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

2010

Atlas Copco’s Compressor Technique business area has a smaller industrial vacuum business, including a part from the Quincy acquisition.

2014

The Edwards Group, with revenues of MSEK 6 950, is acquired. The Vacuum Solutions division is created within the Compressor Technique business area.

2015

Exhaust gas management producer Applied Plasma Systems, South Korea, is acquired. Vacuum pump service business Innovative Vacuum Solutions, USA, is acquired.

2016

Vacuum parts and service business Capitol, USA, is acquired. Leybold, with revenues of MSEK 3 150, is acquired. CSK, South Korea, with revenues of MSEK 870 is acquired.

2017

Vacuum Technique enters into 2017 with approximately 6 800 employees and SEK 14 billion in revenues (pro-forma).
**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**

**Leybold 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
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**
- Burn & Wet
- Plasma & Wet
- Thermal & Wet
- Wet

**Delivery systems**
Vacuum products

Semiconductor

Flat panel displays

Solar panels

Metallurgy

Exhaust management systems

Food & beverages

Packaging

Conveying and assembly

…and more
VACUUM – A GROWING MARKET

Increasing vacuum intensity

Vacuum Technique

Miniaturization
- Moore’s law
- Next generation technologies

LED/Solar
- LED and general lighting
- ‘Green technology’

Scientific OEMs
- Point of Use spectrometry (simplification)
- Bigger system requirements

Industrial / Process
- Freeze drying
- Food processing
- Pharmaceuticals and Healthcare

OLED
- Significant investment
- Hyper growth market

Electrical
- Lithium Ion batteries
- Electric vehicle applications

New processes
- EUV lithography
- Advanced packaging

450 mm transition
- Increasing complexity
- Consolidation

Integrated Systems
- Enabling rapid technology deployment
- Time to 1st wafer

Device proliferation
- Mobility and connectivity
- Electronics as necessity

New vacuum applications
## MARKET COVERAGE

### Vacuum Technique

<table>
<thead>
<tr>
<th>Market segmentation</th>
<th>Rough, process and industrial vacuum</th>
<th>Semiconductor</th>
<th>High and ultra high vacuum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure range (absolute pressures)</td>
<td>1 bar - 10-6 mbar</td>
<td>10-3 - 10-6 mbar</td>
<td>10-3 - 10-11 mbar</td>
</tr>
<tr>
<td>Applications (main classifications)</td>
<td>▪ Rough vacuum</td>
<td>▪ Semiconductor process vacuum</td>
<td>▪ Thin film</td>
</tr>
<tr>
<td></td>
<td>▪ Process vacuum</td>
<td>▪ TFT-LCD display</td>
<td>▪ Instruments</td>
</tr>
<tr>
<td></td>
<td>▪ Industrial vacuum</td>
<td>▪ Solar</td>
<td>▪ R&amp;D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ LED</td>
<td></td>
</tr>
<tr>
<td>Brand used</td>
<td>Leybold Edwards Atlas Copco Quincy</td>
<td>Edwards CSK</td>
<td>Edwards Leybold Gamma</td>
</tr>
</tbody>
</table>
VACUUM TECHNIQUE

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

- Asia/ Australia: 54%
- North America: 24%
- Europe: 19%
- South America: 1%
- Africa/ Middle East: 2%

Revenues

- 2014
- 2015
- 12 months Sep 2016
- 12 months Sep 2016 incl. Leybold and CSK

Revenues by region including Leybold and CSK (when acquired)

Vacuum Technique
VACUUM TECHNIQUE
Including Leybold and CSK

Revenues by application

- Industrial and high vacuum: 40%
- Semiconductor: 60%

Revenues by type

- Equipment: 77%
- Service: 23%

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
Examples of what is inside a fab

- Vacuum pumps
- Power supplies
- Robotics (inside)
- Loader
- Chambers
- Turbo molecular pump / Cryo (if fitted)

**Sub Fab**

**Semiconductor fab**

**Typical semiconductor process tool**

**...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

- Degassing De-aerating
- Cooling Drying
- Distillation
- Holding Lifting Moving
- Forming Shaping
- Preserving
- Creating a clean, controlled environment
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

Degassing
De-aerating
Creating a clean, controlled environment

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

Further segmentation of medium applications achieves 63% further power reduction (iH to iXM).

IXL120 achieves over 80% reduction in power compared to iQDP80

iXH1210 achieves 29% reduction in power compared to iQDP80/1200
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

Semiconductor Service
Providing service solutions to semiconductor customers

> 600 Field Service engineers
32 Workshops and service centers for remanufacturing

Vacuum Technique Service
Providing service solutions to customers in general industry

Remanufacturing
Parts
Labour
1-1 Ratio

**Semiconductor**

- Potential
- Current 1-to-1

**General Vacuum**

- Potential
- Current 1-to-1
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.
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.”