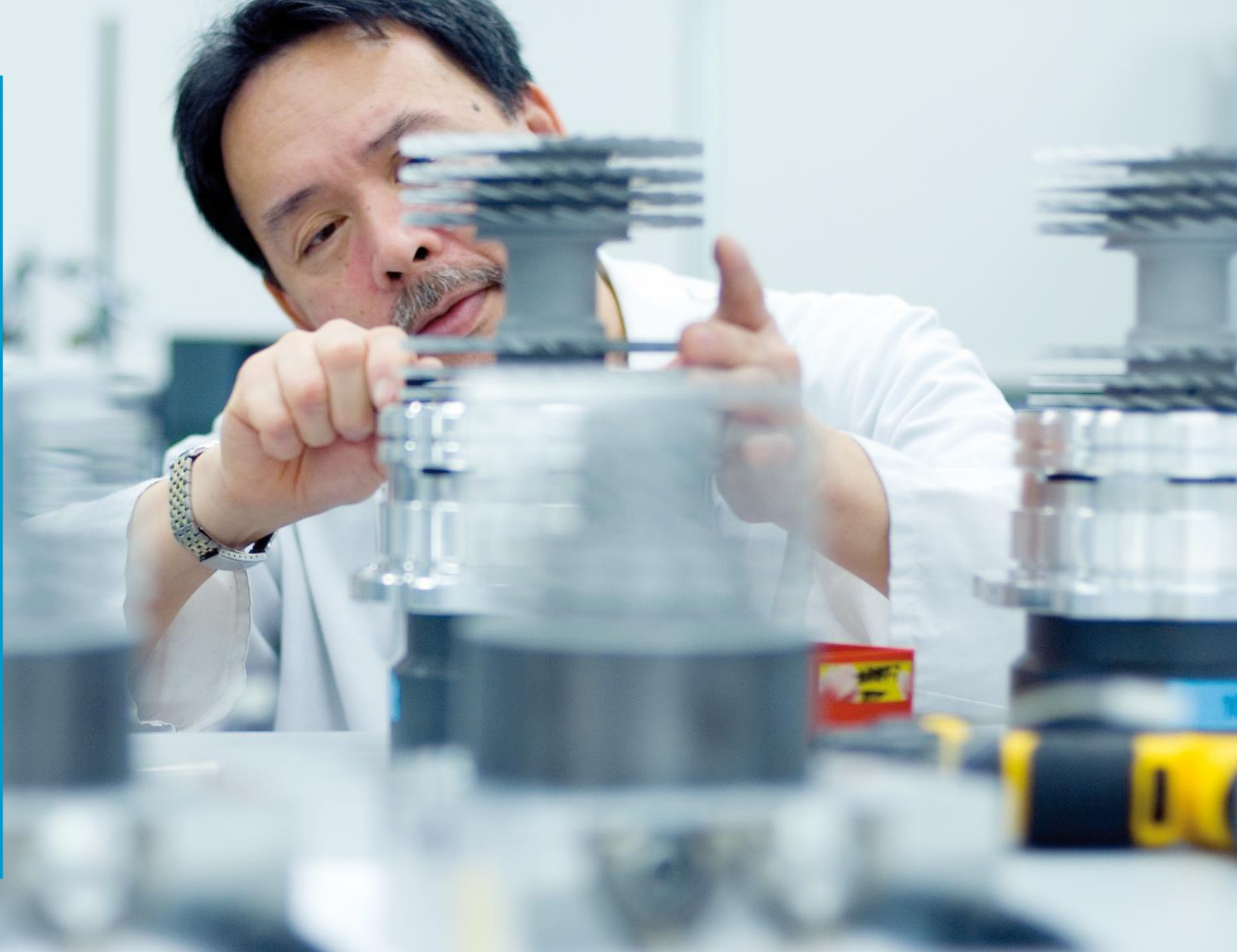


VACUUM TECHNIQUE

Atlas Copco
Capital Markets Day 2016

Geert Follens
Business Area President

Atlas Copco



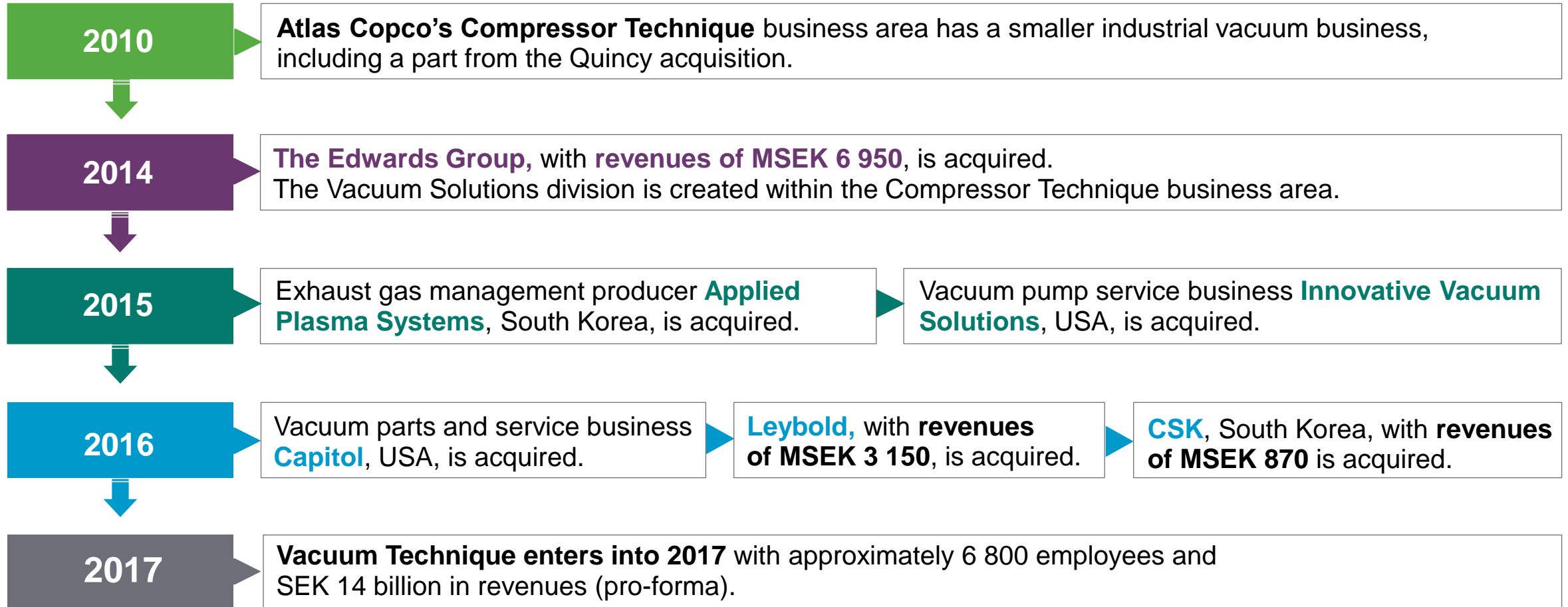
AGENDA

1. Facts in Brief
2. Vacuum Technique
– Way forward
3. Semiconductor industry
4. General industry
5. Sustainable vacuum solutions
6. Service offer
7. Summary



FACTS IN BRIEF

TIME LINE



FACTS IN BRIEF

Edwards / Vacuum solutions division 2015



Headquarters: Burgess-Hill - UK



Employees: 3 903 + 759 add. workforce
(2015)



Revenue: MSEK 9 955
(2015)

Business description

- A leading developer and manufacturer of vacuum products, exhaust management systems and related services
 - Strong presence in the semiconductor industry



FACTS IN BRIEF

Keybold overview



Headquarters: Cologne, Germany



Employees: > 1 600
(2015)



Revenue: MCHF 360 (MSEK 3 150)
(2015)

Business description

- Leader in industrial vacuum with significant presence in high vacuum



DRYVAC
Dry Compressing
Screw Pumps



TURBOVAC i X
Mechanical
Turbomolecular Pumps



TMP MAG Line
Turbomolecular Pumps

TRIVAC

Rotary Vane
Vacuum Pumps



SOGEVAC
Rotary Vane
Vacuum Pumps



RUVAC
Roots Vacuum
Pumps



TURBOSTREAM
Turbo radial Blowers



TMP Classic Line
Turbomolecular Pumps

SCROLLVAC

Dry Compressing
Scroll Vacuum Pumps



COOLVAC
Cryo pumps



SCREWLINE
Dry Compressing Screw
Vacuum Pumps

SYSTEMS
Standardized & customized



FACTS IN BRIEF

CSK overview



Headquarters: Gyeonggi-do, South Korea



Employees: 400
(2015)

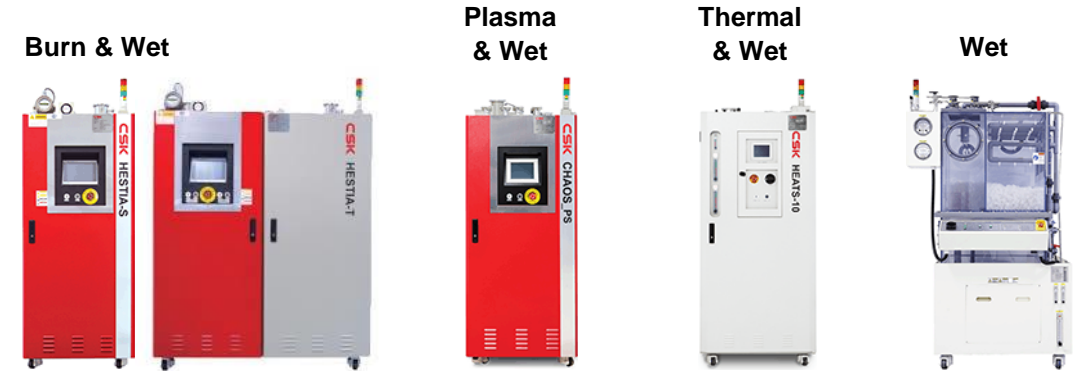


Revenue: BKRW 124.5 (MSEK 870)
(2015)

