

L2P PROGRAM

BRIDGING THE GAP FROM BATCH TO
CONTINUOUS PRODUCTION



How to achieve more efficiency and throughput in
Solid Oxide Fuel Cell & Electrolyzer Cell production
with ONEJOON's L2P Program



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 of Solid Oxide Fuel Cells (SOFC) and Solid Oxide Electrolyzer Cells (SOEC) or subcomponents. More specifically, producers who are considering scaling up their process by using continuous kilns and plant equipment. Our customers in this industry are producing large power generators using SOFCs or use SOECs to generate emission free and carbon-free hydrogen.

Overcome limitations & challenges of batch kilns

The mass production of SOFC/SOEC cannot be implemented with simple chamber furnaces and a few cubic meters of usable space.

This then raises the following question: How to scale up efficiently, effectively and sustainably? 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.

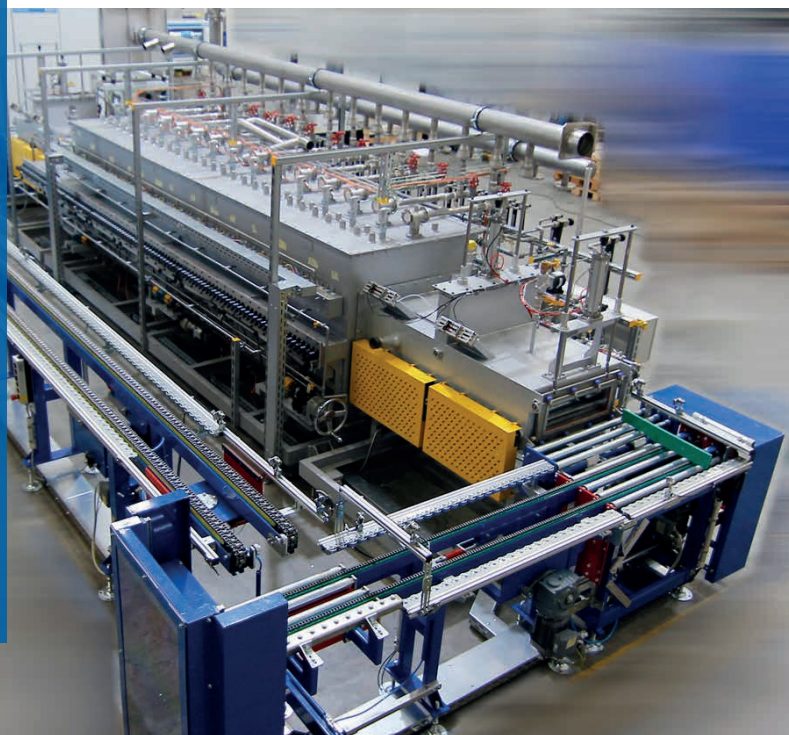
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CURRENT EQUIPMENT LIMITATIONS & CHALLENGES

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

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OUR COMPANY

About ONEJOON GmbH

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.

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

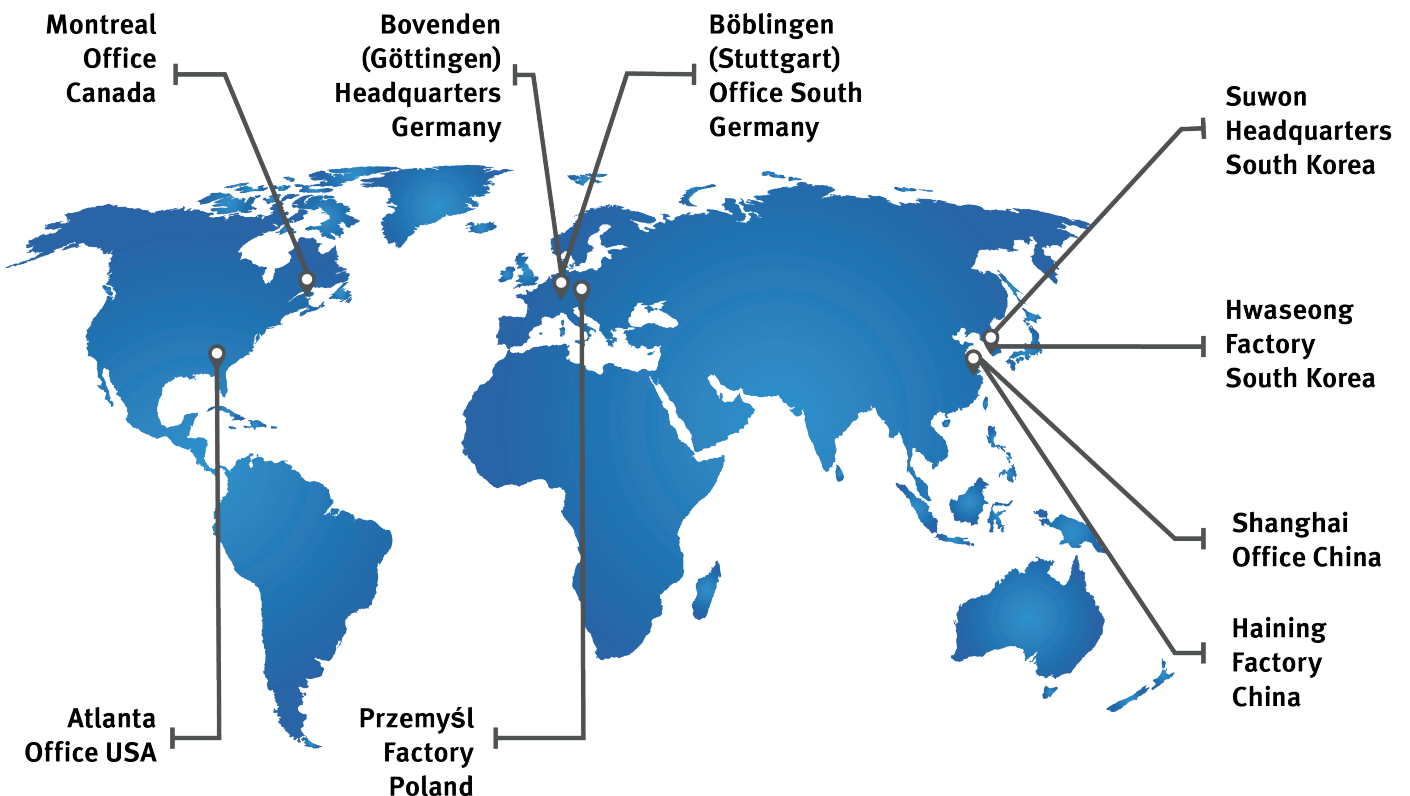
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KEY FACTS

