Future Outlook

Orders by Region

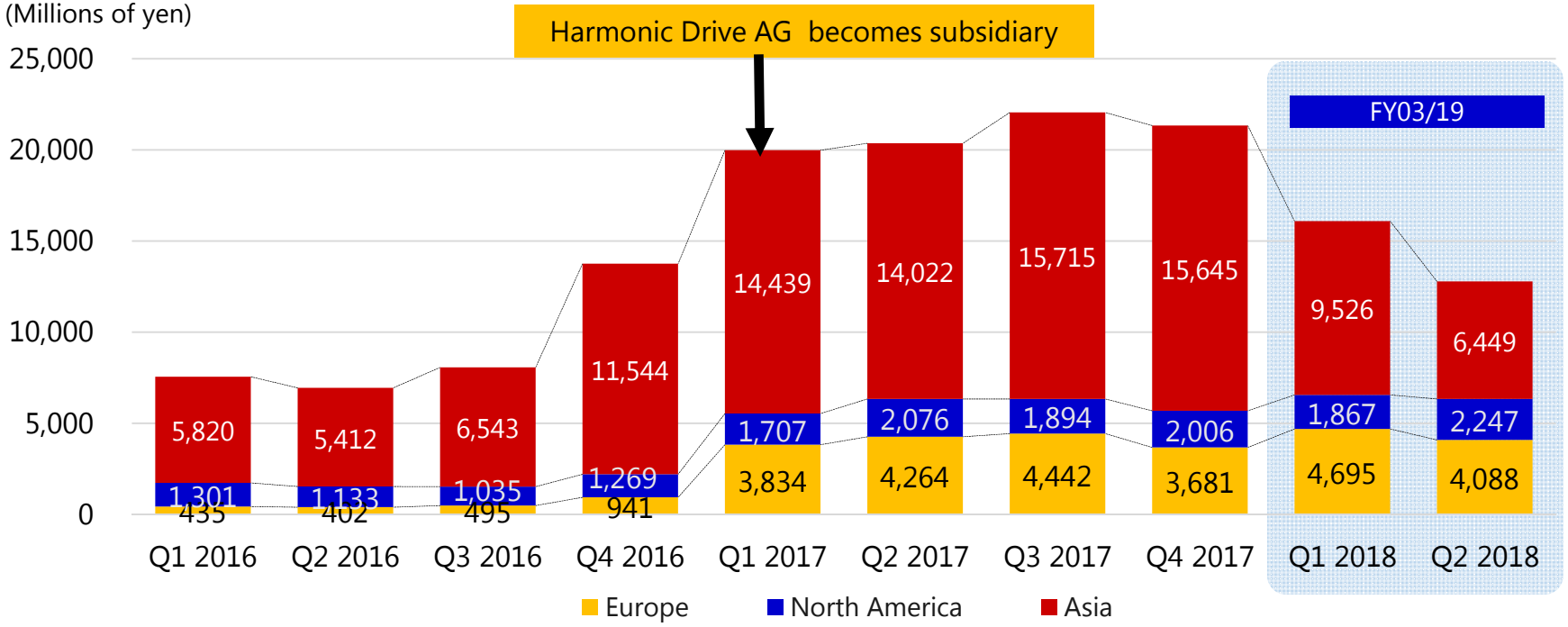
Consolidated Orders, by region

External environment

- In the preceding fiscal year, adjustment process in Asia due to “investment overheating” and “advance orders” centering on robots
- Adopting a wait-and-see approach for some investment due to US–China trade friction and revisions to China’s state subsidy system

Internal environment

- Strong performance in Europe and North America
- Competitive advantage unchanged
- Expect upturn in orders from Q4 (firm in advanced-country economies, strong progress in plans for investing in automation)

