Blower Technologies & Energy Efficiency Opportunities

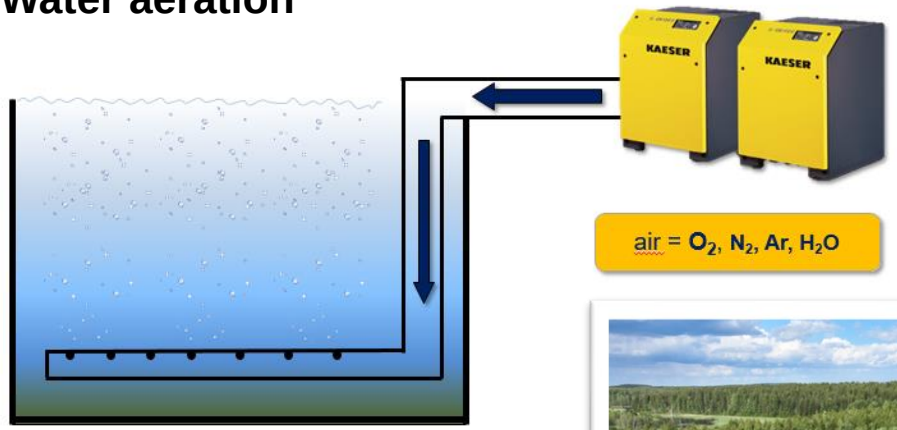
Tony Long

KAESER Compressors NZ Limited
Business Development Manager

Contents

1. WTP air applications
2. Blower operating principles
3. Specific power explained
4. Packaged blower units
5. Energy efficiency in correct control
6. Summary

