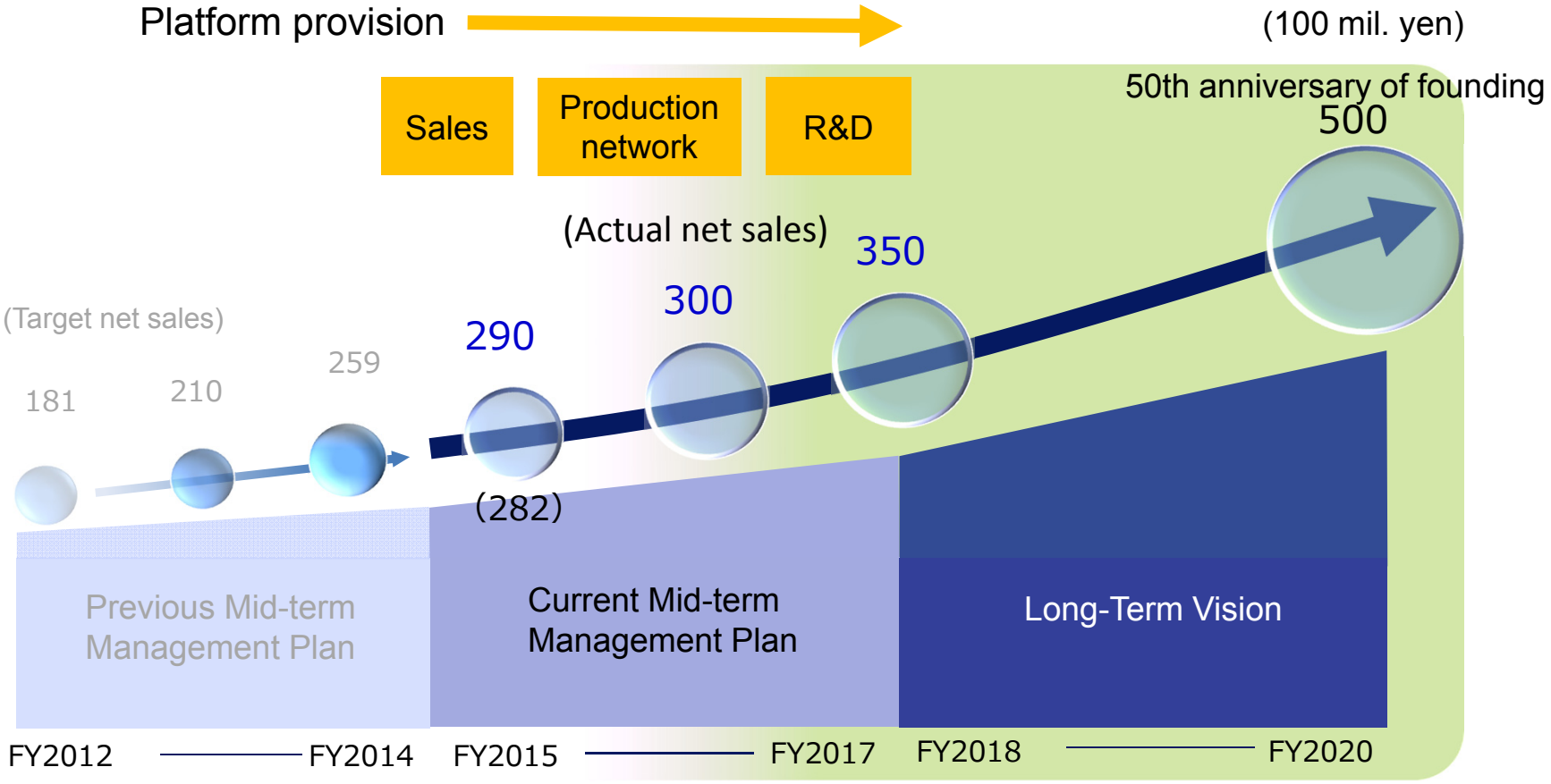
Future Outlook

Realizing our Long-Term Vision

Provision of platforms for sales, R&D, and production

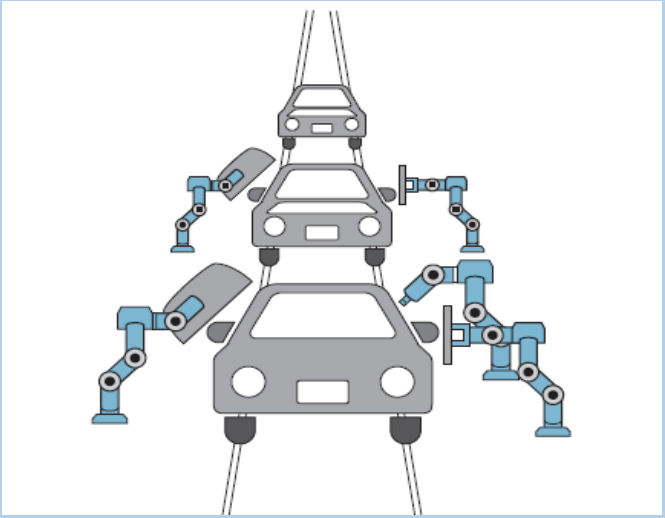


Sales: Trends in Main Application Fields (1)

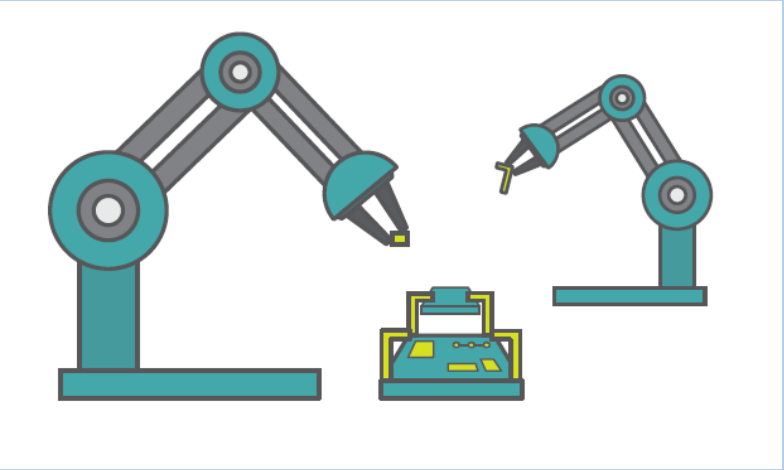
Industrial robots Provide high added value (load capacity, speed)

- Fusion of robots with AI and big data (IoT)

Handle welding, heavy lifting, high-precision



Advances in sensors enabling application to flexible manufacturing

