ONEJOON

L2P PROGRAM

BRIDGING THE GAP FROM BATCH TO CONTINUOUS PRODUCTION

Take your thermal processes to the next level –
faster, smarter, more efficient with ONEJOON's L2P Program.

MORE THAN 125 YEARS
EXPERIENCE IN KILN TECHNOLOGY
1896-2021

What's L2P?

L2P – **lab to production** – is a unique program that we have developed for the upscaling of your process from the lab to fully-fledged industrial production. It is **based on over 125 years of experience in industrial kiln construction** and our rich expertise obtained from numerous experiments for customers worldwide in our **Test Center**. Not only do we provide you with individual furnaces and plants tailored to your needs, we also serve as your partner and guide in taking on your upscaling process by exploring its feasibility and delivering relevant data as well as equipment.

Who can benefit from L2P?

The lab-to-production process is directed towards producers who are considering scaling up their process by using continuous kilns and plant equipment. Customers who benefit from L2P are active in a wide variety of markets – from SOFC/SOEC producers and battery powder manufacturers to innovative developers of state-of-the-art materials.

Overcome limitations & challenges of batch kilns

Efficient themal processing can often not be implemented with simple chamber furnaces and a few cubic meters of usable space.

This raises the following question: How to scale up efficiently, effectively and sutainably? Our answer to this challenge is the ONEJOON L2P program – a proven process to overcome this challenge and providing you and your team the support you need at any time.

Benefits of the L2P program

Here's why ONEJOON is the right partner if you are considering scaling up your process:

- **Technological innovation:** You don't want any technology. You want advanced technology that sets new standards in your industry. We provide you with this technology.
- **Process technology:** Individual air distribution concept and temperature homogeneity
- **Process quality:** Energy efficiency and product quality are key factors. Individually developed processes guarantee first-class performance.
- **Effective & cost-efficient:** You need a plant that gives you a competitive edge.Thus, the project must reliably result in a continuous plant that produces a high-quality and reproducible product on a large scale.
- **Early stage risk identification & development of alternative solutions:** Overcome pitfalls in the initial phase of the project, when there's still time to maneuver around them.
- **Perform tests under realistic & ideal testing conditions without investing in test kilns:** We have the equipment you need for detailed tests in our on-site Test Center at our German headquarters.
- **Enable personnel to continue process optimization throughout continuous production:** We transfer the know-how required to your employees.

CURRENT EQUIPMENT LIMITATIONS & CHALLENGES

Most SOFC/SOECs are debindered / sintered in batch kilns with:

— Limited throughput

— Long processing times cold-to-cold

— Poor binder / gas removal

— Limited explosion limit control

— High energy consumption in relation to throughput

ONEJOON Test Center

When it comes to the development of new products and processes, the staff of the Test Center are at the forefront of technology. Our team of young, dynamic engineers from various technical fields is not afraid to break new ground. Together with you, we want to develop the heat treatment processes of tomorrow. To achieve this, we diligently work on the development of sustainable, reliable and innovative technologies.

Your Vision – Our Support

The Test Center of ONEJOON is your partner for the improvement of advanced thermal processes and product development. For the continuous improvement of your innovation, you can take advantage of our expertise in the field of thermal processes and use our test furnaces for your field trials or scaling up of your trials.

Contribution

From trial to production scale we have a wide variety of continuous and batch equipment available. In addition to our facilities, we can perform a wide range of measurements to monitor the processes in real time.

In addition to data measurements, our experts can create CFD simulations to shorten the design process or to quickly review the practical tests.

Also in the trials, we use our extensive experience and know how in terms of thermal processes to meet the highest of quality and safety requirements.

Cooperation

We would like to collaborate with you to achieve your desired outcomes in an effort to optimize your process and production targets. Our goal is to discover the individually adapted solutions for our customers and to assist with implementing them into your production environment.

Examples for testing materials:

