas flow generated by the burner respectively. The kilns are lined with heat-resistant refractory material, therefore, they can be operated at higher temperatures than other kiln systems merely consisting of metal tubes. As a result of their robustness and scalability, directly heated kilns can manage high throughputs at comparably lower unit production costs.

By contrast, with indirectly heated rotary kilns, the heat is not generated in the tube, where the reactions take place, but rather outside of it. Heat is mostly generated through electrical means or with burners and passes into the reaction area through the wall of the tube. Since there is no need for oxygen within the reaction area to operate the burners, indirectly heated rotary kilns can work under defined gas atmospheres, meaning material processing can also take place under inert or reducing conditions. Because the volume flow created by the heating gas does not move through the reaction area, overall gas flow in that area is mainly driven by the reaction taking place and is normally lower in indirectly heated kilns than in directly heated ones. Therefore, indirect kilns are more suitable for treating very fine powders.

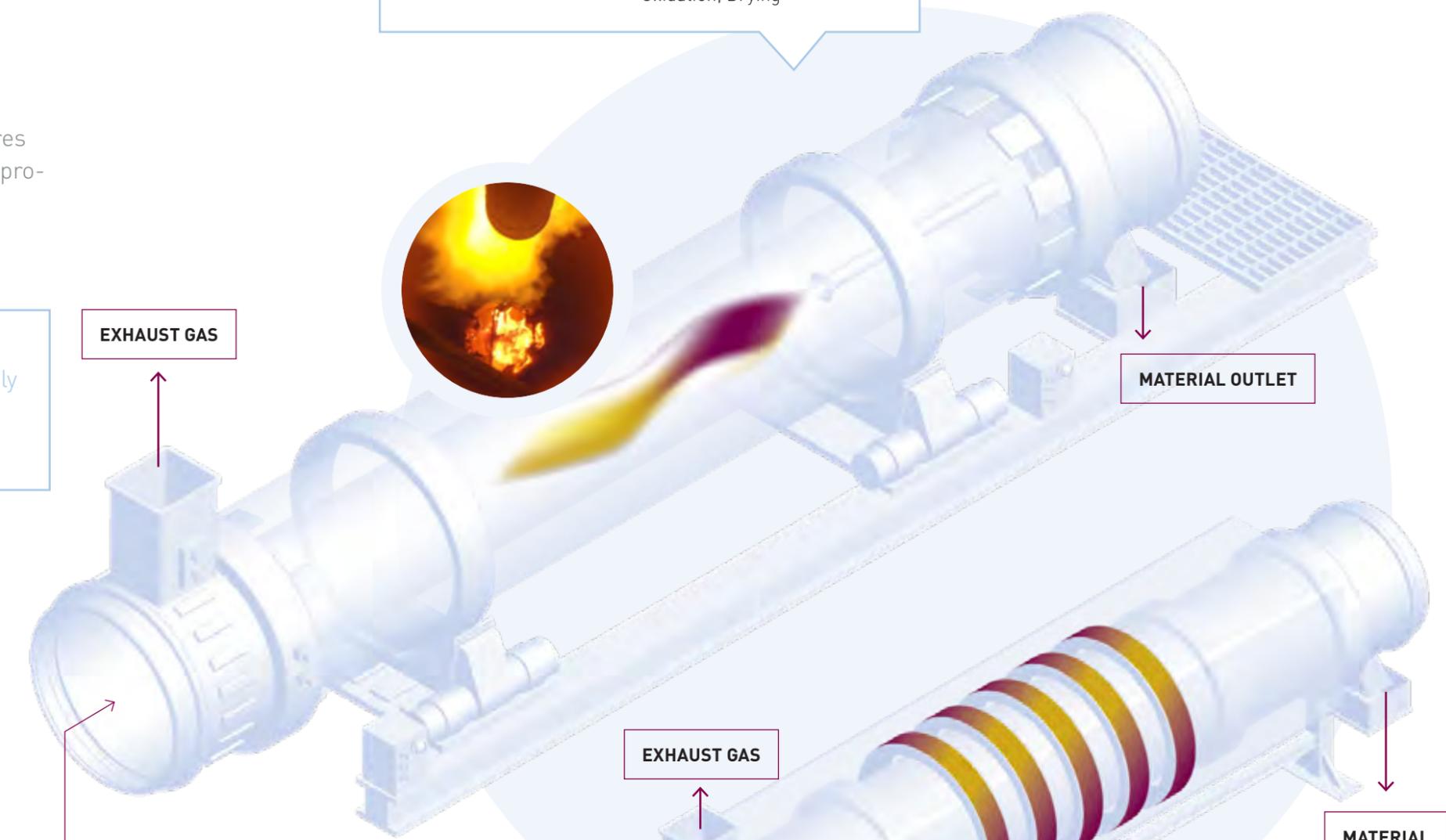
AVAILABILITY:
4 different directly heated rotary kilns