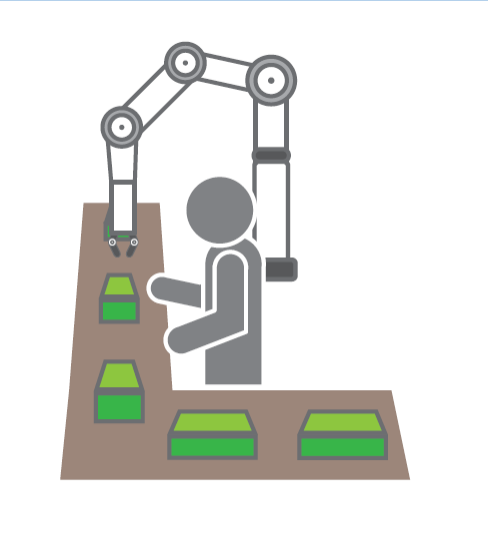


Sales: Trends in Main Application Fields (2)

Co-bots Low added value tasks

- Expanding collaboration between people and robots
- Replacing people with robots

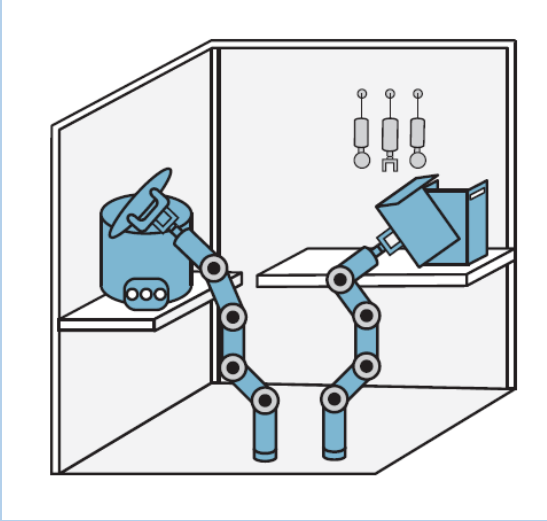
Collaboration between people and robots



Typical usage areas

- **Car manufacturing**
- **Manufacturing of electronic equipment and devices**
- **Food service industry**
- **Manufacturing of cosmetics, pharmaceuticals, and food**

