

# UdZ

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## The Data-driven Enterprise

# FIR international

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With the Right Approach into the Digital Future**

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## 5G

The next generation of wireless connectivity, 5G, is becoming a hot topic in industry. However, there are still many myths and misconceptions surrounding the new wireless technology. By enabling machine-based communications, 5G's capabilities go far beyond mobile broadband.

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## IMPRINT

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## BaSys4Dash

The aim of the 'BaSys4Dash' research project is to develop a partially automated, dashboard-based decision support system for two user companies. The BaSys 4.0 software system provides the basis for the partially automated evaluation of processes and the visualization of information on dashboards that is tailored to the situation and application at hand.

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## MarryIT

The aim of the research project is to support SMEs by providing a methodically guided as-is analysis and evaluation of the current IT-OT integration status.

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## EDI-Multiply

The aim of this sub-project is to achieve a multiplier effect in terms of potential business connections.

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E-Mas:

# FIR Exports Its Professional Training Program for the Automotive Sector to Mexico

Within the last three years, *FIR* made a decisive step in developing from a leading institute at the national level to an internationally active player within the areas of ‘business organization’ and ‘digital transformation’. By developing and implementing the E-Mas continuing education program, *FIR*, together with its partners *MTM ASSOCIATION (MTMA)* and *WBA Werkzeugbauakademie (WBA)* and in collaboration with the private university *TEC de Monterrey (ITESM)*, has succeeded in providing an innovative, consistent and sustainable blended teaching and learning program on tactical and operational production management in the Mexican automotive sector. Furthermore, by establishing the E-Mas partner network, which brings together high-profile companies operating in Mexico, major local training and research institutions, and the Mexican government, *FIR* has created an important foundation for its future activities in the region. The research and development project ‘E-Mas’ is funded by the *German Federal Ministry of Education and Research* within the research program *Internationalisation of Vocational Education and Training* under the registration number 01BE17012A and managed by the project management agency *DLR*. >

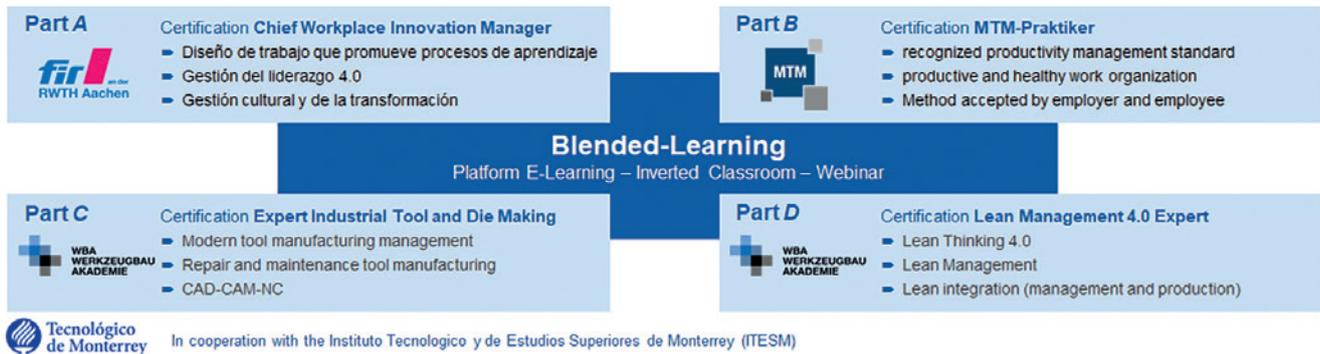


Figure 1: Training program for manufacturing companies in Mexico Production management for Industrie 4.0 Transformation in Mexico

In the last decade, the number of cars produced annually by the Mexican automotive industry doubled from 1,561,052 cars in 2009 to 3,986,794 vehicles manufactured in 2019 alone. This growth received a strong boost when the construction of assembly plants by Audi, BMW and Kia-Hyundai was announced: German manufacturer Audi began producing the Q5 model in 2012, BMW started production of its 334 model there in 2014; and South Korean automaker KIA-Hyundai followed suit with its Rio and Forte models in the same year. Other major assembly companies already present in the country also opened new plants, such as FCA's Jeep and Compas, an alliance between Daimler and Renault-Nissan. Furthermore, the output of OEMs already present in the country, such as Toyota, Mazda, GM and Ford, increased as well over the last decade.