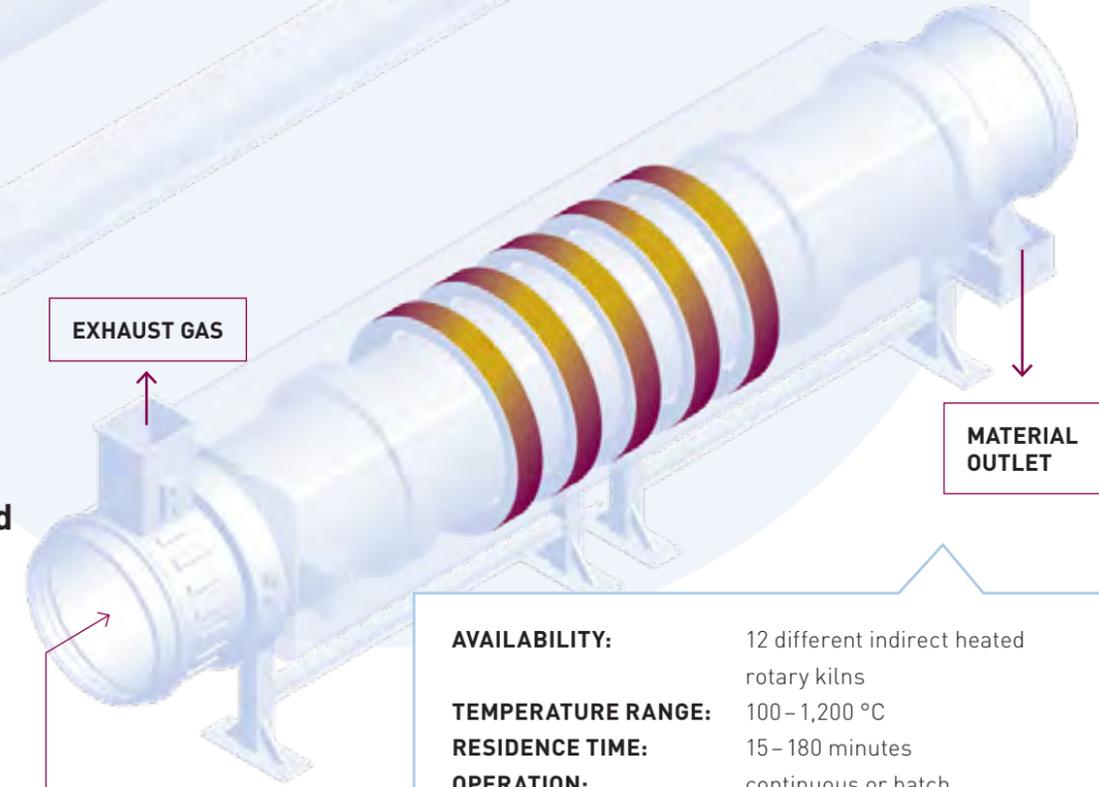
- Typical Applications**
- ▶ Catalysts and catalyst carriers
 - ▶ Battery materials
 - ▶ Ceramic materials
 - ▶ Abrasives and polishing agents
 - ▶ Pigments
 - ▶ Adsorbents

AVAILABILITY: 4 different direct heated rotary kilns
TEMPERATURE RANGE: 100 – 1,550 °C
RESIDENCE TIME: 15 – 180 minutes
OPERATION: continuous or batch
TYPICAL PROCESSES: Calcination, Reduction, Oxidation, Drying

Directly heated Rotary Kilns



Indirectly heated Rotary Kilns



AVAILABILITY: 12 different indirect heated rotary kilns
TEMPERATURE RANGE: 100 – 1,200 °C
RESIDENCE TIME: 15 – 180 minutes
OPERATION: continuous or batch
TYPICAL PROCESSES: Calcination, Pyrolysis, Reduction, Oxidation, Drying

