

Photos: ABP

The ABP service is directly available as „Expert on Demand“ online without any need for traveling (Figures: ABP).

## Hybrid Internet of Things service solutions for the foundry industry

The changing global economic environment and the change in social values with the desire for sustainability are forcing energy-intensive industries in particular to further optimize their processes. The new technical possibilities by digitalization allow to move the boundaries of lean principles further. For this purpose, ABP Induction offers a web-based customer portal that provides innovative hybrid service solutions.

This brings ABP closer to the plant operators and supports them in their daily work and maintenance, and in training their staff.

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Increasing productivity and quality while simultaneously reducing environmental impact and production costs are challenges that foundries are confronted with every day. Over the past few years, a large number of companies have addressed this challenge in the spirit of lean and agility and developed suitable concepts for the economical and time-efficient use of the most important production factors within the framework of all corporate

activities like equipment, personnel, materials, planning and organization. The fourth industrial revolution (Internet of Things, abbr. IoT) with its machine-oriented data evaluation by machine learning and network-based interaction between production plants, but also the consolidation of the machine manufacturers' know how with that of the operators, will advance the processes of self-optimization. Finally, it will lead to Lean 4.0 [1,2].

A high degree of transparency of the machine data from production is crucial in this context [3-8]: The product quality is documented seamlessly from scrap selection to the final product. Fault information and condition monitoring systems are available throughout the company, enabling faster reaction to production interruptions and accelerating the resumption of production [3-6]. In addition, predictive and preventive maintenance concepts based on

the analysis of real-time data enable proactive maintenance and repair [7]. Operators benefit from additional information and recommended actions [8]. The machine manufacturer obtains direct feedback on the operation of their products that can be used directly for further development. New service concepts enable the manufacturer to get closer to the operators and support them with his expertise [9].

As a leading manufacturer of induction systems for ferrous and non-ferrous applications [10-12] (Figure 1), ABP Induction offers a high number of assets in the production value chain of a foundry with its crucible, channel and pouring furnaces. The company sees itself as a competent partner which develops in cooperation with the foundry operators the most suitable individual solutions, both with existing high-end products in furnace and converter technology and with novel digital products. The optimization of the melting and pouring processes as well as the support of the foundries in terms of maintenance and training using web-based technologies in combination with the ABP domain knowledge are the drivers of the digital service solutions.

### Motivation

The digitalization level is still very different in the foundries. All foundry owners are aware that they must invest in digital solutions to stay competitive in the future, but most of them hesitate to start. That is the result of the discussions in the working team "Foundry 4.0" (German: Gießerei 4.0) of the Federation of the German Foundry Industry (German: Bundesverband der Deutschen Gießerei-Industrie, abbr. BDG). The working group published a guideline to help foundries to analyze their digitalization level and to give them approaches for development. Ten topics are outlined in this guideline [8]:

- > Data acquisition in production,
- > Data processing in production,
- > Machine to machine communication (M2M),
- > Process automation by using robots,
- > Flexible production, flexible resources,
- > CAx (computer-aided) technology,
- > Product development,
- > Process development,
- > Information and communication structure,
- > Employees, management and organization.



**Figure 1:** ABP is a technology leader in furnace and converter technology with the most powerful induction furnaces in the world (65t, 42MW).

It is becoming obvious that digitalization is not limited to machine-oriented technology improvements. Ultimately, change processes must be implemented by employees and managers who perceive these changes as an opportunity and are committed to new technologies and information and learning methods [8] (Figure 2). In line with the lean philosophy the human must be in foreground when implementing new digital solution. That is why the BDG recommends that the focus should not be exclusively on technical improvements but rather on all subject areas and that they should be brought to the same maturity level [8]. Summarized, every company needs a digital strategy.