Business description

- A leading supplier of exhaust management and delivery systems in the Korean market, focused on the semiconductor market

• Exhaust management systems



• Delivery systems

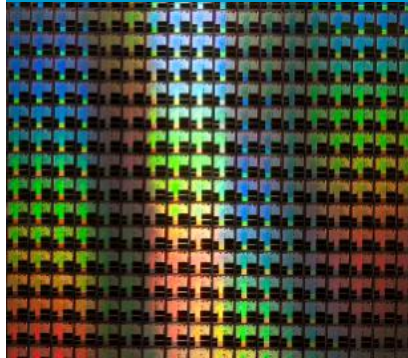


VACUUM TECHNIQUE

Vacuum products



Semiconductor



Flat panel displays



Solar panels



Metallurgy



Exhaust management systems



Food & beverages



Packaging



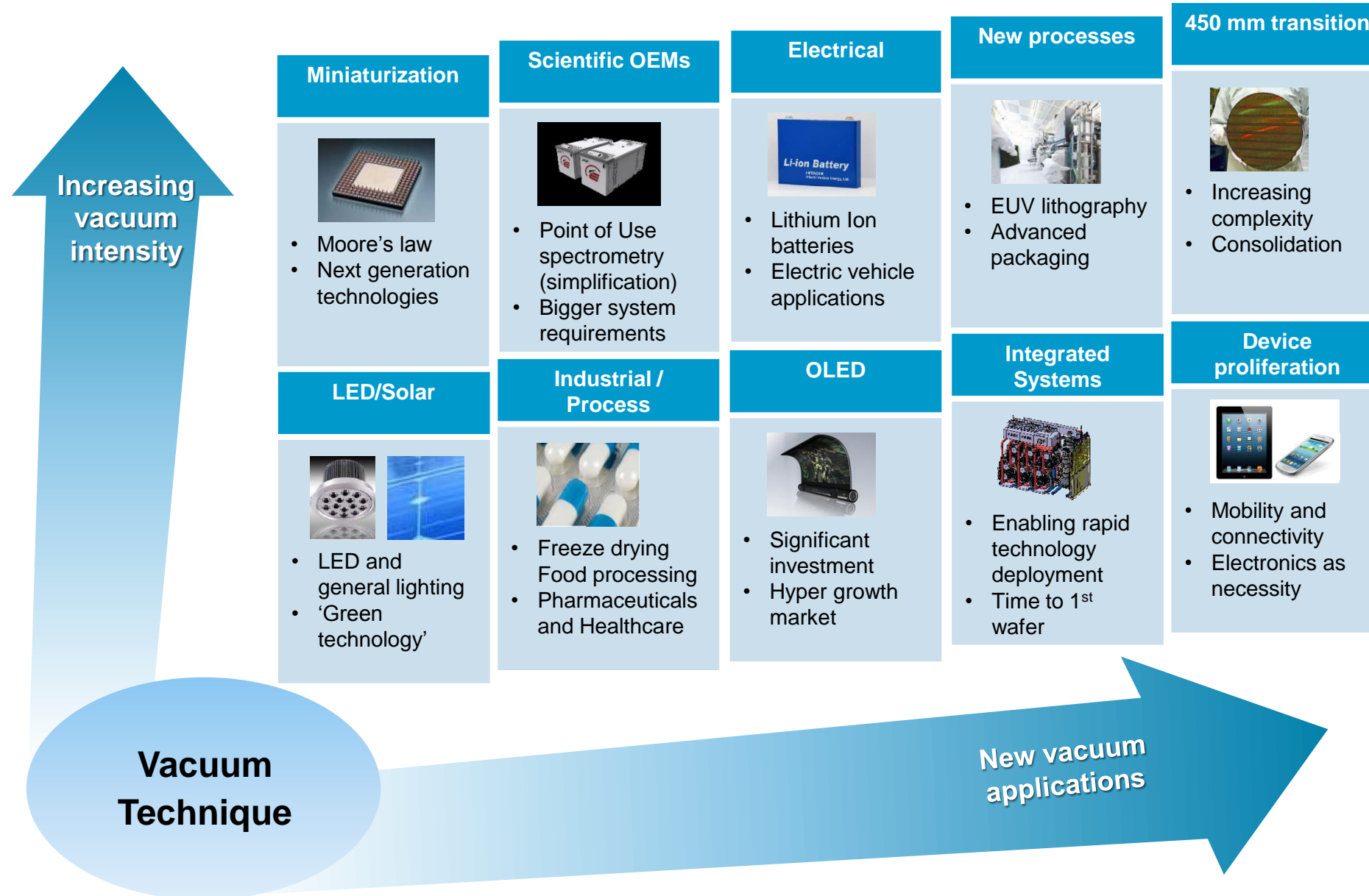
Conveying and assembly



...and more



VACUUM – A GROWING MARKET



MARKET COVERAGE

Vacuum Technique

Market segmentation	Vacuum		
	Rough, process and industrial vacuum	Semiconductor	High and ultra high vacuum
Pressure range (absolute pressures)	1 bar - 10 ⁻⁶ mbar	10 ⁻³ - 10 ⁻⁶ mbar	10 ⁻³ - 10 ⁻¹¹ mbar
Applications (main classifications)	<ul style="list-style-type: none"> ▪ Rough vacuum ▪ Process vacuum ▪ Industrial vacuum 	<ul style="list-style-type: none"> ▪ Semiconductor process vacuum ▪ TFT-LCD display ▪ Solar ▪ LED 	<ul style="list-style-type: none"> ▪ Thin film ▪ Instruments ▪ R&D
Brand used	Leybold Edwards Atlas Copco Quincy	Edwards CSK	Edwards Leybold Gamma

VACUUM TECHNIQUE

ROCE
16%

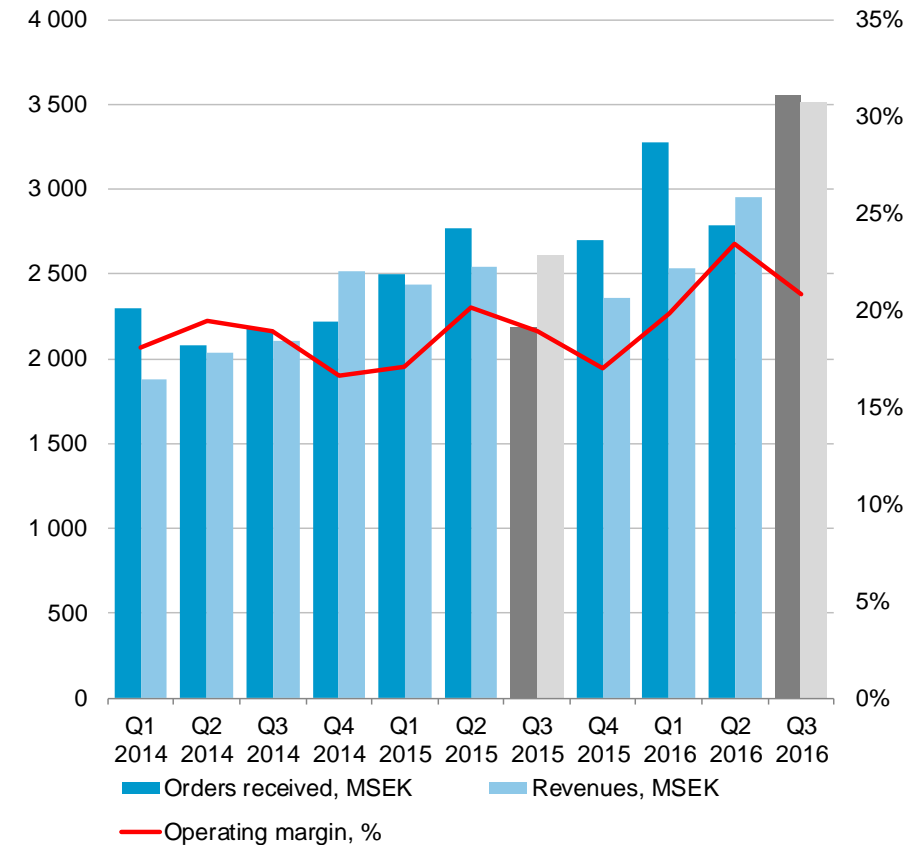
In Brief

- Vision is to become global market leader in vacuum solutions

2016 development

- Organic order growth of 22% Jan. – Sept.
 - Strong order intake from the semiconductor industry, particularly in Asia
- Acquisitions of CSK and Leybold in Q3
- Operating margin at 21.4% (18.7)
 - Support from volume growth and currency
 - Dilution from acquisitions