Home appliance manufacturer examples:
Robots replacing people for cell production



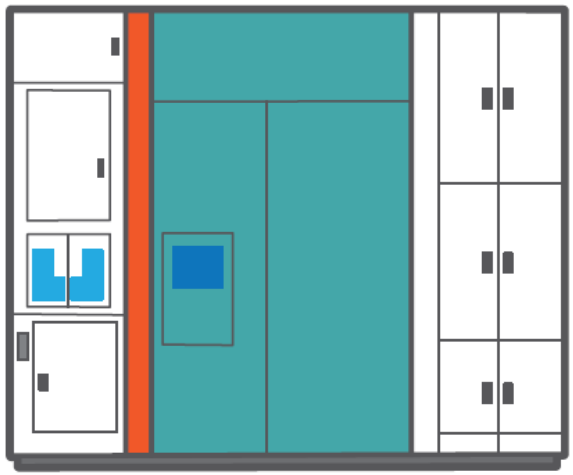
Sales: Trends in Main Application Fields (3)

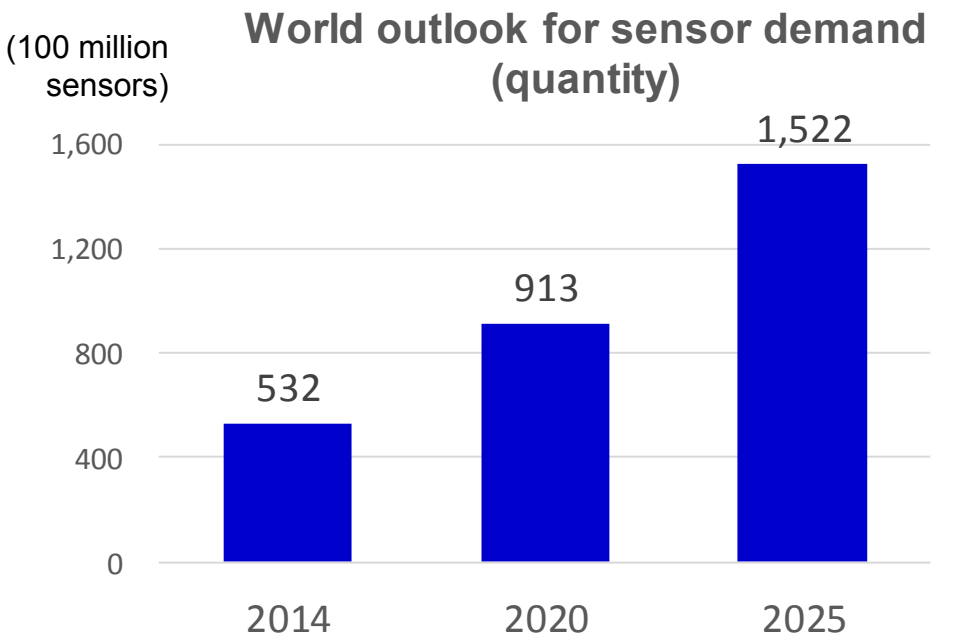
Semiconductor manufacturing equipment

On the way to the trillion-sensor era

- Expansion of investment in 3D (stacked) semiconductors
- Acceleration of development of latest miniaturization techniques

Semiconductor manufacturing equipment





Source: JEITA (Japan Electronics & Information Technology Industries Association)

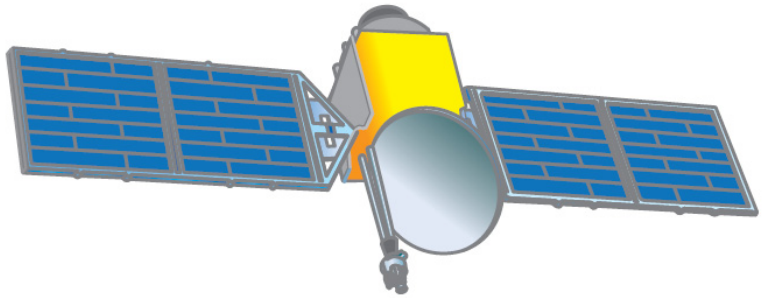
Sales: Trends in Main Application Fields (4)