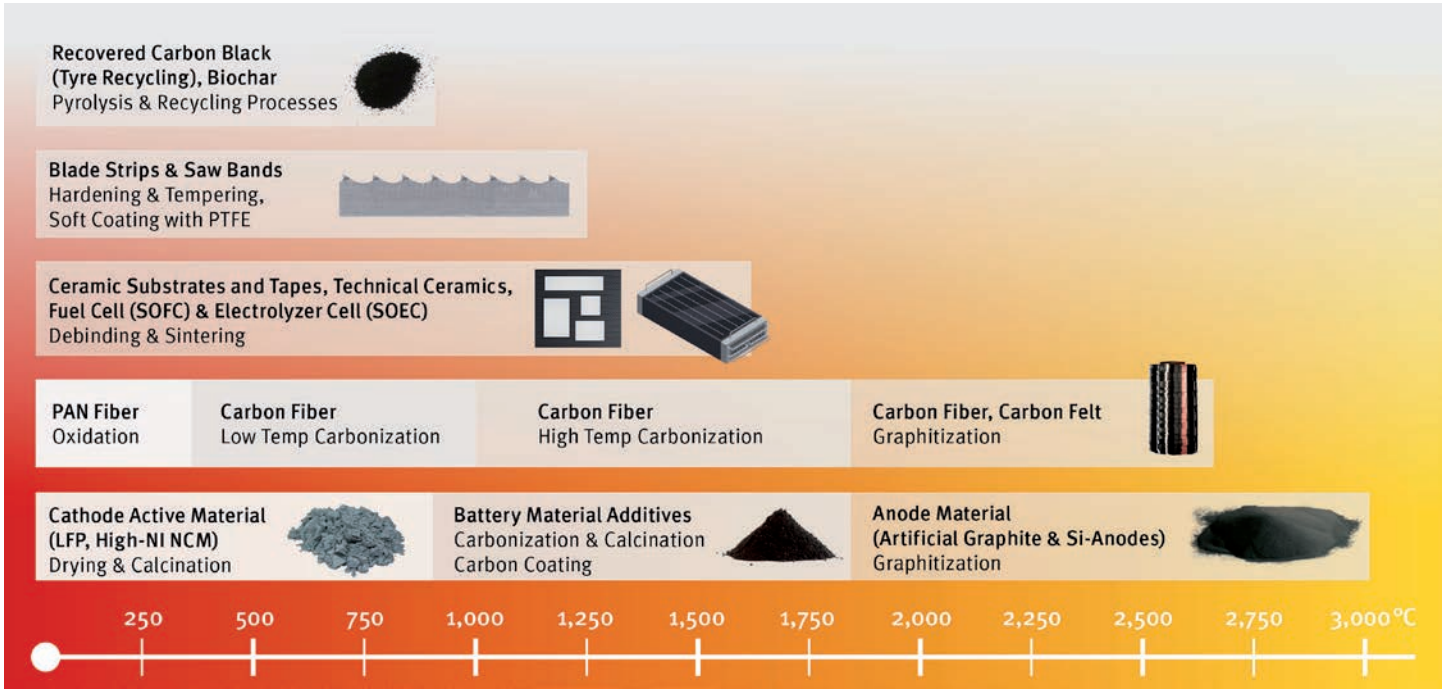
- Battery powders, powder metals and powder chemicals
- Ceramics
- Carbon fibers
- Organic materials
- etc.

Your Benefits

- Tap into our knowledge expertise during the development and optimization of thermal processes
- Optimize your production processes by performing tests among realistic conditions leaving you free to focus entirely on the development of your products

Advantages

- Continuous development and improvement of our products
- Investment and reduction of operating costs by optimizing systems and consumption
- Optimization of processes for a better quality of the products
- Risk reduction by pretests with original parts
- Trust building due to cooperation with Customer



▲ *ONEJOON Test Center – Process / Temperature profile*

THE L2P CORE PROCESS

EVERY STEP AT A GLANCE

BATCH OR LAB PROCESS

- Limited throughput
- Lower temperature uniformity (quality)
- Long process times
- Poor binder / gas removal
- Restricted explosion limit control
- Higher energy cost

AS-IS ANALYSIS

- Existing thermal process & kiln furniture
- Product specific requirements
- Customer specification & requirements

DEVELOPMENT

- Process optimization & adaptation
- Kiln furniture development
- Heating concept
- Gas distribution system

VALIDATION

- Early stage risk mitigation
- Test runs at ONEJOON Test Center
- CFD simulation of pilot & mass production

FOCUS AREAS OF DEVELOPMENT

There are three main areas of development throughout the process:

- **Plant:** The equipment you need to successfully run your plant.
- **Process:** An exact characterization of the heat treatment process you want to reproduce.
- **People:** The necessary capabilities for your employees to run the continuous production plant without external help.

OUR COMPANY

ONEJOON is your expert and partner for demanding heat treatment processes in a variety of industries

ONEJOON is the technology and market leader for thermal processing solutions for SOFC and SOEC components as well as other ceramic components. The company also holds a prominent position in the future markets of cathode and anode material production, as well as carbon fiber production lines.

We are a globally operating team of specialist for the development and scaling of innovative processes as well as turnkey solutions of up to 100 million euros. ONEJOON's core competence is the development of high-quality furnaces and optimized processes. First-class system availability, reliability and temperature homogeneity create added value to our customers' production.

At ONEJOON, we see ourselves as a driving force of innovation. Nearly 500 employees work for the company, among them approx. 250 desgin engineers, developers and researchers. With the help of our kilns and furnaces, battery materials of the next generation are produced, through which the field of e-mobility is further advanced.

▲ *ONEJOON headquarters in Suwon, South Korea*

In addition, we serve as a development partner by scaling up thermal production processes, for example in the production of high-temperature electrolysis cells. In ONEJOON rotary kilns, complex pyrolysis processes can recycle and recover high-quality materials. As these applications show, we are doing our best to make kiln technology not only more efficient, but also more sustainable.