Orders, revenues and operating margin*

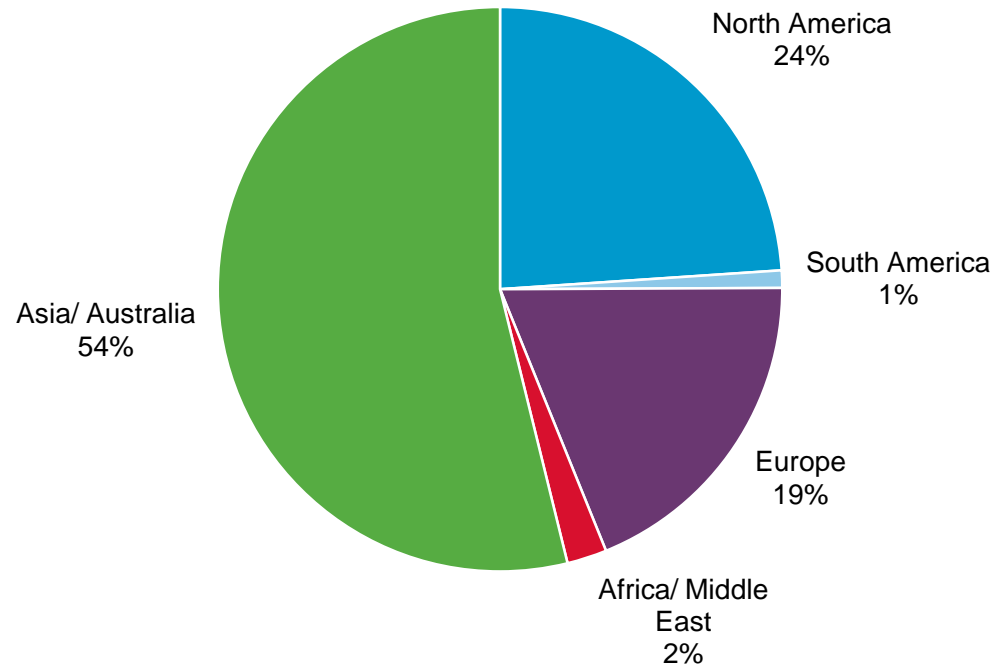


*Restated figures

VACUUM TECHNIQUE

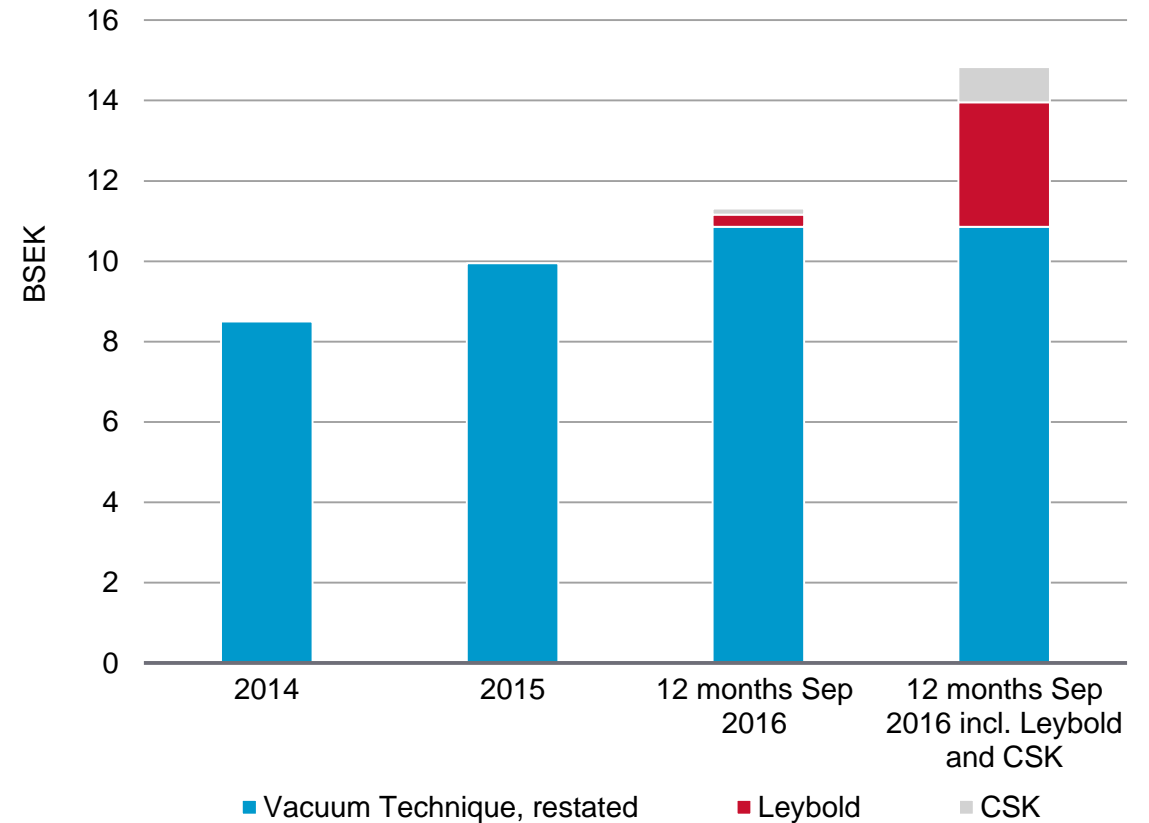
Including Leybold and CSK

Revenues by region



Revenues by region including Leybold and CSK (when acquired)

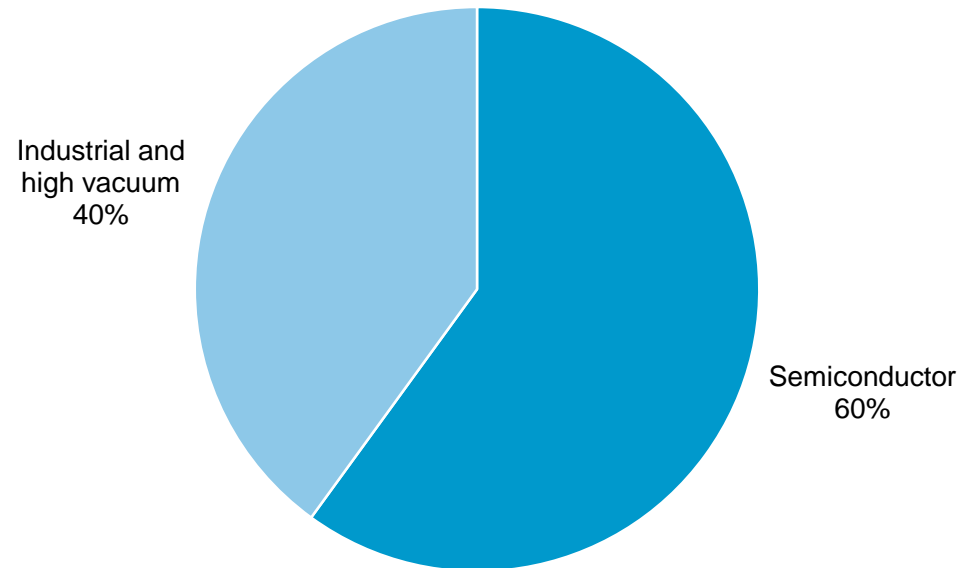
Revenues



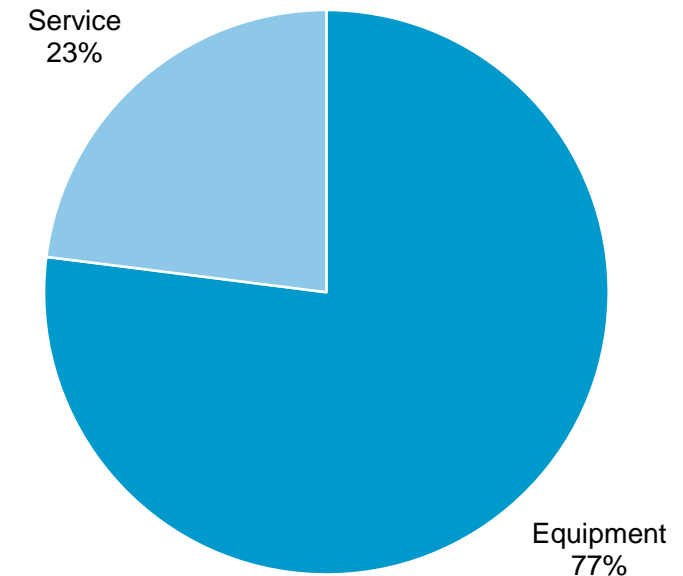
VACUUM TECHNIQUE

Including Leybold and CSK

Revenues by application



Revenues by type

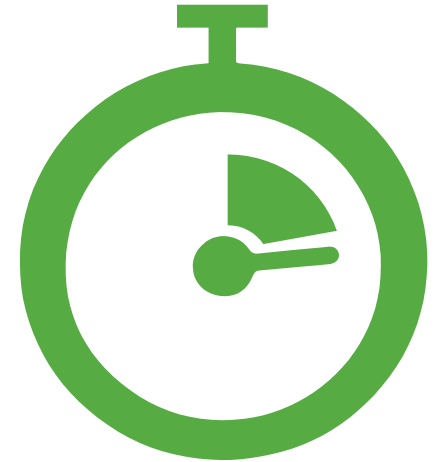


Approximate revenue split including Leybold and CSK (when acquired)

VACUUM TECHNIQUE - WAY FORWARD

VACUUM TECHNIQUE – FOCUS AREAS

- Successful integration of acquisitions
- Successful implementation of decentralized organizational structure
 - Improve transparency, responsibility, accountability and profitability
 - Increase customer intimacy
- Improve agility and resilience
 - Reduce working capital and supply chain complexity
 - Optimize the utilization of the manufacturing foot print
 - Increase service value offering, penetration and 1-to-1 ratio
- Leverage synergies with other business areas and the Group
- Innovation
 - Accelerate time to market