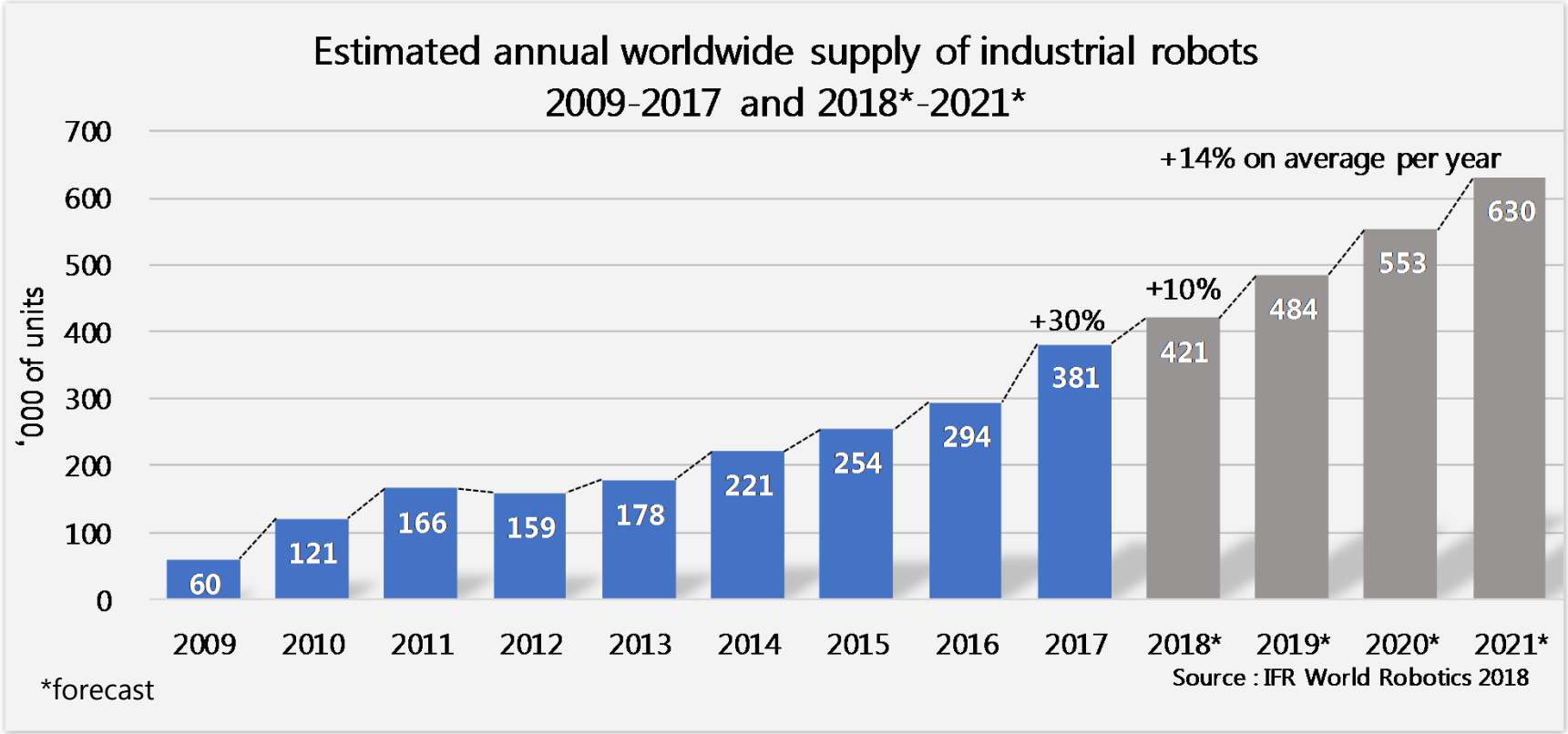


Trends in Main Fields of Application

1. Industrial robots

- Growth leveling off in 2018 due to US–China trade friction and revisions to China's state subsidy system
- A wait-and-see attitude on some investment in Asia
- "Bringing jobs back home" campaigns in the US and other countries, as well as favorable demand for investment in automation in advanced and newly industrialized countries
  (backdrop of rising personnel expenses, worker shortages, and a growing quality focus)