Other

- In-vehicle
- Space
- Medical equipment

In-vehicle

Communication Satellites



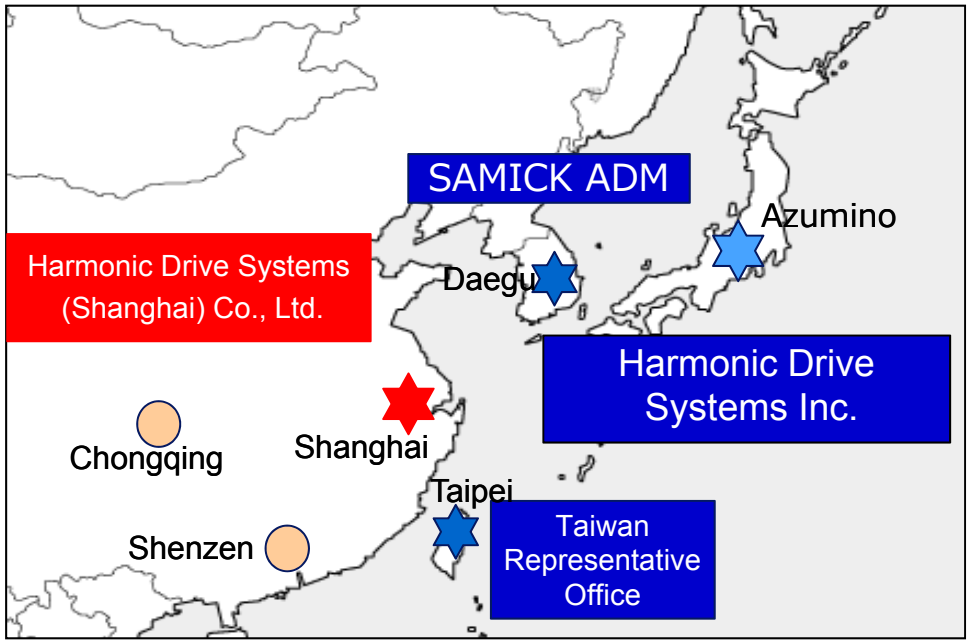
Sales (Asian Market)

Taiwan Representative Office established

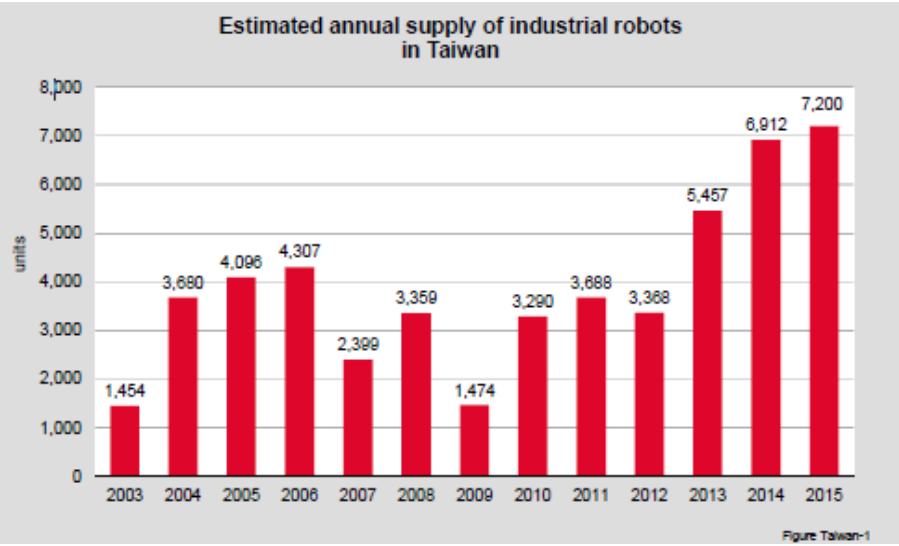
■ Electronic parts, semiconductors, EMS and other industries are flourishing

Markets for robots, semiconductor manufacturing equipment, machine tools and other factory automation products are also expanding

- New robot manufacturers, and makers of built-in EMS robots and collaborative robots, are growing

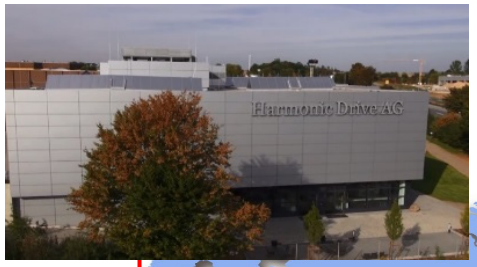


Industrial robot supply trends in Taiwan



Source: IFRS WR Industrial Robots 2016

Production: Worldwide Production Network



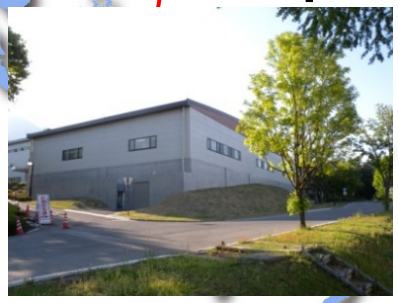
Harmonic Drive AG
■Location: Limburg, Lahn, Germany
■Production scale: 10,000 units/month