VACUUM SOLUTIONS FOR THE SEMICONDUCTOR INDUSTRY

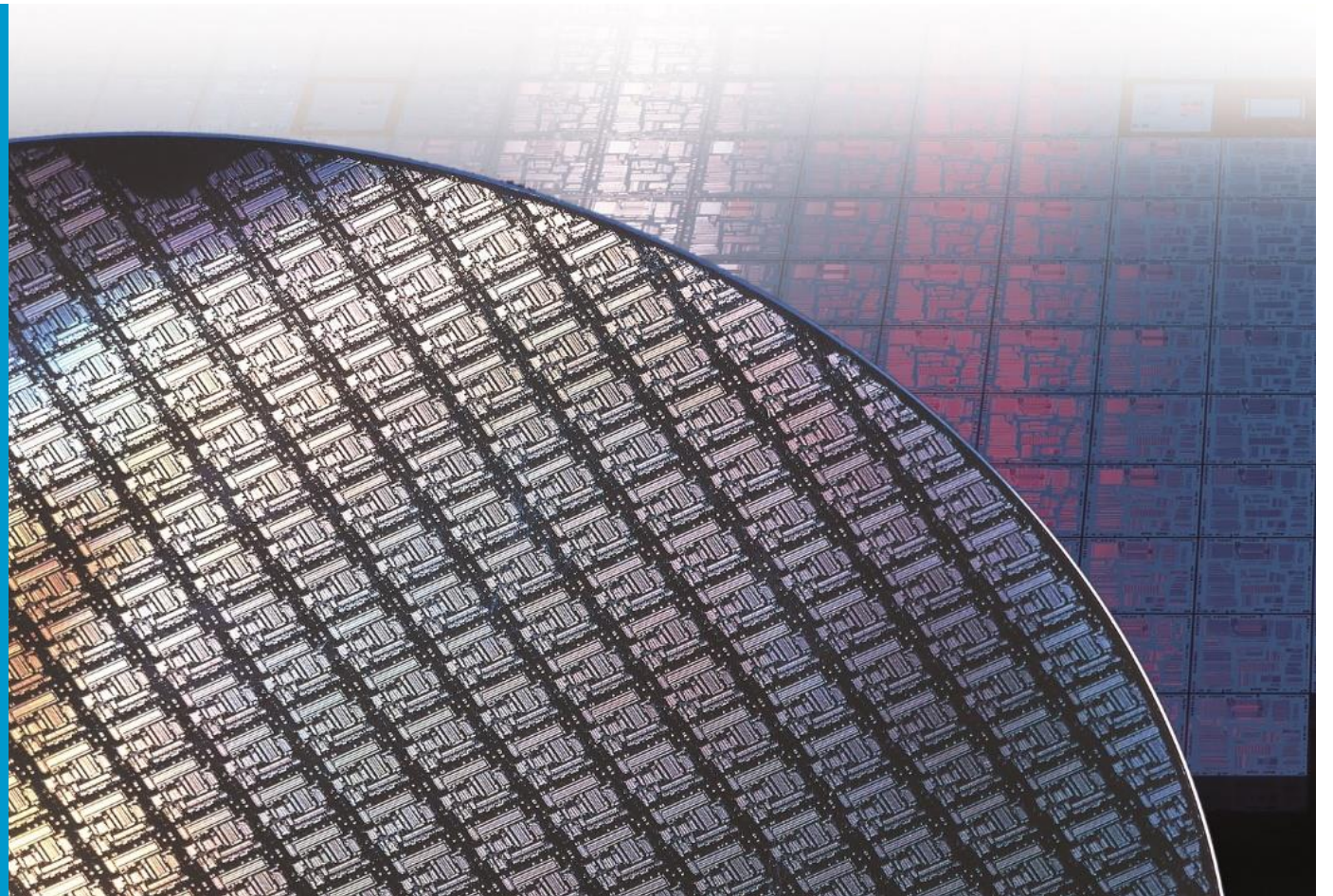
Mike Allison

Edwards brand

High customer concentration

A wide technology portfolio

Leadership in integrated systems



SEMICONDUCTOR INDUSTRY DRIVERS

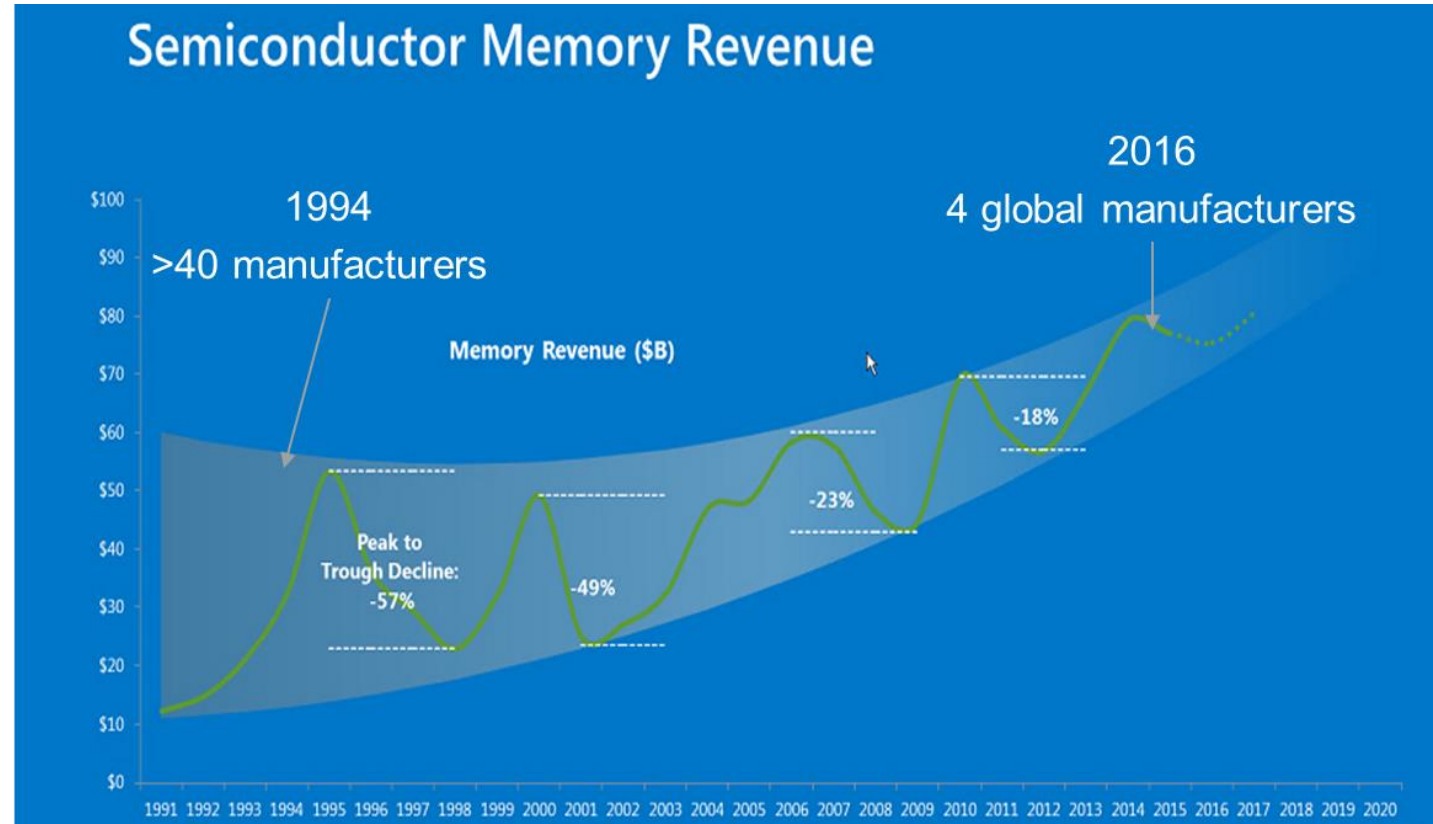
Electronics demand continues into the future



- Moore's law
- Current drivers
 - Smart phones, Tablets, PC's
 - Data storage
 - Internet of Things
 - Automotive
 - Industrial automation

MEMORY – CONSOLIDATION IS DRIVING STABILITY

- Global strong, profitable and consumer driven manufacturers
- Equipment lead times are getting shorter
 - Smaller incremental investments based on consumer demand (e.g. phone cycles, economic events, etc.)



Source: Micron and Industry Analysts

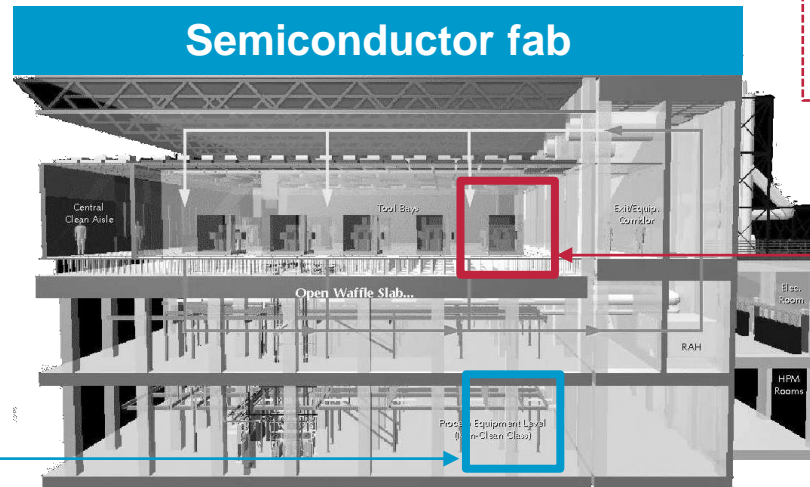
SEMICONDUCTOR FAB DETAILS

Examples of what is inside a fab

Vacuum pumps

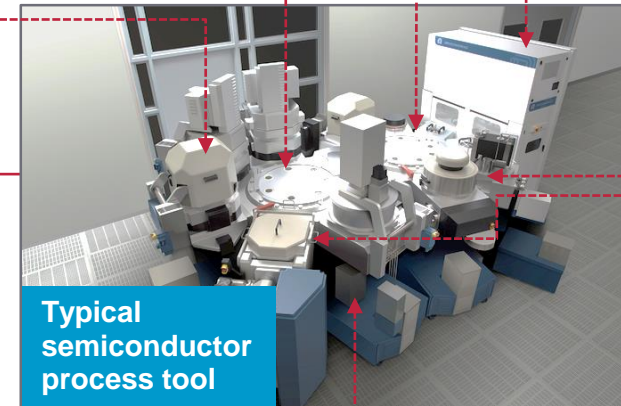


Sub Fab



Power supplies

Robotics (inside) Loader



Chambers

Turbo molecular pump / Cryo (if fitted)

...and lots of other components...