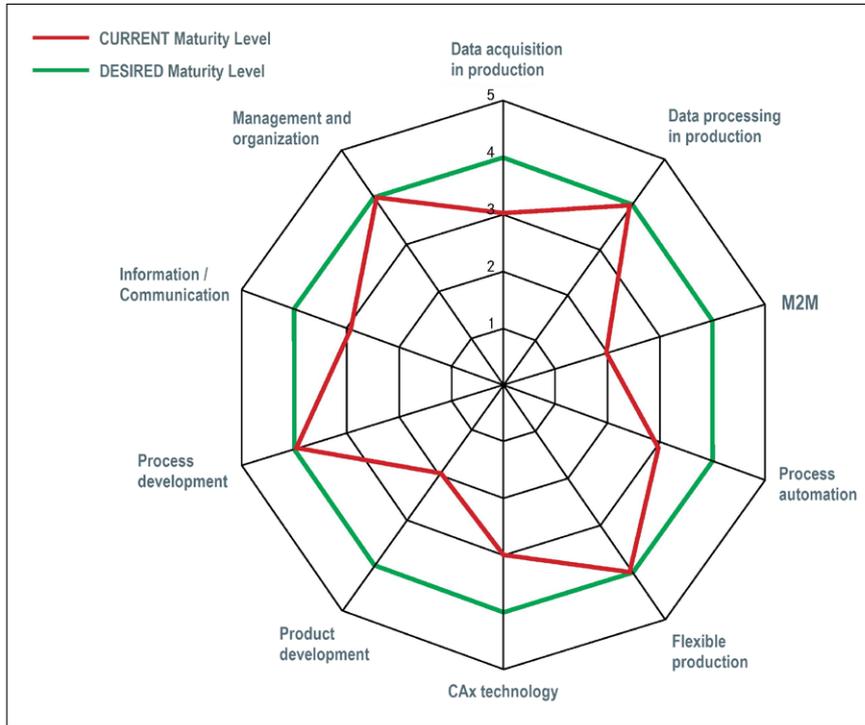
ABP Induction committed itself early on supporting foundries in this process and also recognized its own opportunity to get closer to the operators in order to be able to offer customer-oriented service solutions and expedite its own developments in the field of furnace and converter technology. This

results in hybrid IoT service solutions that complement ABP's existing service strategy. The starting points were the machine-to-machine communication in conjunction with mapping the digital twin and the improvements in information and communication structure regarding new maintenance concepts and training for machine operators. All solutions provide added value to foundry operators directly.

### Hybrid IoT service solutions

„What if your furnace had a smartphone?“ asks Till Schreiter, CEO and President of the ABP Induction Group, and answers his question immediately: „It would completely change the relationship with your plant. It would allow your furnace to notify you when needed, to look for ways to improve per-

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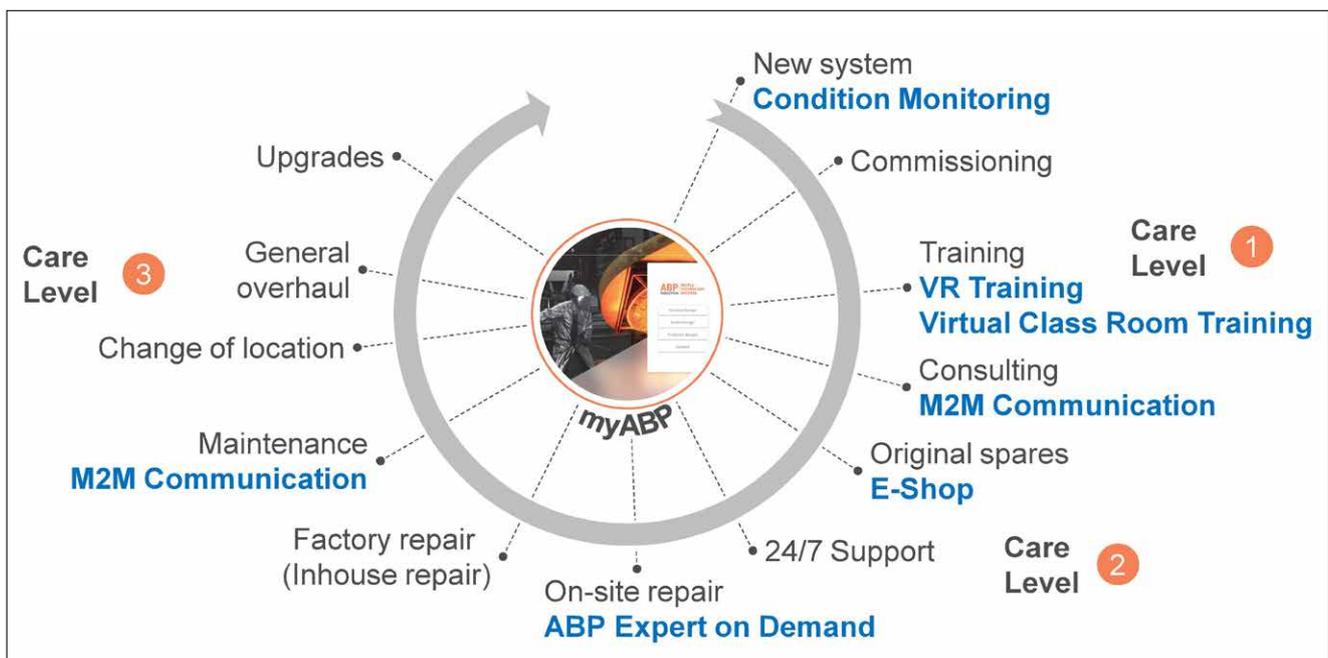
**Figure 2:** The BDG guideline (BDG Kompass) enables analyzing one’s own degree of digitalization and it supports the digital transformation process. Each of the ten topics are divided into five degrees of maturity [8].