Germany

South Korea

Japan

USA



SAMICK ADM Co., Ltd.
■Location: Daegu, South Korea
■Production scale: 1,000 units/month

Harmonic Drive LLC
■Location: Massachusetts, USA
■Production scale: 4,000 units/month

Japan Domestic

Harmonic Drive Systems Inc.
Harmonic AD, Inc.
Harmonic Precision Inc.
Winbel Co., Ltd.

■Production scale: 50,000 units/month

Production: Further expansion in production capacity to 80,000 units/month

Production: Crossed roller bearings

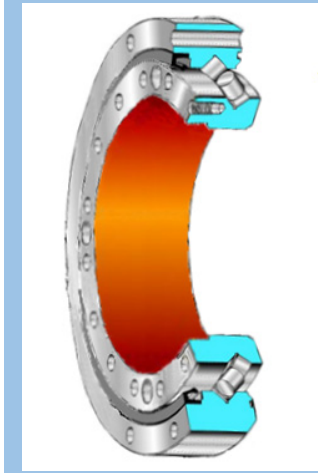
Harmonic Precision Inc.

■Location: Matsumoto-shi, Nagano

■Employees: 118 (including temporary staff)
(as of March 31, 2016)

Internal structure of unit product
Crossed roller bearing

Crossed roller bearings

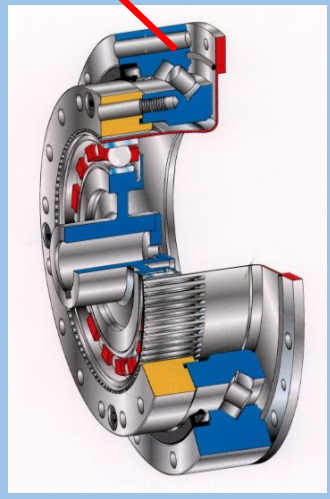


Crossed roller bearings (CRB) are bearings using cylindrical rollers.