Characteristics and Capacities of our Rotary Kilns

DIRECTLY HEATED ROTARY KILNS

| Kiln name | Heated kiln length [m] | Inner diameter [m] | Heating type | Temperature range [°C] | Raw material throughput [kg/h] | Mode of operation | Special features |
|------------|------------------------|--------------------|--------------|------------------------|--------------------------------|-------------------------------|---|
| GDO | 12 | 1 | natural gas | up to 1,500 | 150 – 1,500 | counter-current (co-current) | raw material silo, 10 m rotary cooler, cyclone preheater |
| MDO | 4 | 0.6 | natural gas | up to 1,400 | 50 – 500 | counter-current | rotary cooler, cyclone preheater |
| KDO | 7 | 0.3 | natural gas | up to 1,550 | 10 – 100 | counter-current or co-current | vibration cooler, rotary cooler, reducing gas atmosphere possible, thermal oxidizer |
| BDO | 0.6 | 0.35 | natural gas | up to 1,400 | 15 l per batch | batch operation only | batch kiln for small amounts |

INDIRECTLY HEATED ROTARY KILNS

| Kiln name | Heated kiln length [m] | Inner diameter [m] | Heating type | Temperature range [°C] | Raw material throughput [kg/h] | Mode of operation | Special features |
|---------------|------------------------|--------------------|--------------|------------------------|--------------------------------|---|--|
| IDO 10 | 7 | 1 | natural gas | 300 – 1,150 | 100 – 1,000 | counter-current | 5 heating zones |
| IDO 9 | 7 | 1 | natural gas | 300 – 1,100 | 100 – 1,000 | counter-current | defined gas atmosphere, 5 heating zones, thermal oxidizer |
| IDO 11 | 4.7 | 0,6 | electrical | 100 – 1,150 | 40 – 400 | counter-current | Inert and reducing, hydrogen-atmosphere, thermal oxidizer |
| IDO 3 | 4 | 0.5 | natural gas | 300 – 1,150 | 25 – 250 | counter-current or co-current, batch operation possible | defined gas atmosphere, 6 heating zones, thermal oxidizer |
| IDO 6 | 3.75 | 0.45 | electrical | 100 – 900 | 15 – 150 | counter-current | 3 heating zones, thermal oxidizer, DeNOx |
| IDO 5 | 3.5 | 0.4 | natural gas | 300 – 1,100 | 10 – 100 | counter-current or co-current | defined gas atmosphere, 3 heating zones, thermal oxidizer |
| IDO 1 | 3 | 0.4 | electrical | 50 – 1,150 | 10 – 100 | counter-current or co-current, batch operation possible | defined gas atmosphere, 3 heating zones, thermal oxidizer |
| IDO 2 | 2.5 | 0.35 | electrical | 50 – 1,200 | 10 – 75 | counter-current or co-current, batch operation possible | 4 heating zones |
| IDO 7 | 2.3 | 0.254 | electrical | 100 – 900 | 3 – 30 | counter-current | Inert and reducing, thermal oxidizer |
| IDO 4 | 1 | 0.1 | electrical | 50 – 1,100 | 0.1 – 2 | counter-current or co-current, batch operation possible | defined gas atmosphere, thermal oxidizer |
| IDO 8 | 1 | 0.1 | electrical | 100 – 1,400 | 0.1 – 2 | counter-current or co-current, batch operation possible | ceramic & metal tube, defined gas atmosphere, thermal oxidizer |
| IDO 12 | 0.9 | 0.4 | electrical | 50 – 1,100 | ca. 30 l / batch | batch operation only | |

Innovative technology to create and produce “advanced materials”

The heart of the Pulsation Reactor beats at up to 300 hertz – our proprietary technology for creating and producing powders with exceptional material properties.

The Pulsation Reactor, an IBU-tec innovation, primarily consists of a combustion chamber, a resonance tube and a product filter. Within the combustion chamber, a periodic-transient flame generates a pulsing hot gas stream. This gas stream is highly turbulent and carries the fed raw material with it. The pulsation tube serves as the reaction chamber, in which the desired reactions take place in 0.05 to 2 seconds. The end of the tube leads to a filter, where the newly created or processed materials separate from the off-gas and deposit.

Extremely fast heating and cooling rates differentiate the pulsation reactor from other thermal systems. The material receives “thermal shock treatment” within a minimal residence time, in which a massive heat and material exchange takes place. This treatment leads to special properties in the material, which can be very advantageous. For example, the production and activation of catalysts, doping, or for materials with a special morphology.