KEY FACTS

We are your partner for thermal production systems

— Represented in 6 countries with 11 locations worldwide

— Approx. 500 employees worldwide, more than 250 design engineers, researchers & developers

— Test Center as well as R&D department

— Experienced project management team with project sizes up to 100 millions euros

— Thermal process equipment up to 3000 °C

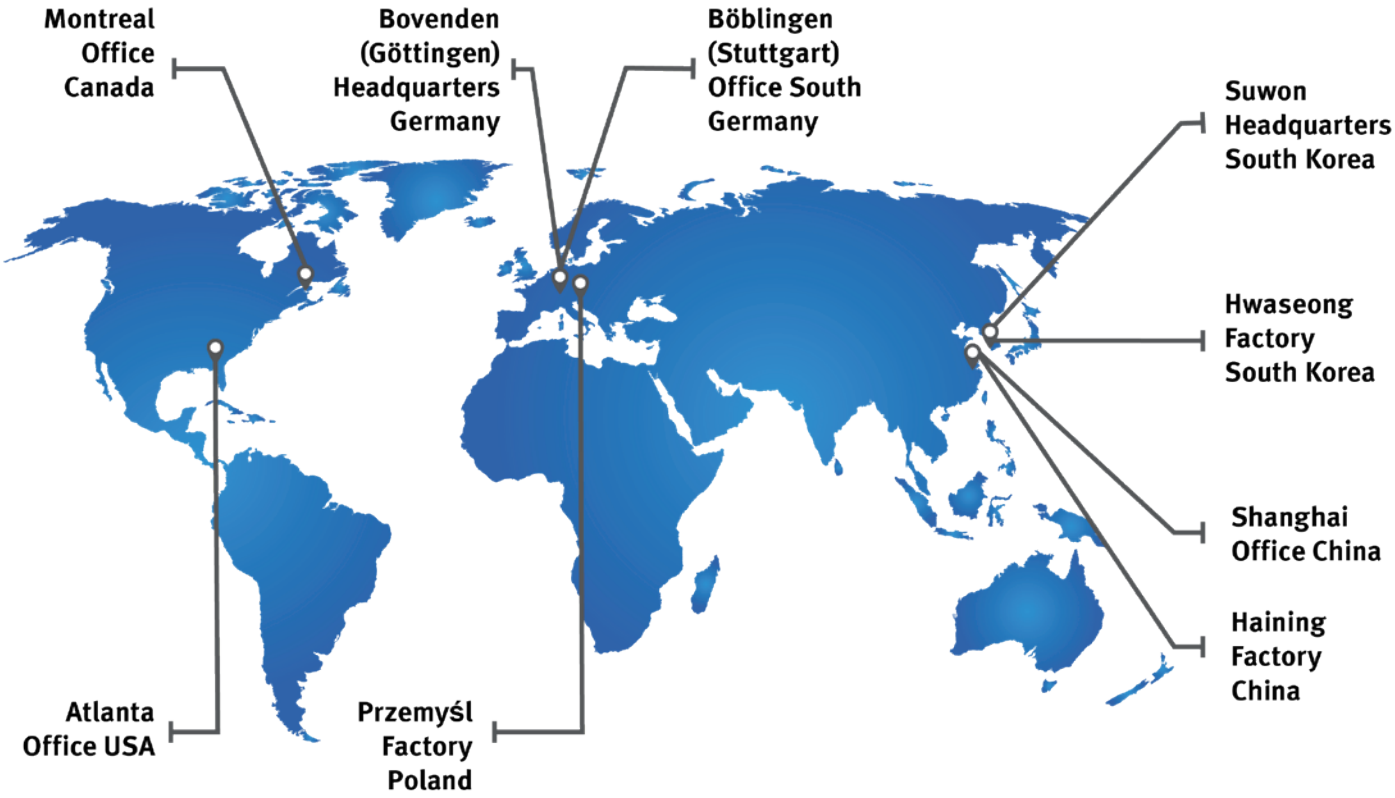
ONEJOON is represented at ten locations in six countries worldwide:

- Korea: Headquarters in Suwon and production in Hwaseong (ONEJOON Ltd, Co.).
- Germany: Bovenden and Böblingen (ONEJOON GmbH)
- China: Shanghai and Haining (ONEJOON Zhejiang Co., Ltd.)
- USA: Atlanta (ONEJOON Inc.)
- Canada: Montreal (ONEJOON Thermal and Powder Process Solutions Inc.)
- Poland: Gliwice (ONEJOON Poland sp. z o.o.)

This makes ONEJOON a reliable partner for our customers in our core markets of Advanced Materials, Carbon Fiber and Battery Materials.

More information can be found at www.onejoon.de

WE'RE RIGHT WHERE YOU NEED US.



LEARN MORE ON OUR WEBSITE & GET IN TOUCH!

Contact us at **ceramics-metals@onejoon.de** or via our offices in Germany, the United States, Canada, South Korea & China

SCAN ME

ONEJOON GmbH
Leinetal/Auf der Mauer 1, 37120 Bovenden, Germany
Phone: +49 551 820 830-0, E-Mail: info@onejoon.de

www.onejoon.de

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