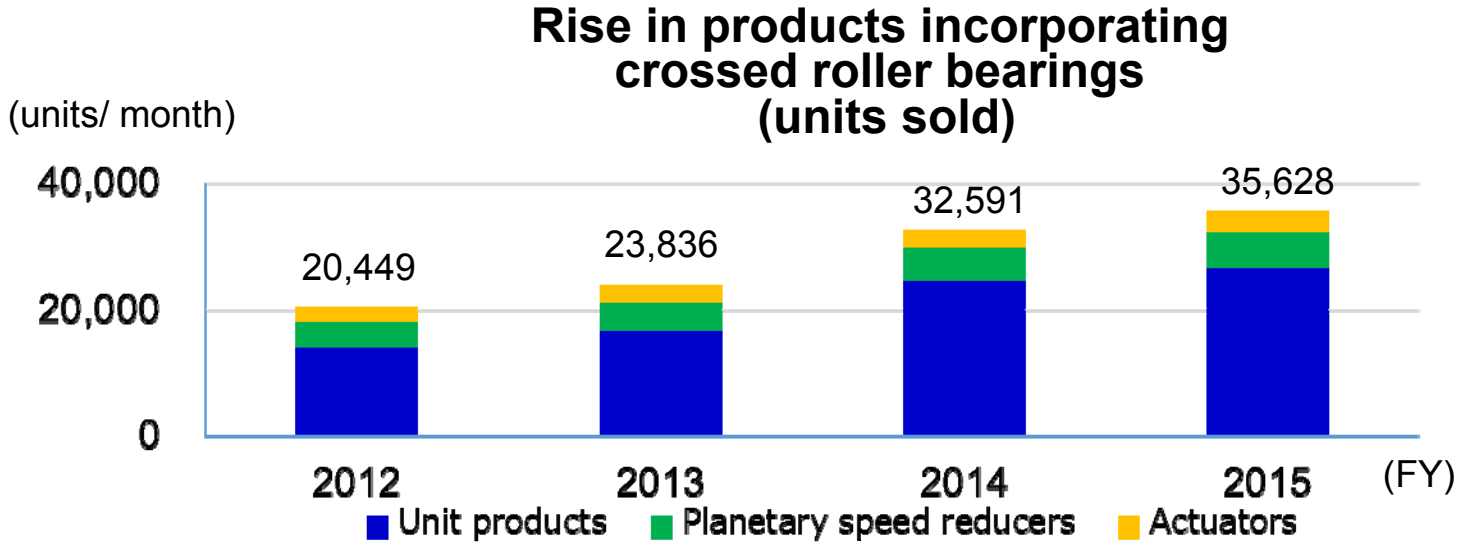
Features

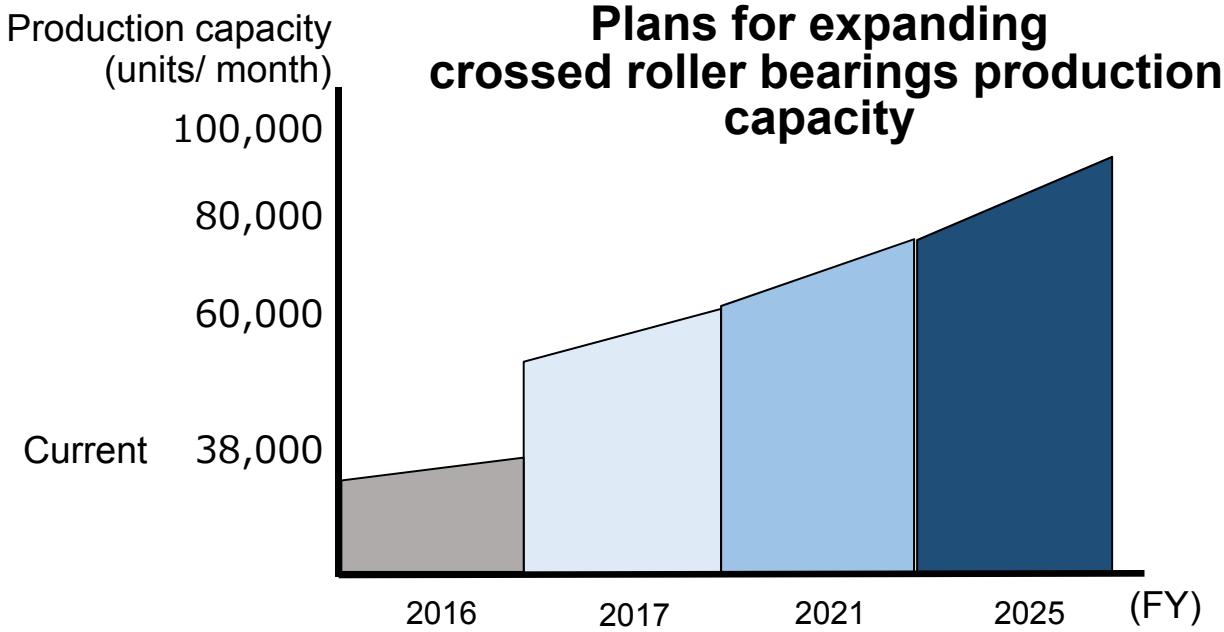
- Compact shape
- Large load capacity
- High strength at all angles

→ Standard in HarmonicDrive® unit products, planetary speed reducers, and mechatronics (MT) actuators

