

# YOKOHAMA'S MAJOR INDUSTRIES ADVANCED MANUFACTURING

## *An advanced manufacturing hub ready for industry transformation*

The manufacturing industry is on the verge of a major transformation, with advanced technologies such as the Internet of Things (IoT), artificial intelligence (AI), and biotechnology increasingly becoming key determinants of success for companies. This shift, often called Industry 4.0, is expected to drastically change the outlook of the industry, lowering barriers to entry, dissolving lines between related industries and exponentially speeding up the development of new products and processes. Yokohama, which is home to both forward-thinking manufacturing companies and leading IT and life science companies with the potential to become powerful partners to these manufacturers, has the capacity to emerge as a leader in 21st century manufacturing.

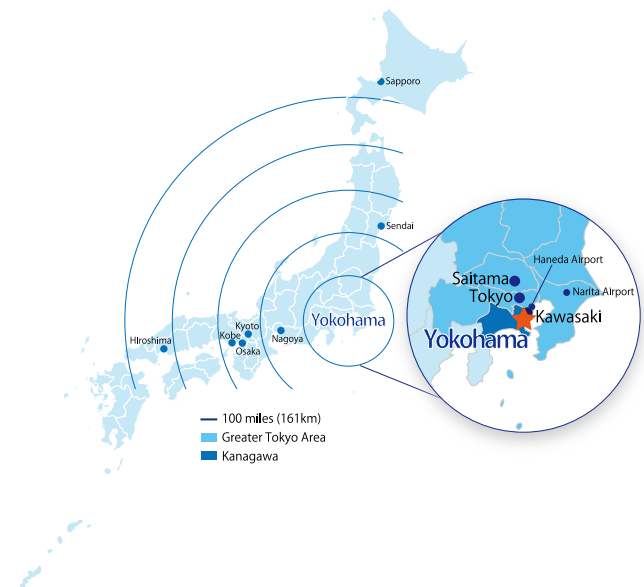
Ever since it opened its port to foreign trade 160 years ago, Yokohama has been recognized as one of Japan's leading industrial cities. The manufacturing sector in Yokohama is the fourth largest in scale following Tokyo, Osaka and Nagoya in terms of the number of business establishments and employees, and second in the nation after Kawasaki in the amount of manufactured goods shipped.

The city has seen a significant clustering of manufacturing companies over the years, especially those related to the automotive industry. In addition to the headquarters of NISSAN MOTOR CO., LTD., 13 of the world's top suppliers of automobile parts have established their Japanese subsidiaries or R&D facilities in Yokohama. Many manufacturers outside the automotive sector have also set up major establishments in Yokohama. For example, the Japanese subsidiaries of Caterpillar Inc., the world's largest construction machine maker, and KUKA Robotics, a leading industrial robot manufacturer headquartered in Germany, have both recently moved their Japanese head offices from Tokyo to Yokohama.

Another recent trend is that global manufacturers have been setting up their open innovation bases in Yokohama. In 2016, Hitachi, Ltd. launched a new open-laboratory within the Yokohama Research Laboratory (YRL). In 2017, Murata Manufacturing Co., Ltd. announced plans to establish its new Minato Mirai Innovation Center in the area, and in 2018 Yamaha Motor Co., Ltd. started operations of the Yamaha Motor Advanced Technology Center in the Shin-Yokohama district. The heavy-industry manufacturer IHI Corporation also has its R&D and engineering centers in Yokohama.

The momentum for innovation is reaching far beyond major companies. The City of Yokohama operates its very own Small Business Innovation Research (SBIR) program, which provides funding and step-by-step support to local small and medium-sized enterprises (SMEs) as they work to commercialize their innovation seeds in manufacturing. The city has also actively promoted open innovation initiatives between Yokohama-based global companies, SMEs, startups, universities and other relevant organizations through its two distinct collaboration platforms: IoT Open Innovation Partners Yokohama (ITOP Yokohama) and Life Innovation Platform Yokohama (LIP.Yokohama). The goal of the city is to stimulate cross-sector collaboration between IT, life science and manufacturing companies of all shapes and sizes.