The pulsation reactor is most suitable for thermal treatment of liquids, suspensions or (wet) powders. Due to the high turbulence in the reactor, every particle experiences the same reaction conditions. Because of this uniform material treatment, extremely homogeneous materials can be synthesized.

Distinctive Features

- ▶ Low agglomeration – homogenous crystal structure/ morphology
- ▶ Achieve homogeneous material properties with low spread
- ▶ Introduce imperfections/displacements in the crystal structure
- ▶ Minimization of thermal “damage” to the material
- ▶ Synthesis of small particle sizes possible (nano)
- ▶ Uniform distribution of dopants
- ▶ Drying and calcination in one step

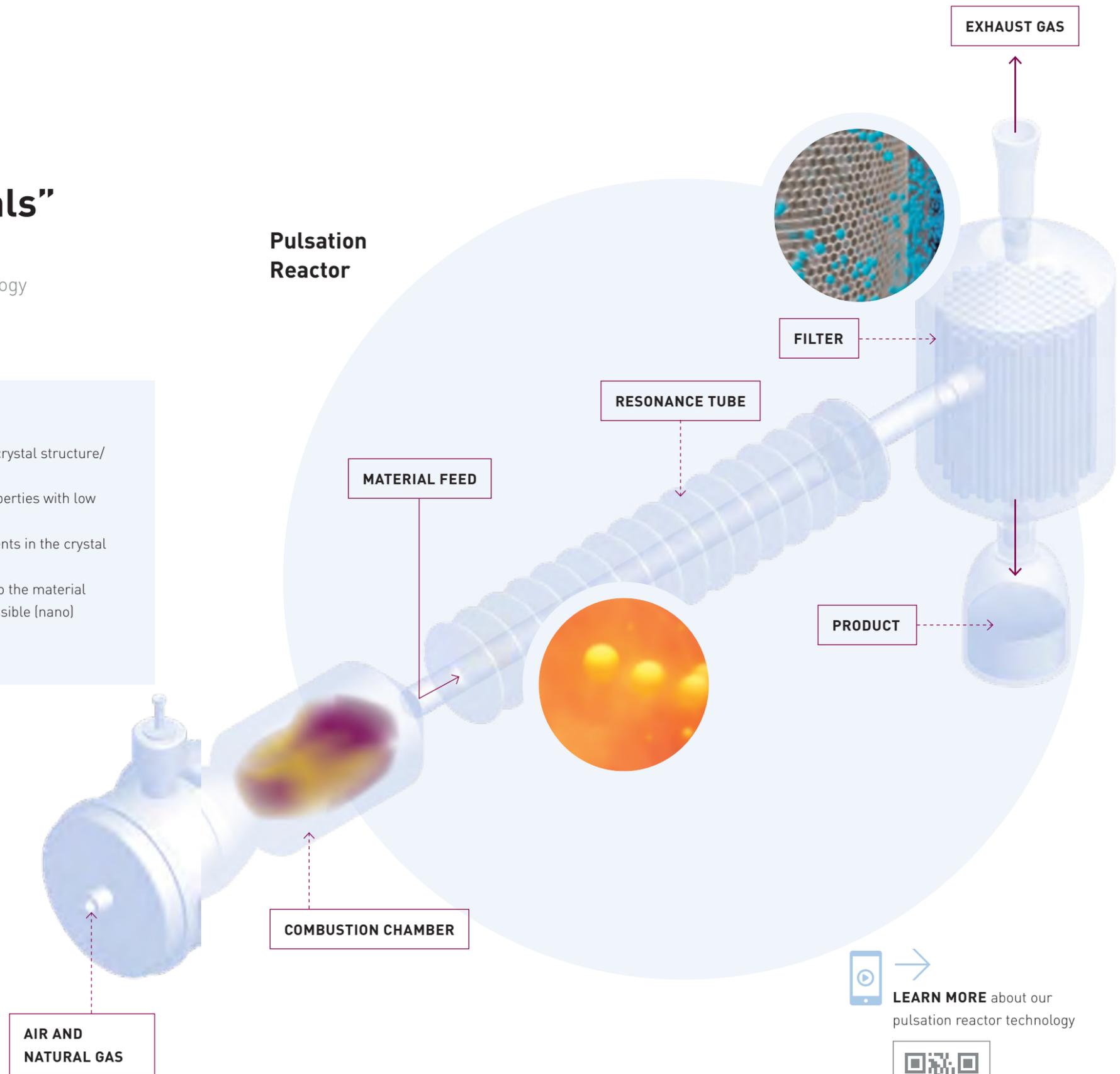
AVAILABILITY:
8 different pulsation reactors