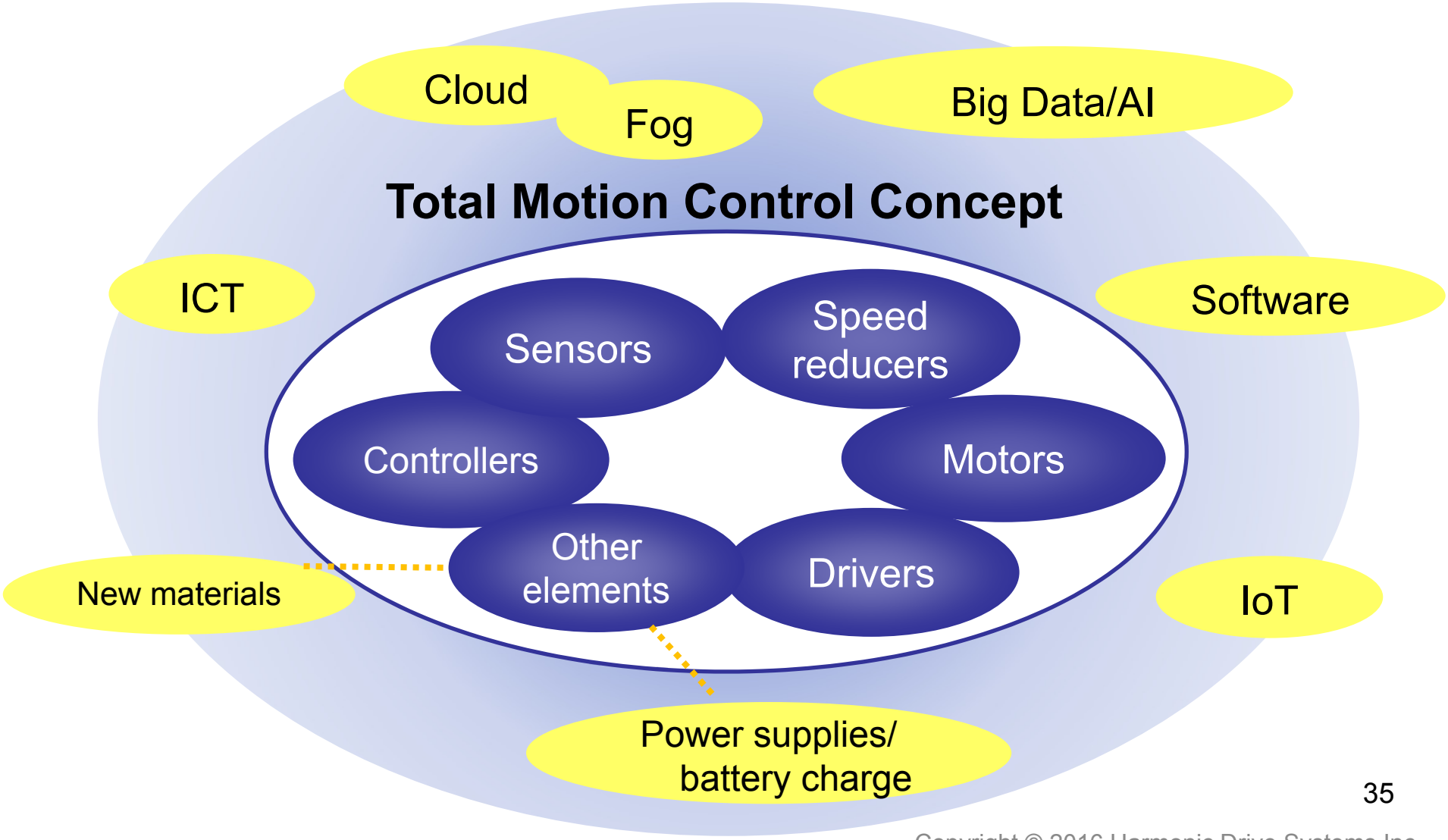


Production: Capacity expansion for crossed roller bearings





Research and Development:
The Total Motion Control Ecosystem



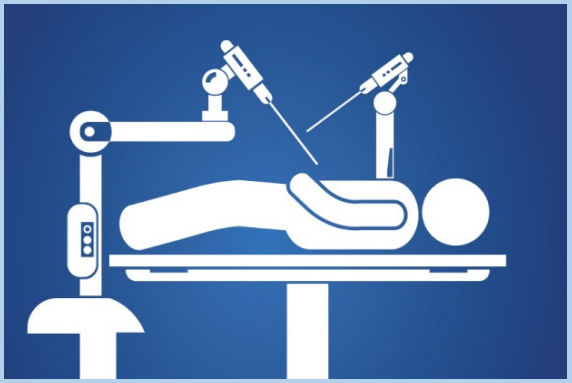
Research and Development: Deepening of R&D

■HarmonicDrive® fundamental/applied research

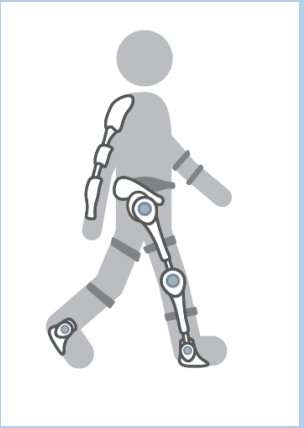
- Lubricating materials
- Stress analysis
- Tiny 5 mm-diameter HarmonicDrive®