formance, and even to plan the best production cycle. And that is exactly what we want to achieve. Service apps use the connection to device sensors and make all information available to the right people at exactly the right time”.

Technology giants such as Amazon, Facebook, Google and Apple have already revolutionized the way ever-

yone behaves in their private lives, enabling new ways to make information available everywhere. The way we communicate and interact with our environment has changed fundamentally in recent years. However, this has only been reflected to a limited extent in the day-to-day work of the foundries. Although there have been improvements in plant technology and pro-

cess automation, nothing can compare with the progress which is already being made in private life. Service is the interface between ABP and its customers in the foundries. ABP has fully revised its service solutions in recent years. Operational excellence has been improved continuously, products and processes have been digitalized and optimized, and service solutions have been completely redesigned and established successfully [9] (Figure 3): The myABP platform is the logical digital extension of our service offering and the introduction to the new digital world. The platform works transparently, in a location and time independent manner. It is designed for all processes and machines involved in a foundry, regardless of whether it is a melting shop, sand preparation or molding plant. Any upstream and downstream processes can be connected easily to the platform. All system-related documents are available in the platform, from product descriptions and drawings to maintenance manuals and service reports. MyABP acts as a personal information and maintenance assistant for melting and heating plants, also those of different manufacturers. It is the central collection point for insights and advice, and it consolidates all relevant knowledge about the plant. Operators can make use of it to manage their services, parts lists, documentation, offers and orders, to request support and to establish connections to the various systems that are used in pro-



**Figure 3:** The digital products marked in blue complete ABP’s service concept C3 (Complete Customer Care). For further information please refer to <https://c3.abpinduction.com>.



**Figure 4:** The virtual training scenarios on operation, maintenance and safety aspects received great attention at GIFA 2019. The training sessions can be used with VR glasses or PC.

duction [9]. The ABP service department can be accessed directly via the worldwide web as an „Expert on Demand“ using data glasses, tablet or smartphone. ABP helps maintenance personnel in troubleshooting by enabling ABP experts to look through the eyes of the maintenance team via the digital devices. This saves travel costs, reduces production downtimes and protects the environment [9,13].

Every employee in the foundry can be trained in virtual training scenarios

on a digital twin of their own plant, either on a PC or with VR glasses (Figure 4). Virtual classrooms allow to interact with the experts from ABP without travelling to training sessions. The participants in the training courses receive suggestions which training courses are required to carry out upcoming maintenance work, to increase productivity and to ensure a high level of safety in the operation of the plants [9,13]. „A revolution is not something that is done just by one person or company. Therefore we rely on

the assistance of our customers, suppliers and other machine and plant manufacturers, and on partnerships with other companies and universities to enable us to develop the platform continuously,“ says Mr. Schreiter, looking optimistically into the future.

### Summary

The digital transformation of foundries can be understood as a continuation of business optimization based on the lean philosophy, with the aim of further increase of productivity and quality while reducing environmental impact and costs, and thus remaining competitive. This is a true change in culture that must be addressed jointly by foundry operators and machine manufacturers. ABP’s hybrid IoT service solutions bridge the gap between traditional services and a new level of connectivity between plant manufacturers and foundries. The hybrid concept of these innovative service tools is to connect people, machines and processes across manufacturer boundaries by the new myABP platform and to lead them through the ongoing digital revolution with ever new service apps.

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**References:**  
[www.cpt-international.com](http://www.cpt-international.com)