40 000 wafer starts per month (wspm) requires about:

- 1 500 vacuum process tools
- 1 000 abatement units
- 2 000 pumps

CORE TECHNOLOGY PORTFOLIO

Creating an interconnected solution for the sub fab

Extensive Vacuum technology portfolio

Turbo-molecular pumps (TMP)



Roots Claw Dry Pump

Dry Screw



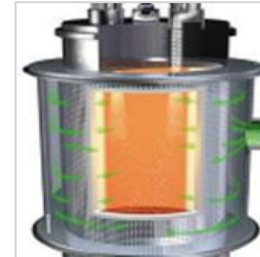
All roots dry pump



Booster



Broad range of abatement technologies



Fuel Abatement



Plasma Abatement

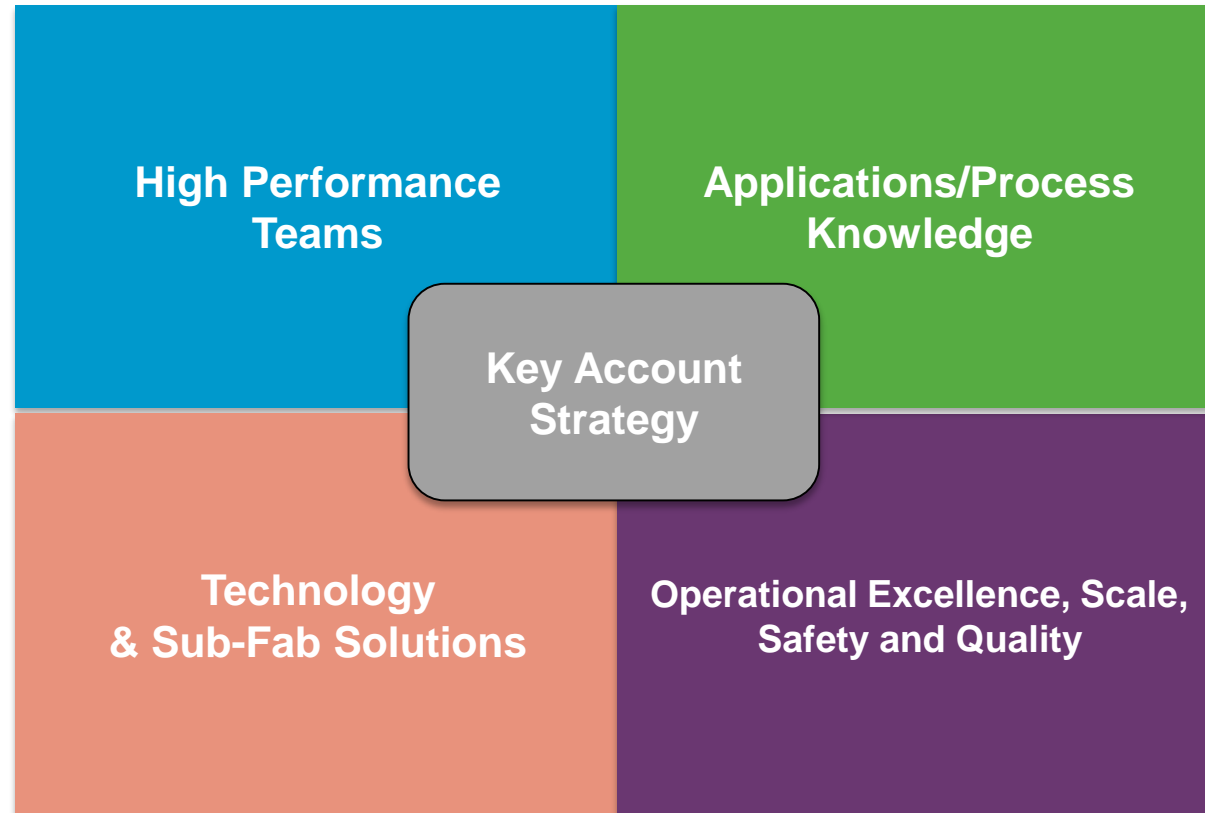
Field proven integrated solutions



eZenith
Integrated System

OUR STRATEGIC FOCUS

Undisputed leader in vacuum and exhaust gas management solutions



THE FUTURE

Vacuum solutions for the semiconductor industry

Opportunities – growth drivers

- Consolidation is driving stability
- New technologies
 - NAND (non-volatile, flash memory) / 3D NAND
 - Extreme Ultra Violet (EUV) lithography
 - OLED growth
- Integrated systems
- Demand growth
 - PC's, tablets, smartphones
 - China - \$100B investment fund
 - Service penetration

Challenges

- Price pressure
- Master new technologies
- Cost efficient manufacturing

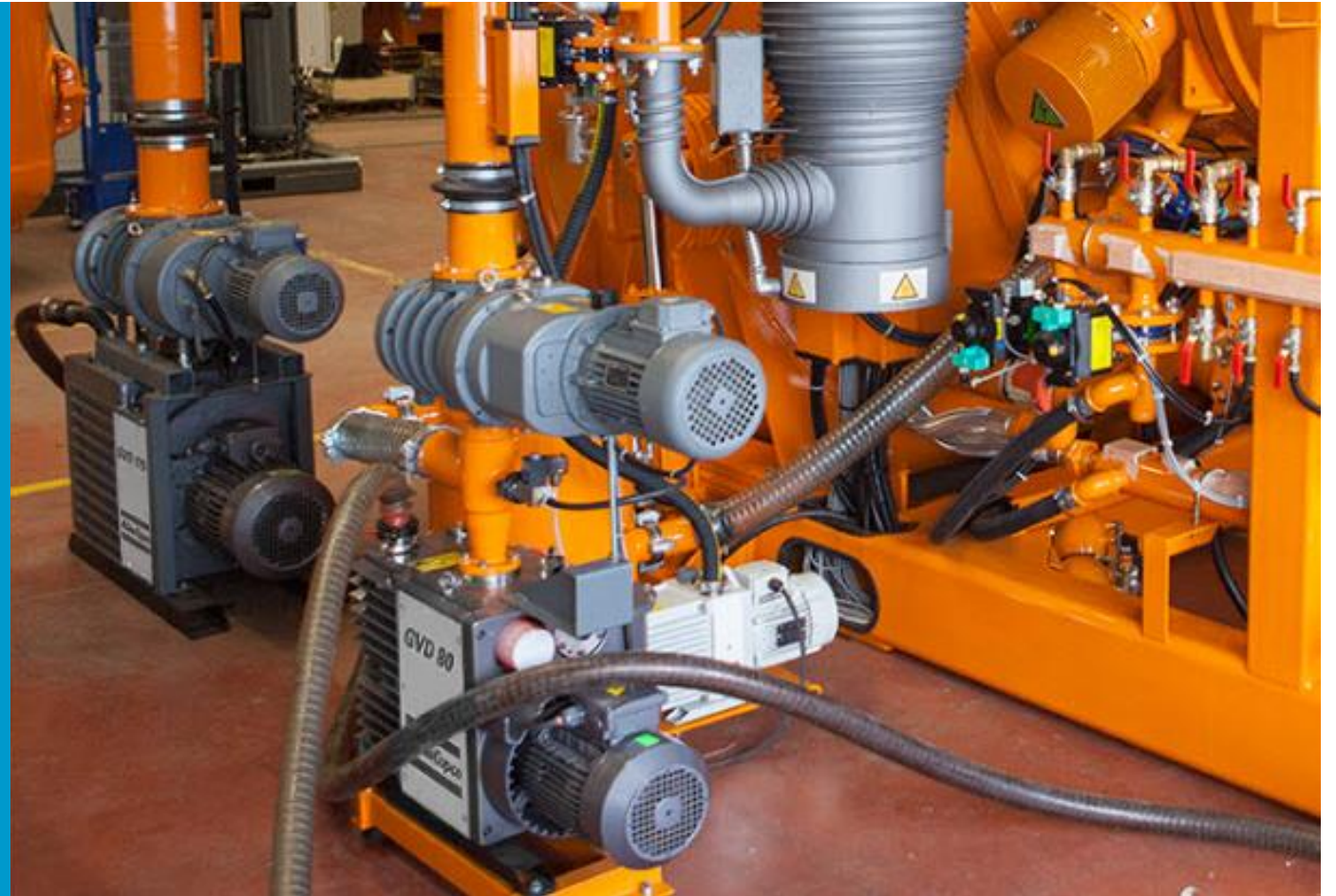
VACUUM SOLUTIONS FOR THE GENERAL INDUSTRY