■Development of applications

- Space
- Medical equipment
- In-vehicle
- Service robots



Surgical robot



Service robot

Research and Development: Deepening of R&D

■Silicon Valley office established

- Gateway to latest robotics technologies
- Joint research with SRI*: Abacus drive (pure rolling cycloid)
- Joint research with other US research institutions and universities

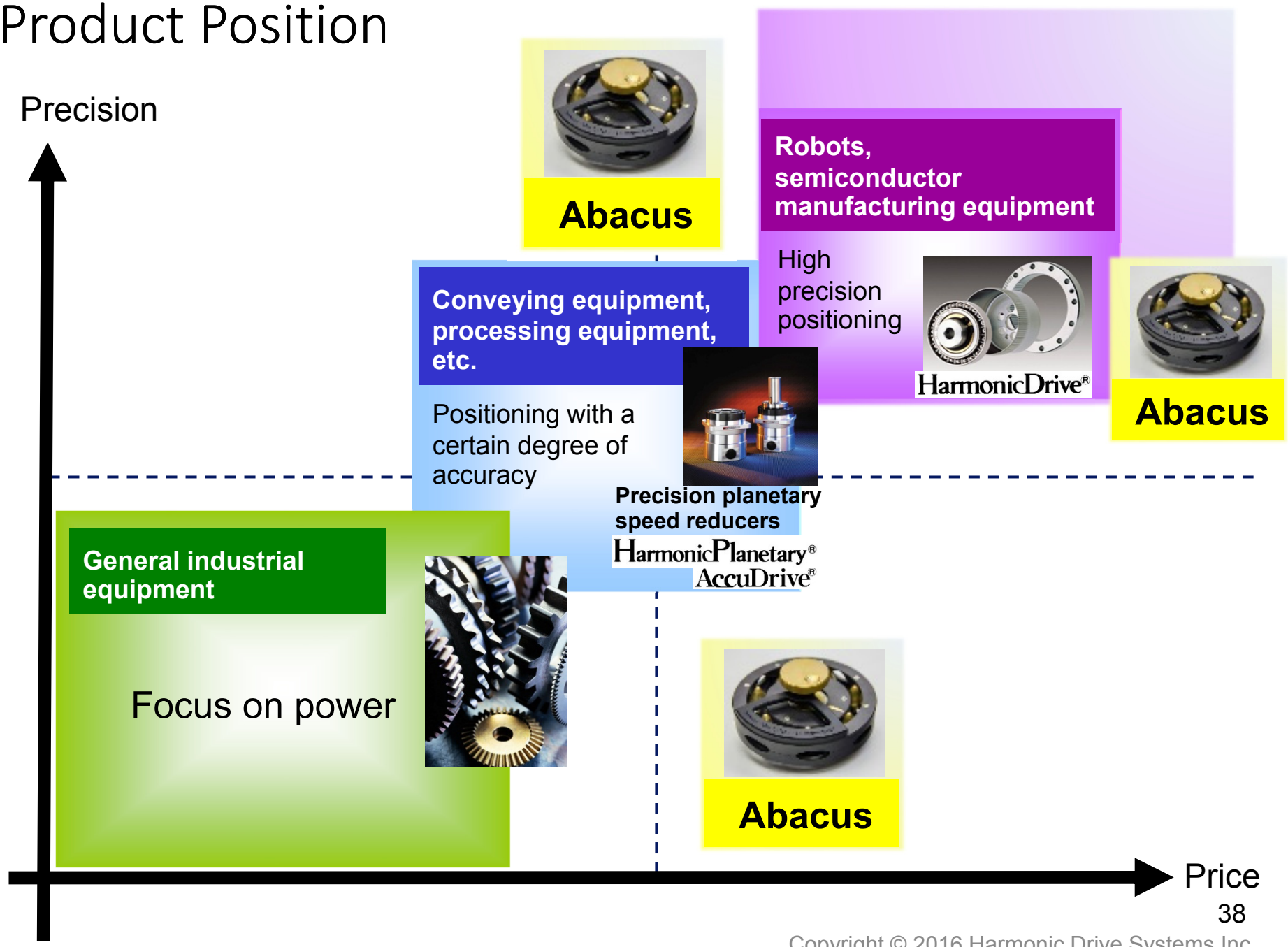
*Stanford Research Institute

Abacus drive
(pure rolling cycloid)

Advantages of the Abacus drive

- **High energy efficiency (low loss)**
- **Low reduction ratio region (complementary with strain wave gearing devices)**
- **Few parts**

Product Position



Our Growth Trajectory