Good infrastructure and logistics conditions, a beneficial macroeconomic and regulatory environment, as well as access to various export markets contribute to the dynamism of the Mexican automotive industry: 11 free trade agreements with 46 countries, complementary economic agreements with most Latin American countries, as well as investment protection agreements with countries such as China, Singapore and India facilitate collaborative ventures. This dynamism and growth continued to boost the demand for specialist staff with certified expertise in specific areas, highlighting the demand for and benefits of the E-Mas Continuing Education Program (E-Mas for short), the teaching and learning program on “tactical and operational production management” developed jointly by FIR, MTMA, WBA and ITESM. E-Mas has been designed to counteract the shortage of specialists at the middle management level at automotive manufacturers and suppliers. The course offering is aimed at HR developers, operational managers responsible for production and change processes, and team and group leaders in production.

## Getting Ready for Transformation

FIR, MTMA and WBA have jointly developed continuing education courses based on a blended learning concept combining digital content with face-to-face classroom activities. Under the motto of “Effective and efficient work design that promotes learning,” FIR implemented the “Chief Workplace Innovation Manager” course, which provides comprehensive knowledge in the areas of transformation management towards Industrie 4.0, design of work processes that promote learning, change management, and intercultural management with particular emphasis on collaboration between Mexico and Germany.

MTMA has established the MTM internship with a focus on “Innovative Productivity Management.” In this program, participants learn how to correctly apply time measurement methods and acquire knowledge about planning, designing and optimizing processes, work systems, and products. Upon completion of the internship, participants receive a certificate listing their newly acquired knowledge and skills.

WBA dedicated itself topics such as “Modern Toolmaking Management” and “Lean Methods Adapted to Industrie 4.0”, thus preparing the creation of two certification courses. The first course, “Expert Industrial Tool and Die Making,” teaches concepts and methods for designing and building tools according to international standards. Participants in this course use current technologies to optimize processes through simulation and automation, gain information for the identification of potential risks and damage, and, based thereon, propose solutions to eliminate these risks. They also acquire skills to control and manage the design process and to develop and manage tool maintenance strategies. WBA's second certified course, “Lean Management 4.0 Production Expert,”

provides participants with practical knowledge and skills to apply the methods and principles of lean thinking and to exploit the potential benefits of production in Industrie 4.0. The course is based on five fundamental principles: Value from the customer's perspective, value flows, creating a continuous flow, facilitating pull, and striving for continuous improvement.

The goal of the program is to empower companies and employees to increase productivity, continuously evolve their processes, keep technical systems flexible, and improve the well-being of their employees. They are put in a position to apply agile production management in their companies and to implement long-term strategies.

### Intense Collaboration – a Pillar of the E-Mas Program

Based on the implementation strategy of the E-Mas program in Mexico, *FIR* identified *Tec de Monterrey (ITESM)* as a strategic partner and signed a cooperation agreement with the university to promote the program. *ITESM* played a key role in implementing the program, as its existing continuing education platform made it possible to connect with business leaders, especially in regions known to be Mexico's major automotive manufacturing sites: *Campus Mexico City*, *Campus León*, and *Campus Guadalajara*. These regions in particular were the targets of networking activities and served as locations for conferences, workshops, lectures, and the in-person activities of the certified courses. These activities facilitated the process of getting in touch with various key players in business, government, and education, which in turn was instrumental in expanding the E-Mas program to other Mexican states and other industrial sectors. Company visits helped to tailor the educational offerings to the specific requirements posed by the business environments of the companies in question. These visits made it possible to identify themes and topics to further refine the courses on offer. In addition, the exchange on site helped to identify and address specific challenges, such as the high staff turnover in the automotive industry, which poses a problem for longer-term staff development.