Typical Applications

- ▶ Catalysts and catalyst carriers
- ▶ Battery materials
- ▶ Ceramic materials
- ▶ Polishing agents
- ▶ Pigments

Pulsation Reactor



LEARN MORE about our pulsation reactor technology



Characteristics and Capacities of our Pulsation Reactors

PULSATION REACTORS

| Name | Gas atmosphere | Residence time [s] | Thermal output [kW] | Heating type | Temperature range [°C] | Raw material throughput [kg/h] | Special features |
|-------|-----------------------|--------------------|---------------------|--------------------------------|------------------------|--------------------------------|--|
| PR 10 | oxidizing, (inert) | 0.5 to 2 | 500 | natural gas | 250 up to 950 | up to 160 | |
| PR 9 | oxidizing | 0.1 to 1 | 250 | natural gas | 500 up to 950 | up to 160 | DeNO _x |
| PR 8 | oxidizing | 0.1 to 1 | 250 | natural gas | 500 up to 950 | up to 160 | |
| PR 7 | oxidizing | 0.1 to 1 | 250 | natural gas | 500 up to 950 | up to 160 | |
| PR 6 | oxidizing, (inert) | 0.1 to 2 | 500 | natural gas | 500 up to 1,300 | up to 80 | |
| PR 5 | oxidizing | 0.1 to 1 | 250 | natural gas | 250 up to 950 | up to 160 | |
| PR 4 | oxidizing | 0.1 to 1 | 150 | natural gas, (H ₂) | 500 up to 950 | up to 80 | DeNO _x |
| KM-PR | oxidizing | 0.05 to 1 | 50 | natural gas | 250 up to 1,000 | 0.1 to 20 | flexible, highly specialized trials with small quantities of materials, individually tailored to customer requirements |

Full service includes pre and post processing of your materials

With us as your partner for thermal material processing, you not only place the treatment of your materials "in good hands", you also ensure the best pre- and post-treatment. Our installations can be fitted with additional peripheral equipment to meet your particular requirements. We can handle important upstream and downstream steps in the production process. In material processing, for example, you will find among others, devices for crushing, granulating and mixing, as well as for dissolving and impregnating materials. Further, our facilities can

be set up with magnetic separators or sieves. For effective exhaust gas treatment, we use dust filters, mobile or fixed DeNOx systems, thermal oxidizers for the control of volatile organic compounds, and scrubbers. You can rely on our experts at all times, including when modifications of our installations and equipment need to be prepared to tailor it for your project by our internal workshop.

With our equipment, we can create comprehensive solutions



CONVEYING & DOSING



MIXING & GRANULATING



SORTING & SCREENING



EXHAUST GAS TREATMENT

CONVEYING AND DOSING EQUIPMENT

- ▶ Screw conveyors
- ▶ Conveyor belts
- ▶ Disc conveyors
- ▶ Pneumatic conveyors
- ▶ Gravimetric dosing unit with screw feed
- ▶ Volumetric dosing screws
- ▶ Vibration chutes (Vibration conveyors, Gravimetric feeders)
- ▶ Dosing belt scale
- ▶ Membrane pumps
- ▶ Spraying lances
- ▶ Rotary feeders
- ▶ Displacement and peristaltic pumps

MIXING AND GRANULATION UNITS

| Type | Number on site | Typical size | Attainable throughput | Material type | Specifications / special characteristics |
|-----------------------------------|----------------|---|-----------------------|-----------------|--|
| EIRICH Intensive mixer R2 | 1 | Useable vol.: 3.5 l | N/A | Stainless steel | Laboratory mixer |
| EIRICH Intensive mixer R09 | 1 | Useable vol.: 150 l | up to 300 kg/h | Stainless steel | Batch mixer, suitable for tests or production |
| EIRICH Intensive mixer R11 | 1 | Useable vol.: 250 l | up to 1,000 kg/h | Carbon steel | Batch mixer, suitable for tests or production, automated |
| Cone mixer | 2 | 1 x à 1,500 l 1 x à 2,500 l | up to 400 kg/h | Stainless steel | Batch mixer, suitable for tests or production |
| Lödige ploughshare mixer | 5 | 3 x à 600 l 1 x à 300 l 1 x à 1,600 l | up to 600 kg/h | Stainless steel | Batch mixer, suitable for tests or production |