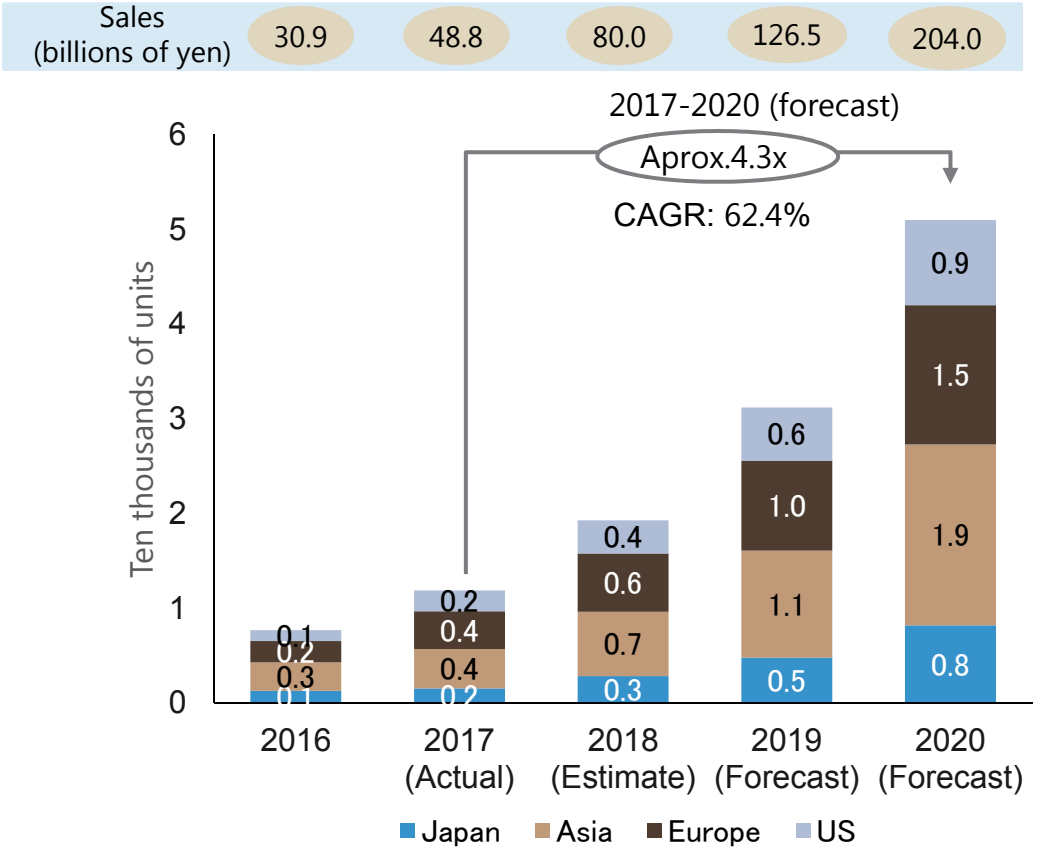
Worldwide outlook for number of industrial robots sold



2. Collaborative robots (co-bots)

- Expanding adoption in the manufacturing and service industries
- Robust demand, centered on Europe

<u>Expected size of the market for co-bots (by amount and units)</u>



Source: Techman Robot Inc.

Source: "Reality and Future Outlook of Worldwide Robot Related Market 2018; Vol.1 FA Robot Market Edition," Fuji Keizai Group

3. Semiconductor manufacturing equipment, LED and OLED manufacturing equipment

Semiconductor manufacturing equipment

- At present, adjustments underway to invest in higher semiconductor multilayer and miniaturization technologies
- Growing demand for AI, VR, and CASE (automobile-related)
- Driven by 5G-related investment (3G [voice] ➔ 4G [data] ➔ 5G [video])
- Explosion in data volume driving increases in server demand and accelerating the shift toward cloud computing
- Shift from hard disk drives to solid-state drives

LED and OLED manufacturing equipment

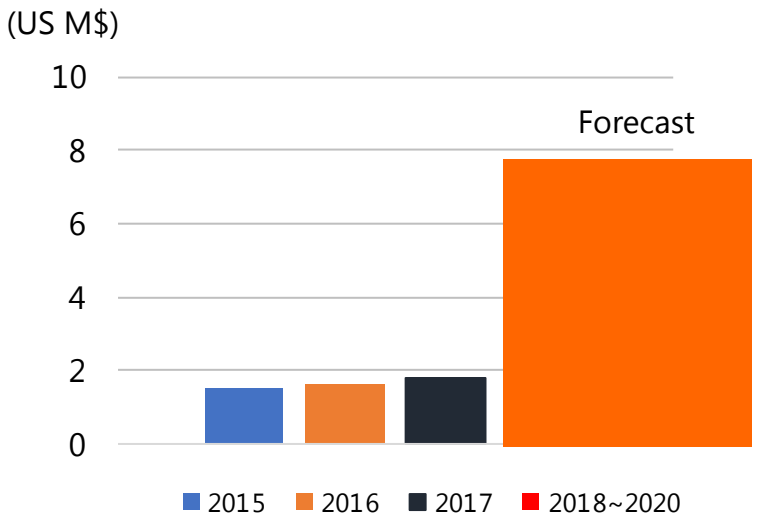
- Demand for small- and medium-sized panels falling as smartphone growth levels off
- Demand emerging for OLEDs used in large TVs and onboard automotive electronics