The E-Mas program assists managers in educating and training their employees to meet evolving requirements and also sharing their visions on various technological and personal development topics. Via

the networking platform, experts from the industrial environment were invited to participate as speakers in international conferences, which have been organized since 2019. Furthermore, based on the collaboration agreements, the heads of the consortium members of the E-Mas program had the opportunity to host workshops or participate as guests in events. For example, the project leader of E-Mas, *FIR's* Roman Senderek, was able to participate in the "Engineering Week 2019," an event organized by *Continental Automotive* in Guadalajara, where he led a workshop titled "Competencies for Industrie 4.0 Transformation in the Automotive Industry."

*FIR* formed another important alliance with the Secretariat of Economic Development of the State of Jalisco. A cooperation agreement was concluded during a visit of this government body to *FIR in Aachen*. The visitors had the opportunity to gain insights into the activities of the *Smart Logistics Cluster on RWTH Aachen Campus* and to visit the *Demonstration Factory Aachen*, the *Fraunhofer Institute for Production Technology*, and the assembly plant of the electric vehicle manufacturer *e.GO*.

### E-Mas Networking Platform for the Manufacturing Industry

A series of international conferences held in Mexico City, León, Guanajuato, Guadalajara, and Jalisco significantly contributed to the networking platform. To promote the program within the business environment and facilitate networking activities between the automotive manufacturing industry and governmental and educational institutions, two international E-Mas conferences were held.

The first conference, titled "The Path to Industrie 4.0 – Training the Necessary Skills for Transformation in the Mexican Automotive Sector", was held in the spring of 2019 on *Tec de Monterrey's Campus León*. In February



2020, the second conference was held under the motto of “Moving to the Future 4.0 – Concepts and Technologies for the Transformation of the Mexican Industrial Sector.” More than 200 participants from various companies such as *Ingenics, Schaeffler, Volkswagen, Hasco, Schnellecke, Scheugenflug, BASF, BMW, ZF, and Magna* attended each of the conferences. The program consisted of 18 keynote presentations, for example from *Andonix, Intel, Continental, Deloitte, Bosch, HP, and BMW*. The E-Mas consortium partners held nine workshops on various specialist topics addressed in the courses. In addition, the collaboration partners were invited to participate as speakers in the 18 parallel sessions as well as in the panel discussions with representatives from industry, government and educational institutions. Participants had the opportunity to participate in a company visit, either to *Continental Automotive* or to the *Intel Design Center*.

Both conferences promoted the exchange of ideas, discussion of relevant technological topics and concepts, and collaboration among the participants. New alliances emerged among the various participants, for example between *BMW* and the *Secretariat of Economic Development of the State of Jalisco*.

## E-Mas Partner Network

All of these activities resulted in a dense network around the E-Mas consortium, which is made up of companies, government agencies, and educational institutions. This network serves to exchange expertise, disseminate

knowledge, and promote collaboration in the planning, design and implementation of short-, medium-, and long-term projects with the goal of supplying the skilled workforce needed to implement *Industrie 4.0* in automotive production.

In the future, the E-Mas network aims to assist Mexico in launching other projects, which are supported not only by the *Federal Ministry of Education and Research (BMBF)*, the *German-Mexican Chamber of Commerce and Industry (CAMEXA)*, or the *German Society for International Cooperation (GIZ)*, but also by German private initiatives: due to the expansion of German corporate activities in Mexico, for example, *PEM Motion* and *KIT Hub* have recently established offices in *San Luis Potosi* and *Guanajuato*, respectively.

For its part, *FIR*, together with *MTMA* and *PEM Motion*, has developed the ‘Y-Mas’ project, which aims to expand the educational offerings on topics such as industrial logistics, ergonomics, and methods of production implementation beyond Mexico to the Spanish-speaking countries of Latin America. As part of *KIT Hub*, a mutual collaboration was initiated to support the delivery of courses offered by the *WBA Tooling Academy*. Today, in collaboration with the government of the state of *Guanajuato*, the academy is conducting a feasibility study for establishing a higher education institution. The results obtained will facilitate training for specialists in different areas related to industrial production.

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