Koen Lauwers

Leybold, Edwards and Atlas Copco brands

Growth strategy

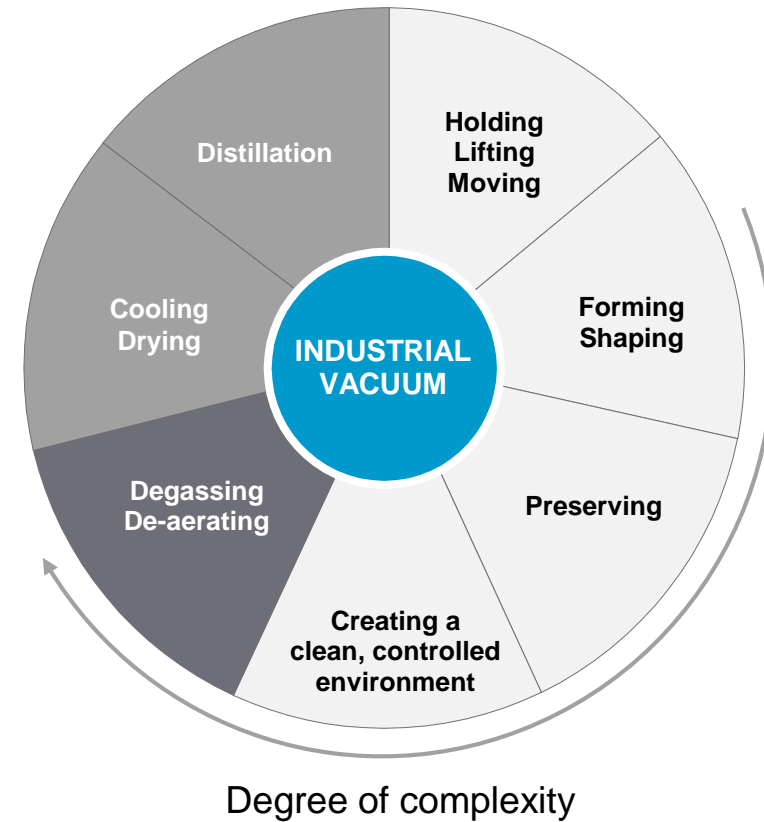
Product innovation focus



MARKETS FOR INDUSTRIAL VACUUM

- Strive for growth
 - Densify presence
 - Innovation
 - Brand management

7 Main applications for industrial vacuum use

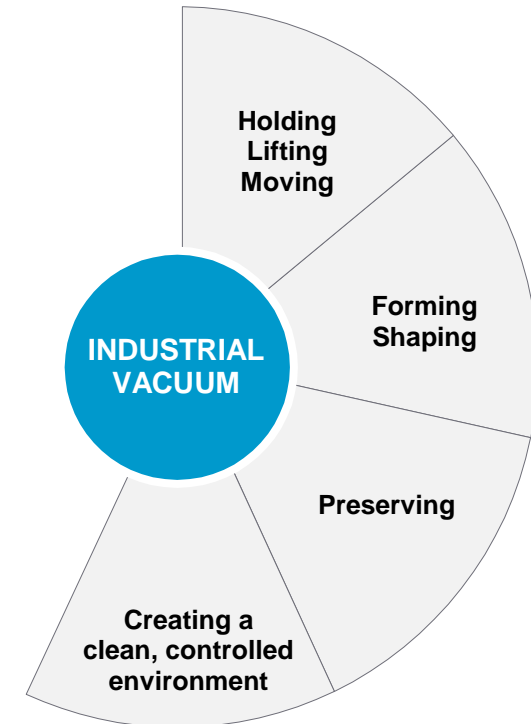


MARKETS FOR INDUSTRIAL VACUUM

- Rough (utility) vacuum
 - Direct, indirect and OEM channels
 - Strong innovation program



Disruptive screw and claw technologies launched in 2015 and 2016



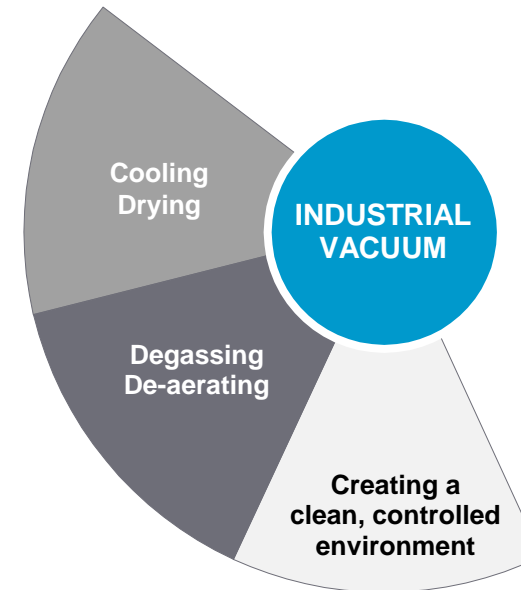
General industry, packaging, canning, food, electronics, etc.

MARKETS FOR INDUSTRIAL VACUUM

- Industrial vacuum
 - Harsh applications - competence prerequisite
 - Edwards and Leybold brands well positioned
 - OEM and end customers



Successful penetration in the lithium ion battery markets



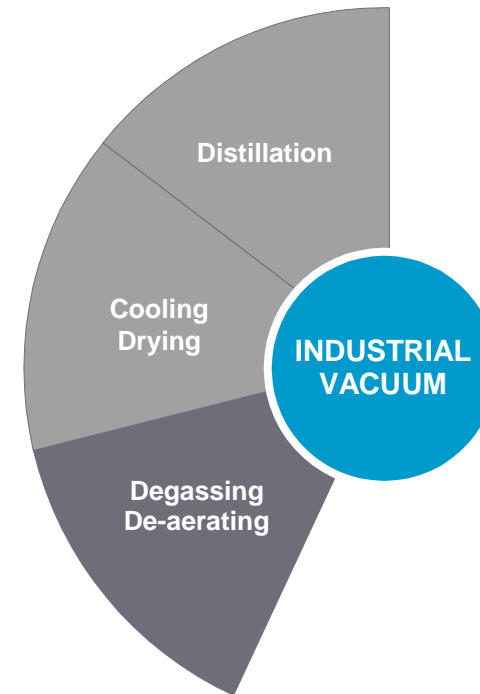
Metallurgy, automotive, electricity, light bulbs, etc.

MARKETS FOR INDUSTRIAL VACUUM

- Process vacuum
 - Harsh applications
 - End customers and Engineering, procurement and construction companies (EPC'S)
 - Product programs defined



Example of an Edwards liquid ring pump skid for an offshore sea water de-aeration unit



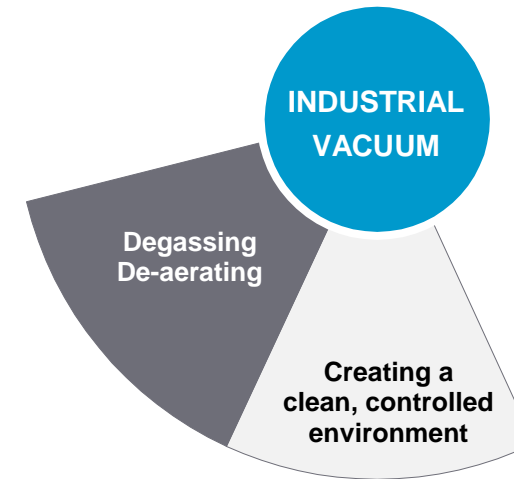
Chemicals, petrochemicals, pharmaceuticals, plastics, food processing, etc.

MARKETS FOR INDUSTRIAL VACUUM

- Thin film
 - Edwards and Leybold well positioned
 - OEM and end customers



Example of coater system



Optical coating, data storage, glass and surface coating, display coating, solar, etc.

INNOVATION

The key to success for Industrial Vacuum

- Traditional focus is on application driven solutions, allowing aging of platforms
- Our focus is on disruptive product platforms!
- Example the GHS VSD+ pump