New Applications

1. Medical applications

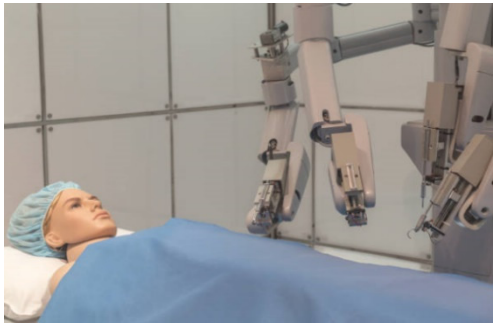
- Robotics technology is playing an active role in medical practice
- Use of power assistance is expanding in physical therapy clinics and for easing the burden of carrying heavy objects
- Health insurance applicability to surgery assistance robots is growing

Market forecast for surgical robots



Source: IFR "World Robotics 2017 Industrial Statistics"

Surgical robots



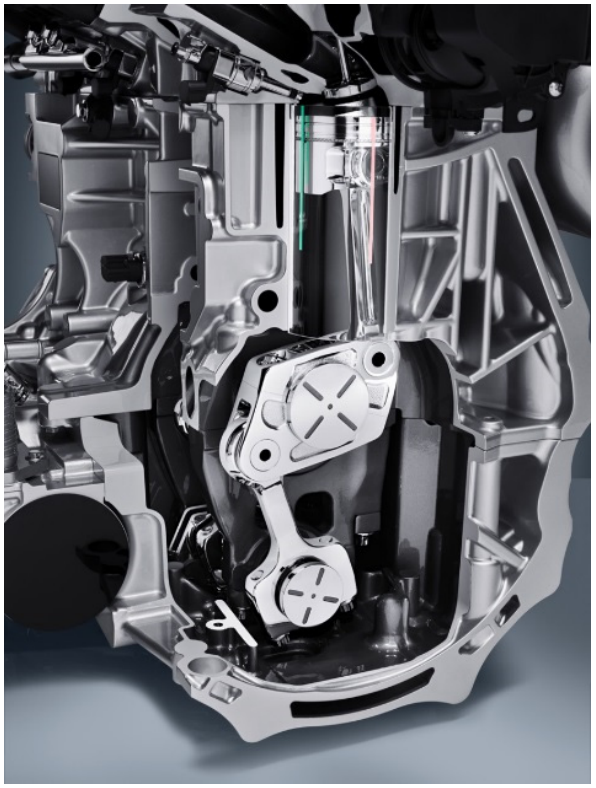
Power assist suits

5mm diameter HarmonicDrive®

2.-(1) Helping to bring a revolutionary type of new engine into practical use

■ Nissan Motor Co., Ltd.

Used in actuator for variable compression ratio (VCR) engine
One Harmonic Drive® used in each engine



Source: Nissan Motor Co., Ltd.

Significantly improved fuel performance

- Compression ratio continuously changes according to driving conditions
- Significantly improved thermal efficiency
- Has been something of a dream among internal engine technologies, under development for more than 20 years

◆ Expected to drive next-generation technologies
State-of-the-art technology contributing to the fusion of internal combustion engines and electric vehicles

2.-(2) Helping to bring a revolutionary type of new engine into practical use

◆ Major technological breakthrough in internal combustion engines

Optimal compression ratio for travel obtained by changing the top dead center position of the piston