SCREENING AND SORTING

| Type | Number on site | Attainable throughput | Mesh dimensions | Specifications / special characteristics |
|-------------------------------------|----------------|-----------------------|------------------|---|
| Multi-deck screening machine | 1 | up to 1,000 kg/h | 0.1 mm to 7 mm | 7 decks |
| Vibration-screening machine | 1 | up to 500 kg/h | 40 µm - 1,000 µm | 2 decks / ultrasound cleaning |
| Vibration-screening machine | 1 | up to 350 kg/h | 40 µm - 1,000 µm | 2 decks / ball cleaning |
| Round-vibration sieve | 1 | up to 350 kg/h | 40 µm - 1,000 µm | 2 decks / ultrasound cleaning |
| Single deck screen | 2 | up to 100 kg/h | 0.2 mm to 5 mm | 1 deck / only for removal of oversized and undersized particles |

EXHAUST GAS TREATMENT

- ▶ Thermal thermal oxidizers and exhaust gas cleaning
- ▶ DeNOx systems to denitrogenize the exhaust gas
- ▶ Filter systems to remove dust from the exhaust gas
- ▶ Gas scrubbers, venture-scrubbers (wet gas scrubbers) for the removal of particulates and absorbable gases (acidic and alkaline washes)
- ▶ Dust analysis in the treated gas, final police filter
- ▶ Use of adsorbents to remove acidic components

Process Analytics – focusing on material innovations and quality

Whether sample preparation, lab tests, analyses or complex R&D projects – you will receive comprehensive support for selecting the most suitable analysis methods for your material or process development. Thanks to the extensive experience of our lab staff, and our state-of-the-art laboratory environment, we can also manage complex analytical quality assurance system (ISO 9001:2008).

Overview: From sample preparation to analyses



CHEMICAL/ELEMENTAL ANALYTICS

- ▶ ICP-OES
- ▶ Complexometry, colorimetry and potentiometry (wet chemistry)
- ▶ Gravimetry
- ▶ Atomic absorption spectroscopy (AAS)



MINERALOGICAL ANALYTICS

- ▶ X-ray diffraction analysis (XRD) incl. Rietveld analysis

**FUEL ANALYTICS**

- ▶ Elementary and proximate analysis
- ▶ Calorific/heating value determination
- ▶ Ash and ash melting analysis

**PHYSICAL ANALYTICS**

- ▶ Specific surface area (BET)
- ▶ Laser diffraction method
- ▶ Sieve analysis
- ▶ Color value determination
- ▶ Density determination



At Home in the “Impulse-Region”

IBU-tec advanced materials AG is not only centrally located within Europe and Germany, it is also in one of the most attractive economic and science hubs in the country – the “Impulse-Region” Erfurt, Weimar, Jena. Here, tradition meets innovation and cutting-edge research finds creative outlets. Outstanding achievements in engineering and in creative sectors such as architecture and design are recognized far beyond the local region.