The Yokohama Industrial Development Corporation (IDEC Yokohama), which operates as the main SME support center of the City, plays a central role in supporting companies through ITOP Yokohama and LIP.Yokohama and also runs several incubation centers throughout the city. IDEC also hosts the Yokohama Business Grandprix, a startup pitch competition which awards multiple cash prizes including special prizes for student and women entrepreneurs and provides long-term business support to finalists. Additionally, IDEC has published the "Yokohama Monozukuri (manufacturing) Company Guide" in an effort to aid manufacturing SMEs' product promotion activities directed at both domestic and international audiences and facilitates partnerships between Yokohama-based SMEs and companies overseas.



## Leading breakthroughs in research and building the next generation manufacturing workforce

Yokohama is home to top tier research institutions and universities pursuing groundbreaking research in a wide range of academic disciplines including science and engineering. At the same time, these institutions are producing highly skilled engineers and specialists who will continue to support the prosperity of the region's manufacturing industry in the future.

Yokohama's nationally recognized academic institutions are leading front line research in various interdisciplinary fields. Yokohama National University (YNU) has a center for advanced research called the Monozukuri Life Innovation Research Center which aims to develop a platform which accelerates innovation in 3D nano-fabrication, high precision/high aspect fabrication and 3D molding techniques to create groundbreaking products in the fields of health and welfare. The center works to develop various 3D micro devices such as micro sensors, flexible sensors, lab-on-a-chip devices and artificial organs. Through this program, YNU promotes collaboration between academic and industry partners and works closely with the Kanagawa Institute of Industrial Science and Technology (KISTEC) and IDEC Yokohama. Another example is the Tokyo Institute of Technology (TITECH), which launched its Laboratory for Future Interdisciplinary Research of Science and Technology (FIRST) on April 1st, 2016 with the mission of creating innovative industrial technologies by fusing research fields such as mechanical engineering, information science and technology, electrical and electronic engineering, environmental engineering, disaster prevention engineering and social engineering. FIRST operates 11 distinct interdisciplinary research groups and envisions to contribute to the future prosperity of human society through their research findings and products. Both YNU and TITECH are also contributing to high skilled human resources development in STEM (Science, Technology, Engineering, and Math) fields.

Yokohama-based academic institutions, long-known for their first-class research in STEM fields, are now gearing up to further explore new research fields and prepare the future workforce for the era of Industry 4.0.

## Exploring creativity in manufacturing: the evolution from STEM to STEAM

Lately, SME manufactures in Yokohama have been leading a unique movement in design manufacturing, which involves

cross-industry collaboration between traditional manufacturing and industrial design. The Yokohama Makers Village is a branding project by metal processing companies in Yokohama that have come together to make cutting-edge products by combining the craftsmanship of traditional manufacturing companies with the inspiration of talented designers, including those from overseas. The project has given birth to quality products that integrate high-end design and technology which have received high praise in events such as the MILANO SALONE 2017 held in Milan, Italy.

### Initiatives

**ITOP Yokohama:** An innovation platform for collaboration and exchange, project implementation, and human resources development to spur the growth of new businesses in IoT, big data, AI, and robotics, while capitalizing on Yokohama's existing manufacturing and IT industries. In order to qualify for membership, companies/organizations/universities must be interested in engaging in open innovation to design new products or services using IoT etc., and either already work with SMEs or plan to involve SMEs in their prospective projects.

**Yokohama Industrial Development Corporation (IDEC Yokohama):** As the main SME support organization of the City, IDEC supports SMEs stabilize and strengthen their business bases, offers solutions for managerial issues, promotes the launch of businesses and the development of overseas business, all with the objective of contributing to the vitality of Yokohama's economy.

This is in line with Yokohama's continued efforts to transform itself into a "Creative City," adding on an Arts aspect to its original strengths in STEM. In 2005, the city successfully attracted the Graduate School of Film and New Media of the Tokyo University of the Arts, the top-ranking arts university in the nation, a testament to the city's focus on STEAM (Science, Technology, Engineering, Art, and Math). This has caused a steady stream of artists and creators to flow into the region, further fueling the creative culture and creating new possibilities of collaboration between the manufacturing and creative industries.

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