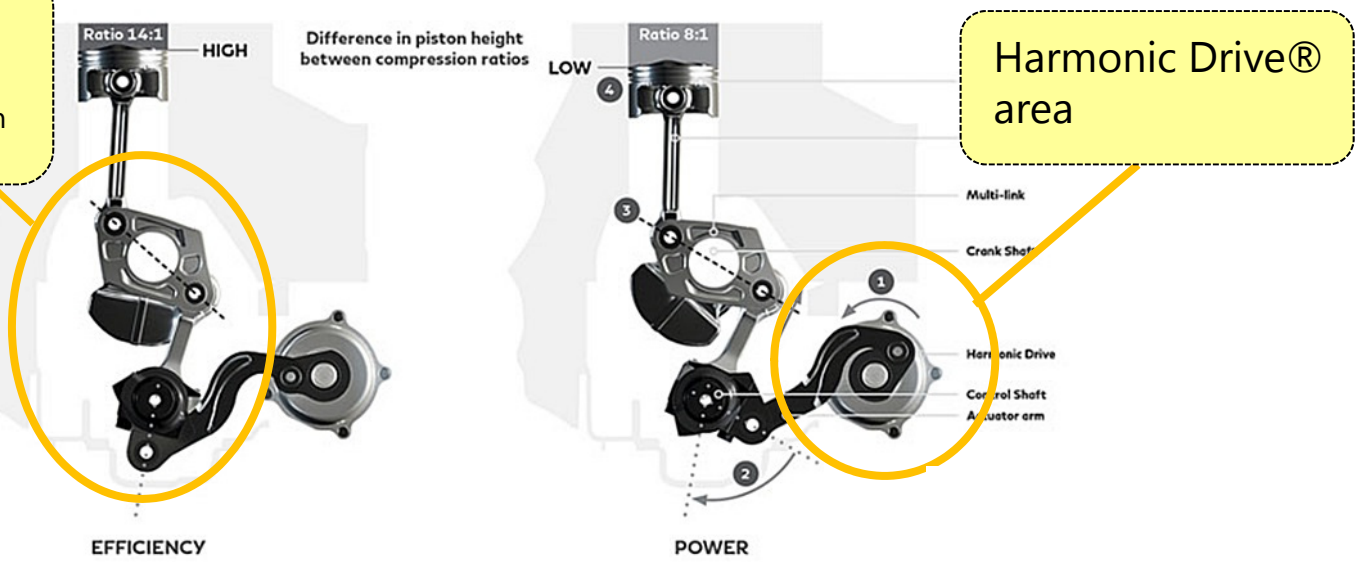
◆ We are developing and commercializing specialized speed reducer for VCR engines

Newly developed Harmonic Drive® Dual type

COMPARISON OF VC-T TECHNOLOGY IN HIGH AND LOW COMPRESSION RATIOS

Multi-link mechanism

Note: Developed by Nissan Motor



Technology once considered a dream achieved through multi-link mechanism and new Harmonic Drive®

2.-(3) Autonomous motorcycle

■ Yamaha Motor Co., Ltd.'s MOTOROiD
Uses batteries as weights and pendulum principles to control balance
➢ Used in actuators to control vehicle position

◆ Our AC servo actuators contribute help control vehicle balance

- Used to control steering and center of gravity
- Non-backlash contributes to improved controllability
- High marks for being lightweight and compact

Source: Yamaha Motor Co., Ltd.