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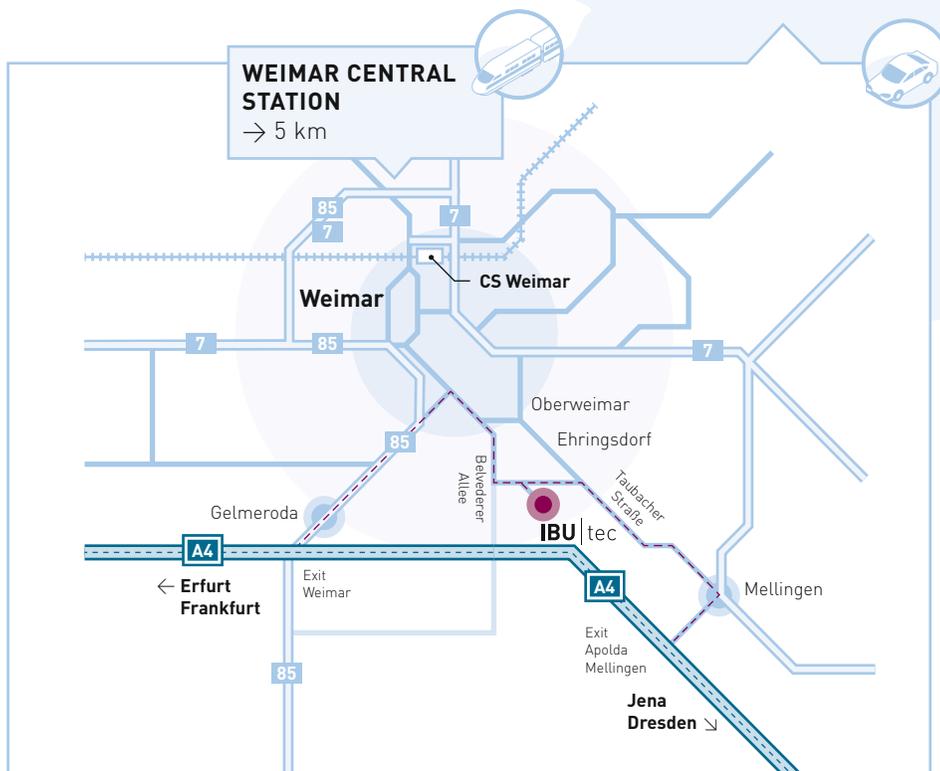
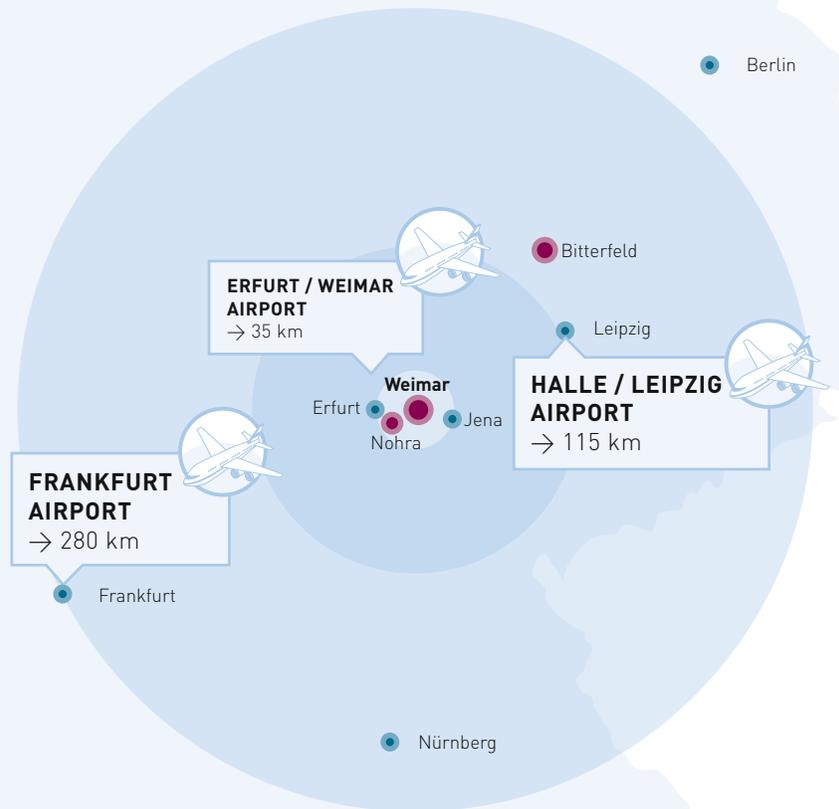
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Directions to IBU-tec

For arrival by air, you have several possibilities available. There is a convenient rail connection directly from Frankfurt am Main International Airport's Fernbahnhof to Weimar, with the trip lasting approximately 2.5 hours. Smaller regional airports are also relatively close to Weimar, but provide limited scheduled service; these include Berlin Tegel Airport, Schönefeld Airport, Leipzig/Halle Airport and the Erfurt/Weimar Airport.

Should you have any questions regarding travel, please feel free to contact us. We will be happy to assist you with your travel planning.



Locations IBU-tec



NAVIGATION SYSTEM:
Scan the QR code to plan your route.



IBU-tec advanced materials AG, is a global full-service provider for thermal process engineering. The company is an independent technology leader for the development and operation of thermal systems. It works with clients across many industries and provides support from the development stage to commercial production of inorganic materials. Furthermore, customers who want to optimize already established processes and existing installations can rely upon the extensive experience and deep expertise of the IBU-tec team. Through its client projects, IBU-tec helps to make sustainable and lasting improvements to material, energy and raw material efficiency in products, as well as in production processes.

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