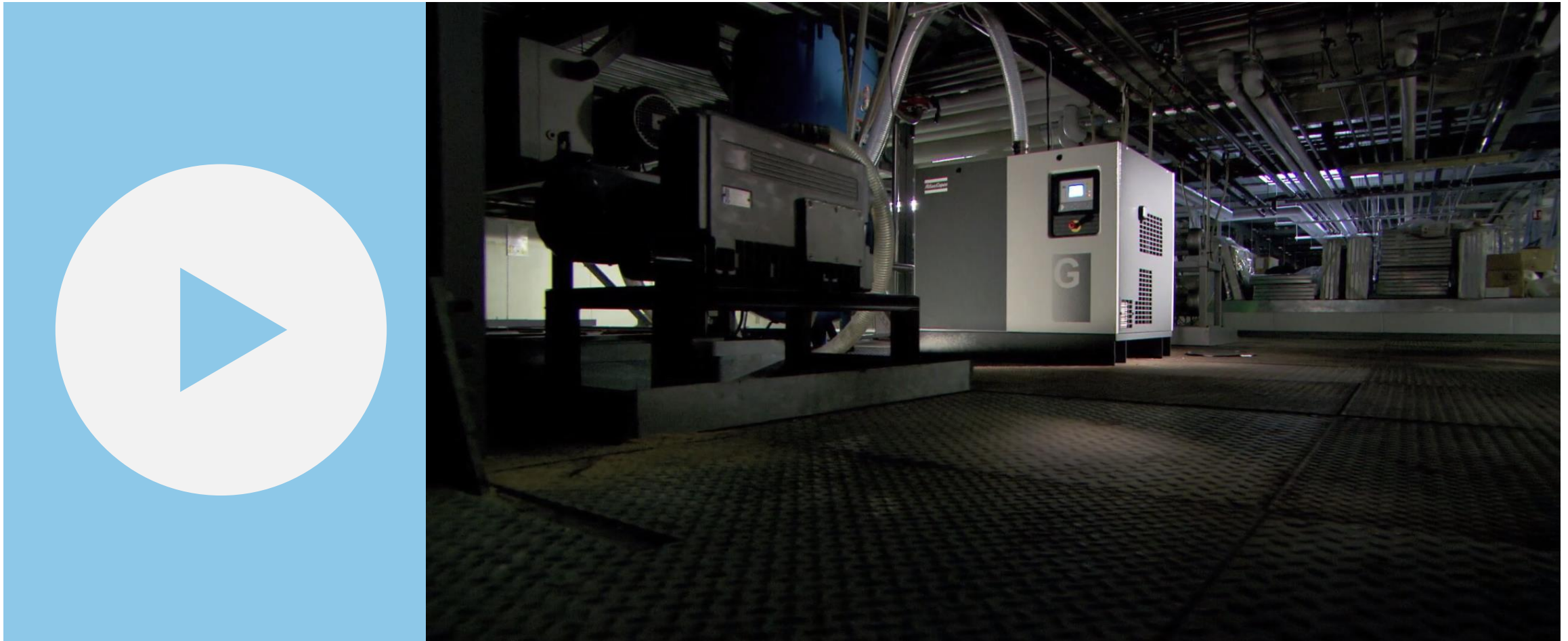


Best in class in efficiency, noise, functionality

75% same components as for the compressor range GA VSD+

INNOVATION

CHS VSD+ Vacuum pump



THE FUTURE

Vacuum solutions for the general industry

Opportunities

- Organic growth
- Leverage branding
- Expand the offer with disruptive innovation
- Strive for manufacturing excellence
- New applications in emerging markets and technologies
- Grow the service business

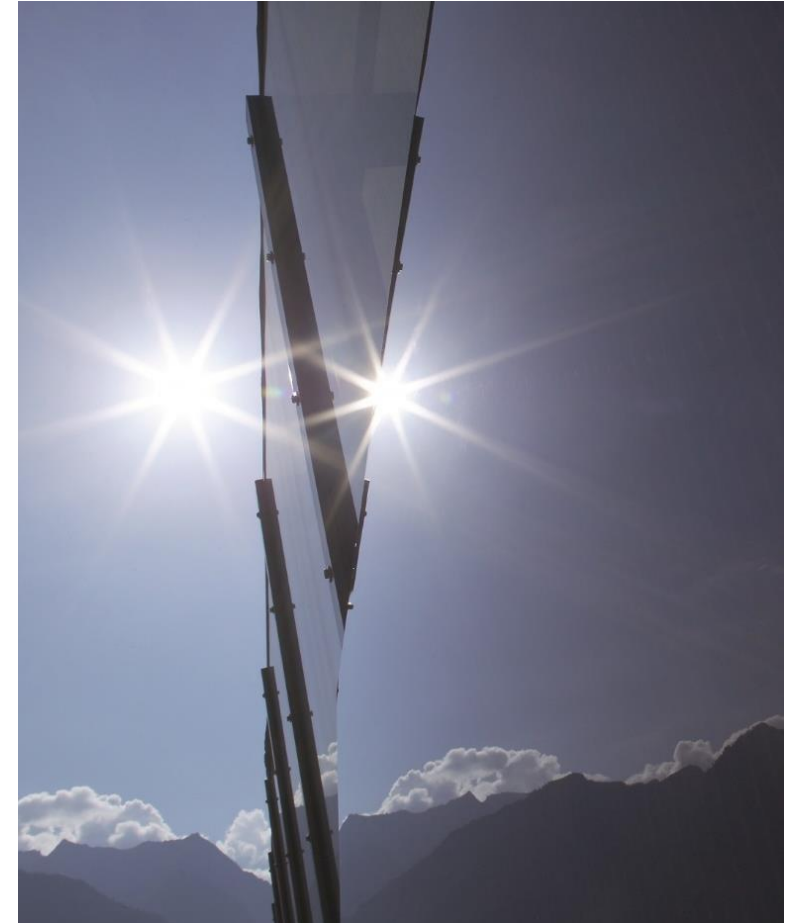
Challenges

- Slow growth in traditional applications
- Competitive market conditions

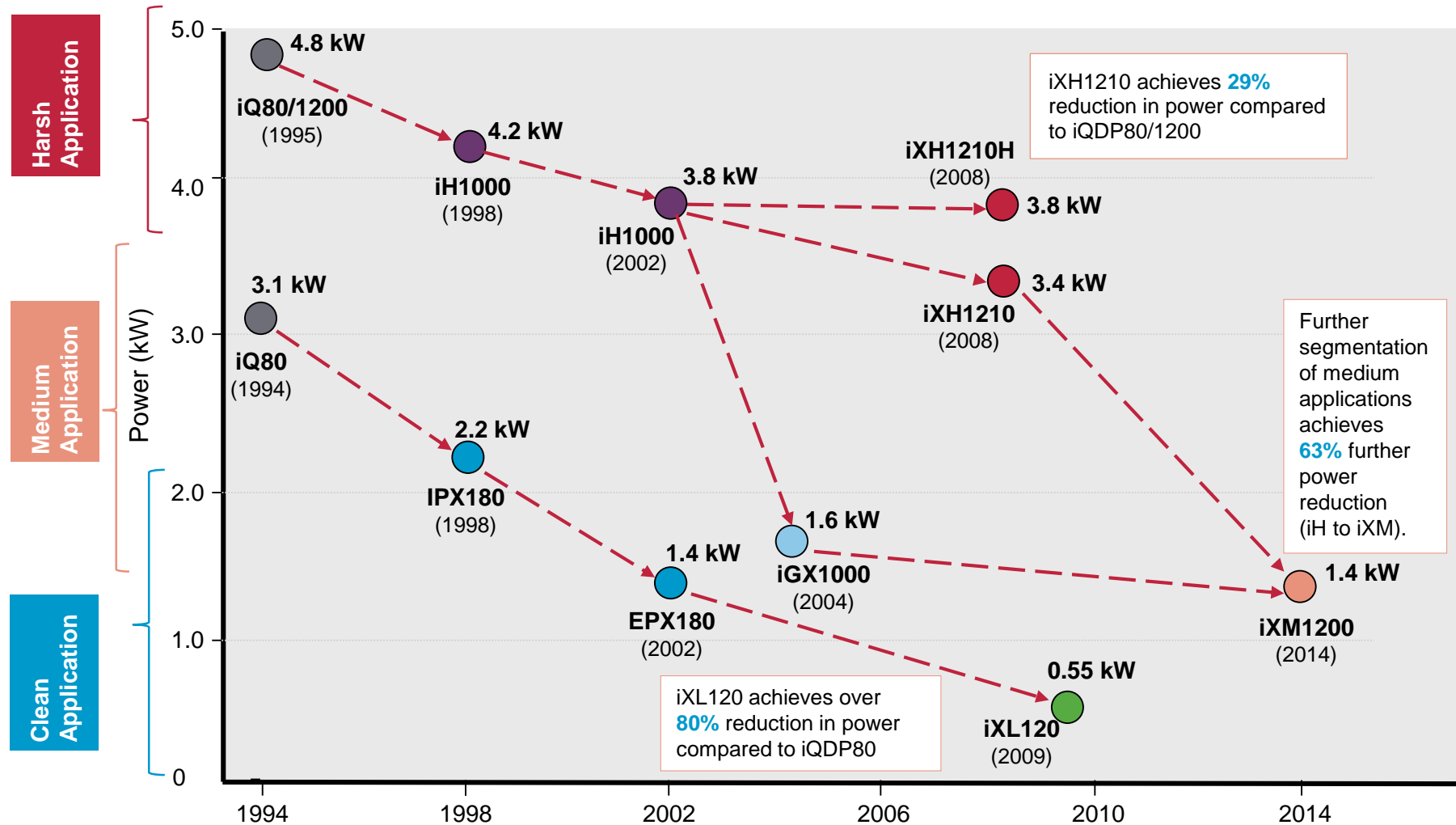
SUSTAINABLE VACUUM SOLUTIONS

ENABLING ENVIRONMENTAL TECHNOLOGY

- Solid state lighting, e.g. LED, can offer 80% energy savings
- Solar cells provide clean renewable energy
- Biofuel production uses vacuum in the process
- Vacuum used in the production of steel alloys can reduce the level of hydrogen, carbon and other impurities during the process
- Did you know?
 - Over 50% of the world's solar panels made are using Edwards products