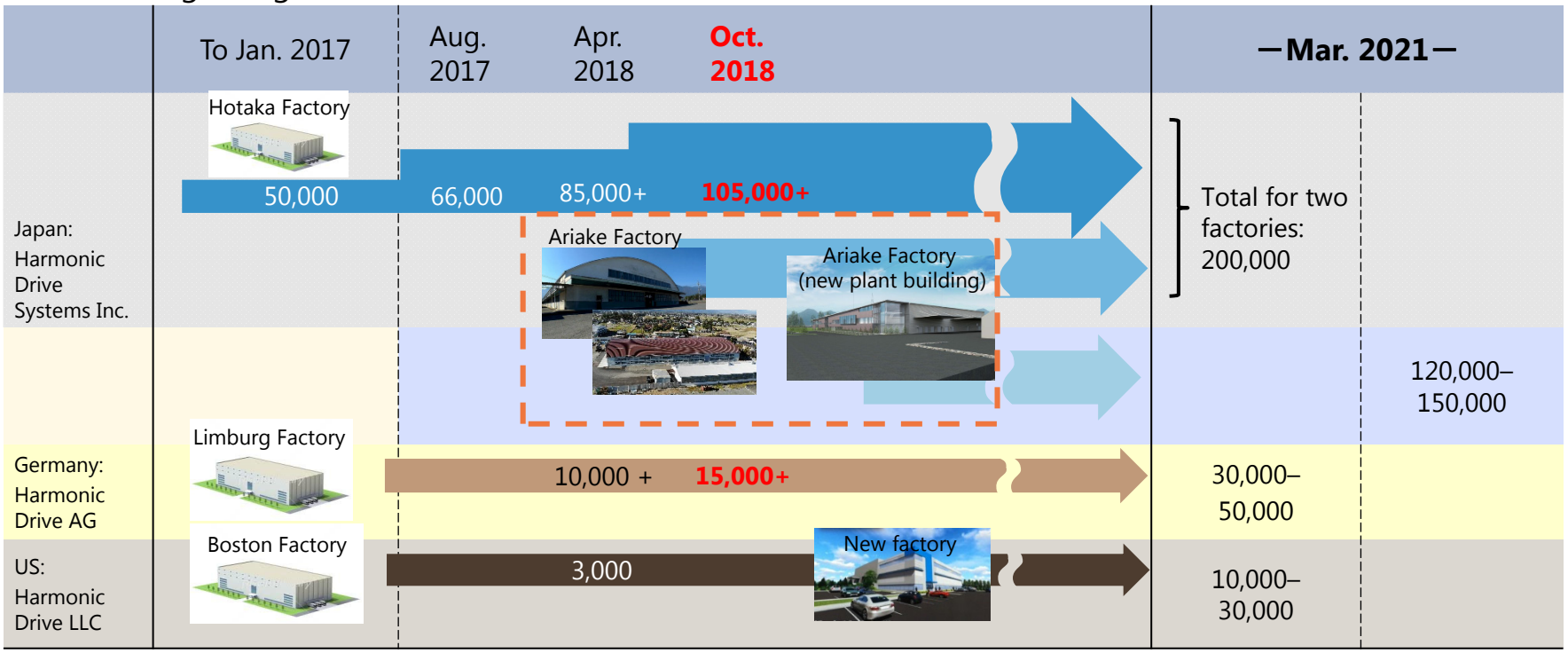
◇ Unveiled at the 2017 Tokyo Motor Show
◇ On display at the Yamaha Motor Booth at World Robot Summit 2018 (October 17–21)

Initiatives Aimed at Achieving Medium-Term Management Plan Targets "Raising QCDS Capacity"

1. Roadmap to raising production capacity

1. Strain wave gearing devices

(Numbers indicate units produced per month)



2. Crossed roller bearings

2. Construction of new plant building at the Ariake Factory (Azumino, Nagano Prefecture)

- Production base for strain wave gearing devices (Harmonic Drive®)
- Factory designed in anticipation of production increases over the medium term (total floor space of 21,818sqm)
- We plan to increase capital investment in equipment and increase the number of personnel in stages, keeping a close watch on demand trends

Now

Sep. 2018 — Nov. 2018 — Jul. 2019

Construction started — Under construction — Construction to be completed


Groundbring ceremony


Building area


Artist's rendition of completed facility

3. Construction of new plant building at the Matsumoto Factory (Matsumoto, Nagano Prefecture)

- Production base for crossed roller bearings
- Factory designed in anticipation of production increases over the medium term (total floor space of 23,659sqm)

Now

Dec. 2017	Nov. 2018	Jan. 2019
Construction started	Under construction	Construction to be completed


Site preparation


Current progress


Artist's rendition of completed facility

4. Construction of new plant building at the US Factory

(Beverly, Massachusetts)

- Production base for strain wave gearing devices (Harmonic Drive®)
- Designed to increased North American local production ratio and meet future demand increases (total floor space of 8,830sqm)