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
- Factories in Germany, Korea, China & Poland
- Experienced project management team with project sizes up to 100 millions euros
- Thermal process equipment up to 3000 °C

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THE L2P CORE PROCESS EVERY STEP AT A GLANCE

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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



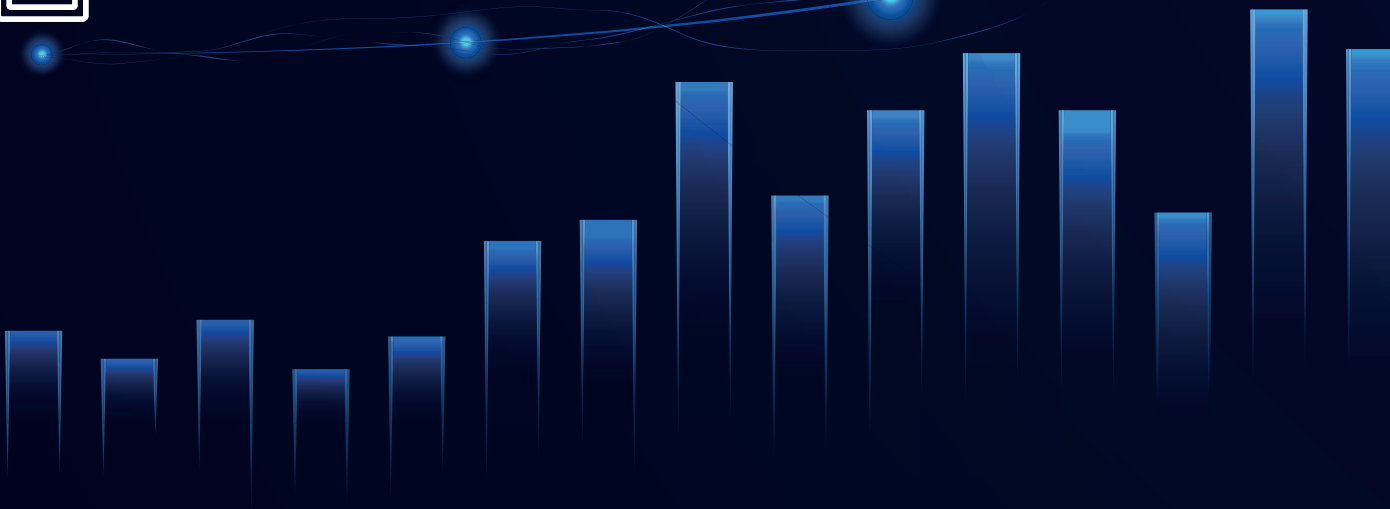
DEVELOPMENT

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

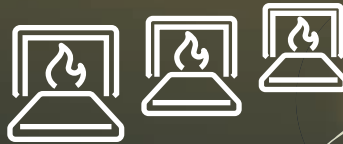


VALIDATION

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



NEXT-LEVEL
GW PRODUCTION



START OF
PILOT PRODUCTION



TRANSFER

- Documentation of developed process specification
- Calculation of Total Cost of Ownership
- Showcasing upscaling potentials
- Service concept



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.

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MEET OUR TEAM

You would like to learn more about our solutions for SOFC/SOEC producers? We would be pleased to show you in a personal appointment what we can do for you.



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