EDWARDS' POWER REDUCTION TREND



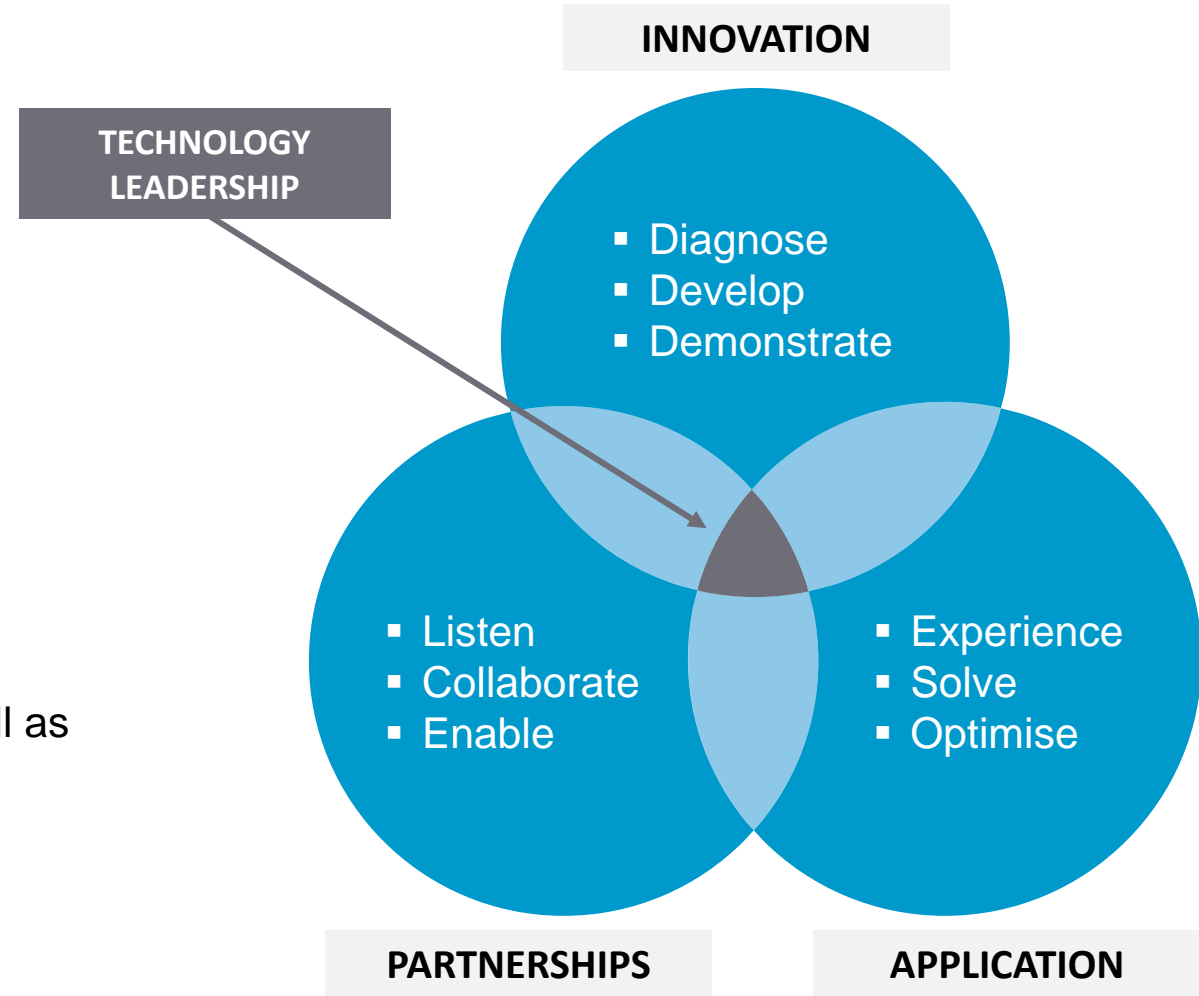
INNOVATION DRIVERS AND SUCCESS FACTORS

■ Innovation drivers

- Total cost of ownership
- Environmental challenges
- Noise & footprint
- Technology changes

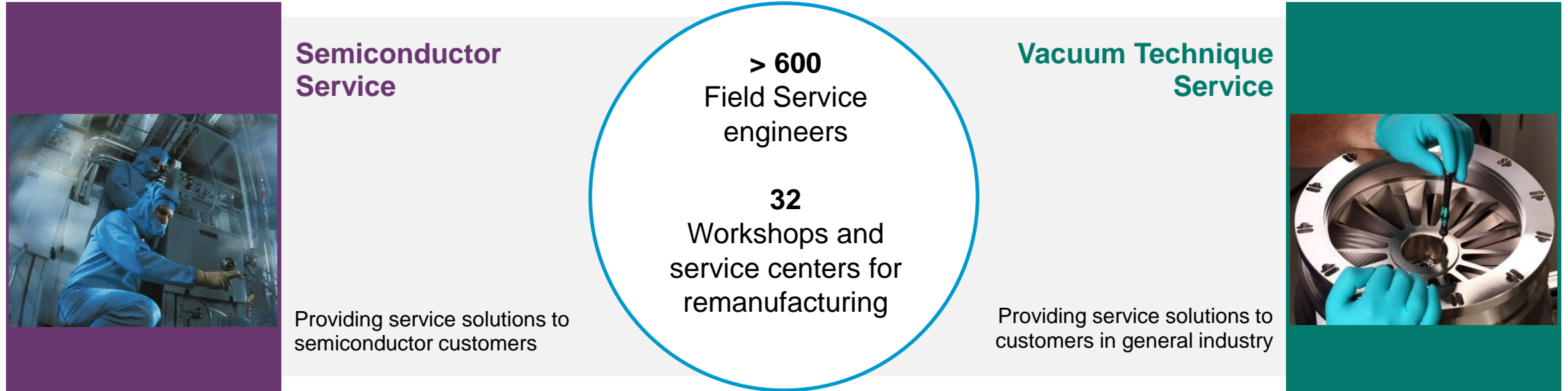
■ Success factors

- Long-term collaboration with customers
- Proven results – for customers across all core industries
- Partnerships with demanding customers as well as with industry and academic groups



SERVICE OFFER

TWO SERVICE BUSINESSES



Remanufacturing



Parts

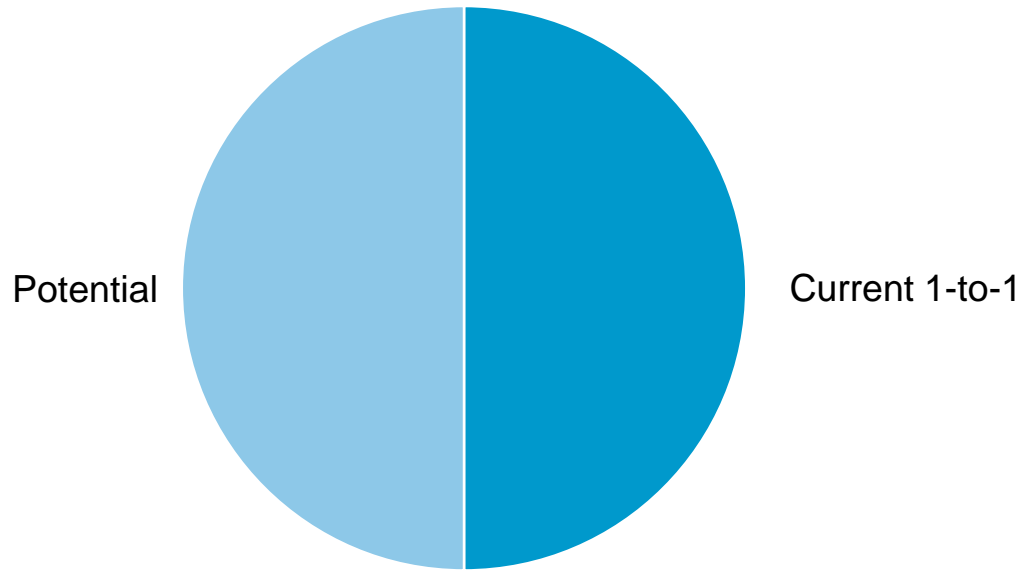


Labour

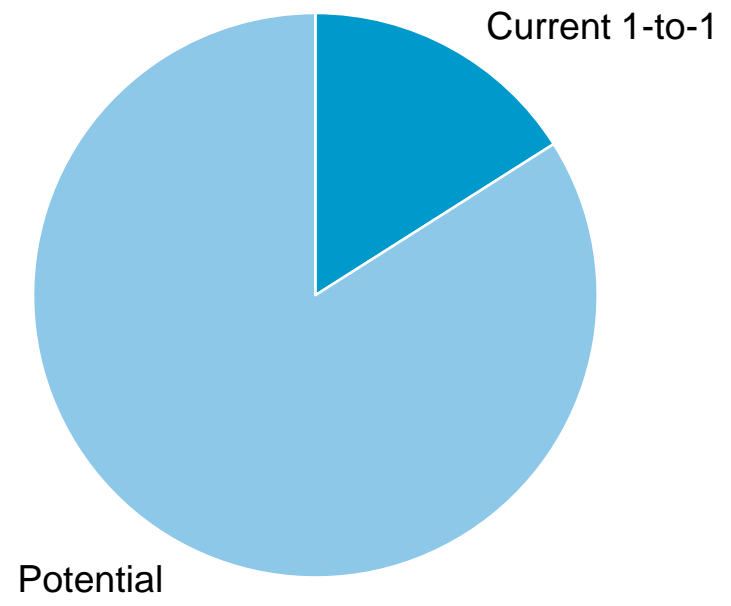
SERVICE

1-1 Ratio

Semiconductor



General Vacuum



CONNECTIVITY

- EdCentra
 - Edwards' latest equipment monitoring and data analytics platform
 - Deployed on a server inside a customer's facility
 - Supporting several hundred devices per instance

- FabWorks (Legacy product)
 - Total connected devices: ~ 75 000



SUMMARY

Vacuum technique

Vacuum is a growth area

Vision is to become and remain the global leader in vacuum solutions

Focus on integration

Innovation



***COMMITTED TO
SUSTAINABLE PRODUCTIVITY.***



Atlas Copco



CAUTIONARY STATEMENT

“Some statements herein are forward-looking and the actual outcome could be materially different. In addition to the factors explicitly commented upon, the actual outcome could be materially and adversely affected by other factors such as the effect of economic conditions, exchange-rate and interest-rate movements, political risks, the impact of competing products and their pricing, product development, commercialization and technological difficulties, supply disturbances, and major customer credit losses.”