Now

Jul. 2018 — Nov. 2018 — Jul. 2019

Construction started | Under construction | Construction to be completed


Site preparation


Current progress


Artist's rendition of completed facility

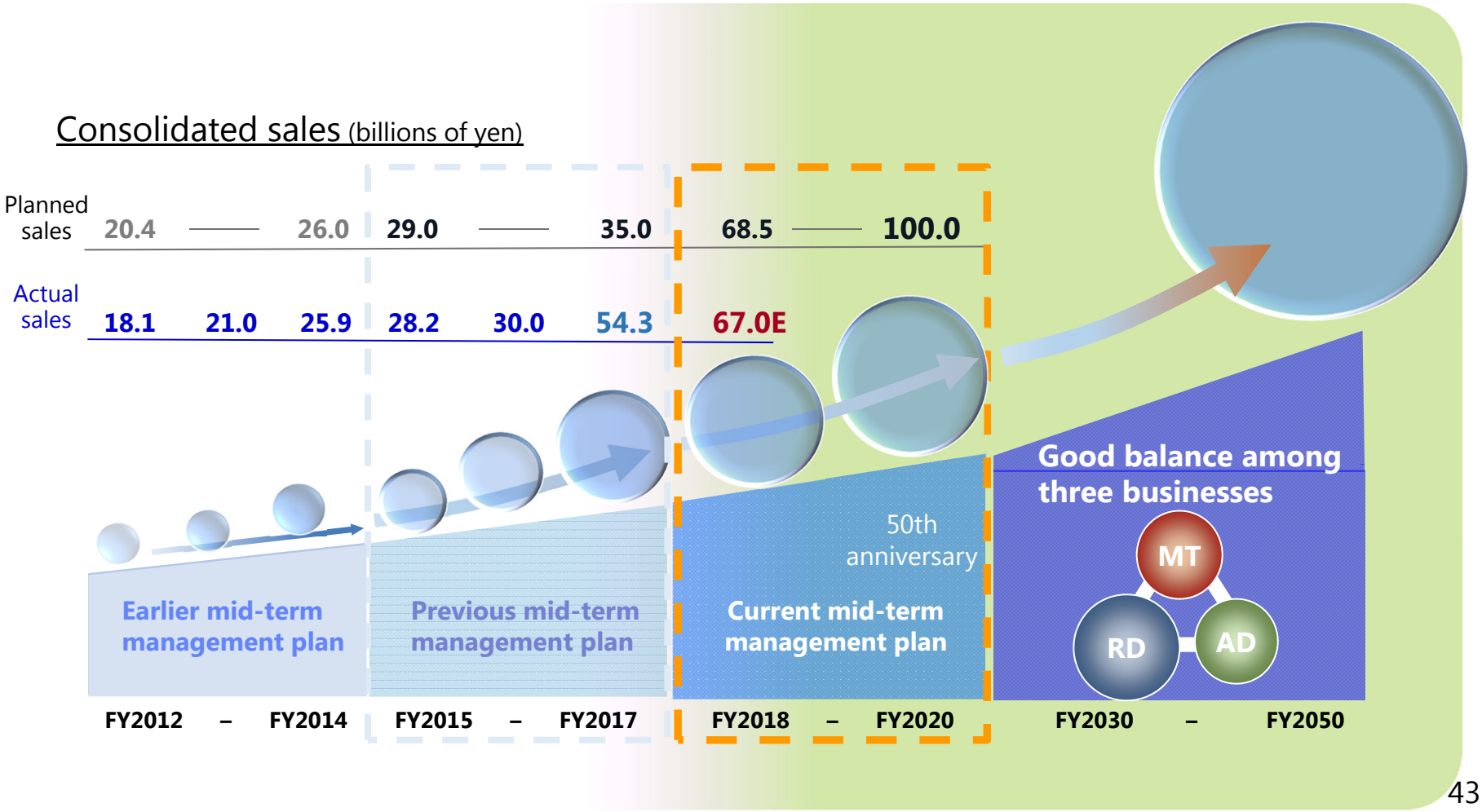
5. Efforts to increase productivity

- Expand automated lines
- Promote cross-trained workers
- Achieve ongoing improvements in fabrication, assembly, and testing processes

- Normalize and shorten delivery times
- Pursue further quality increases
- Enhance cost competitiveness

Current Mid-term management plan and Aiming for Further Growth toward 2030 and 2050

Mid-term management plan and long-term vision



The performance targets and other numerical data presented herein are forecasts based on information available to the HDS Group at the time this material was prepared, and are subject to the influence of uncertainties including those in the economic and competitive environment. Actual performance may therefore differ materially from the forecasts given in this material.

Harmonic Drive Systems Inc.

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