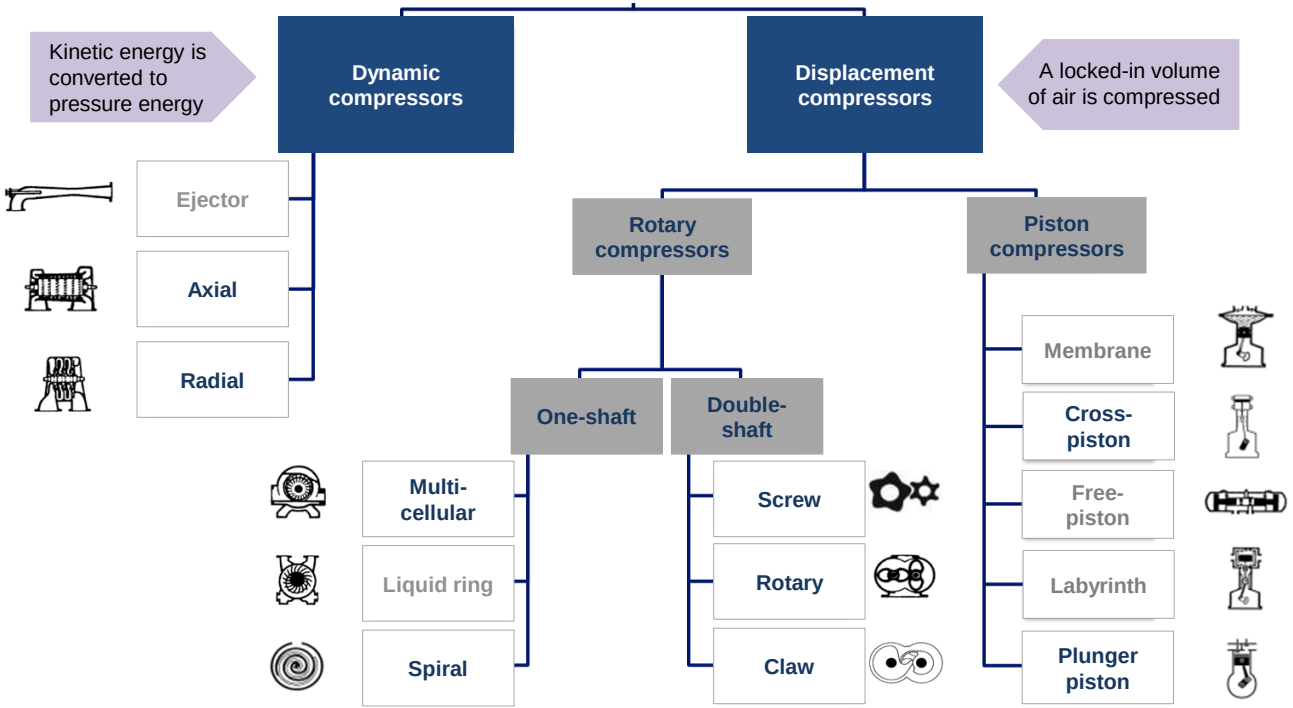
1. WTP air applications
Water aeration



air = O_2, N_2, Ar, H_2O

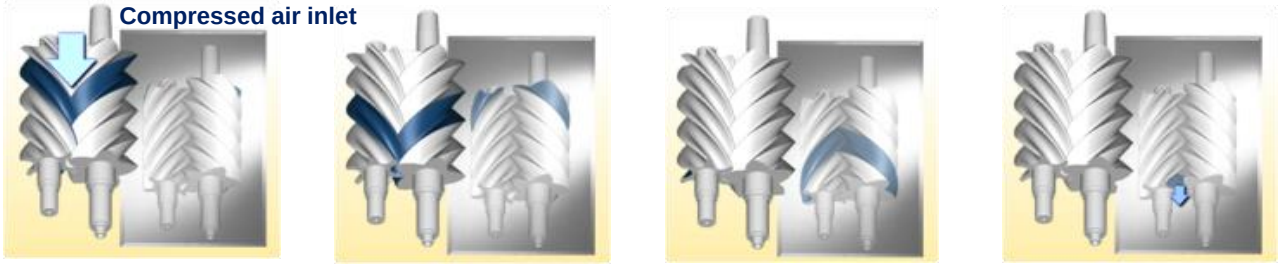
1. WTP air applications
Sewage plants – aerator membrane activation basin

2. Blower operating principles
Types and classification of air compressors

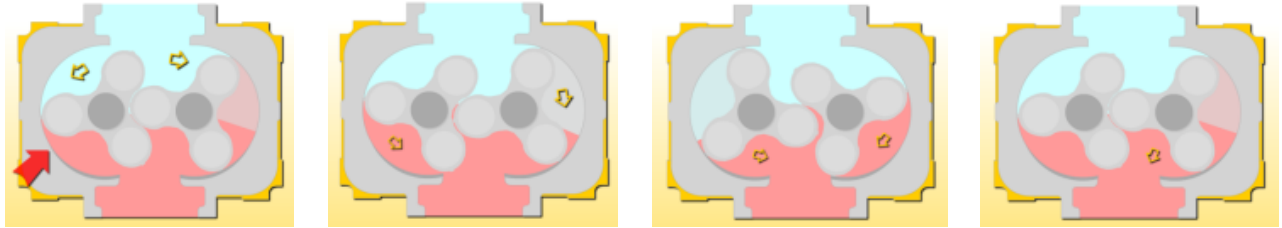


Rotary blower vs. Screw blower
Displacement compressors – internal & external compression

Internal compression - a certain pressure is always built up, independent of the process requirements:

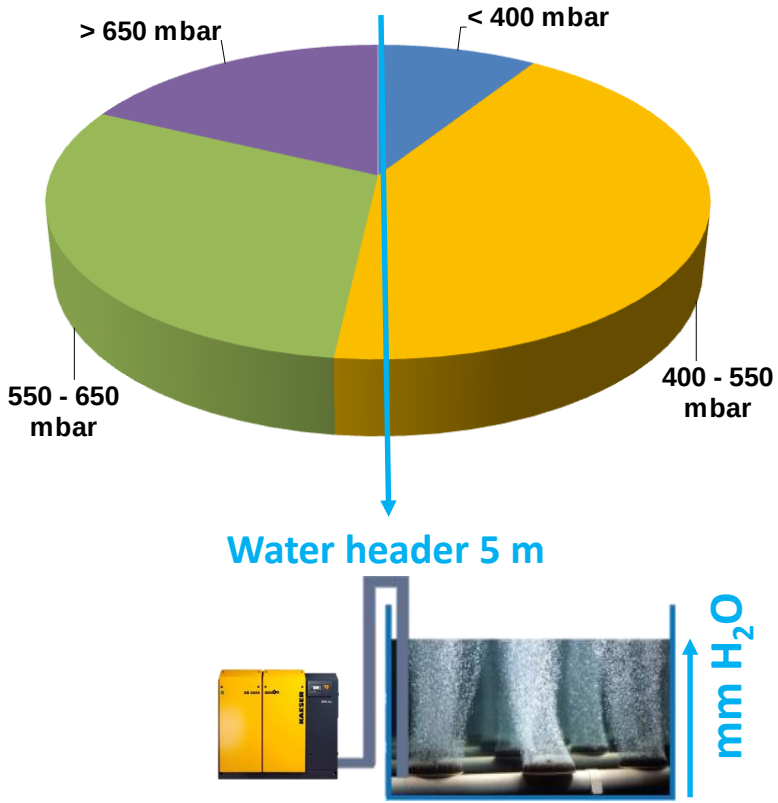


External compression - it is pushed out against the pressure losses in the process and therefore compressed in the piping between blower and application:

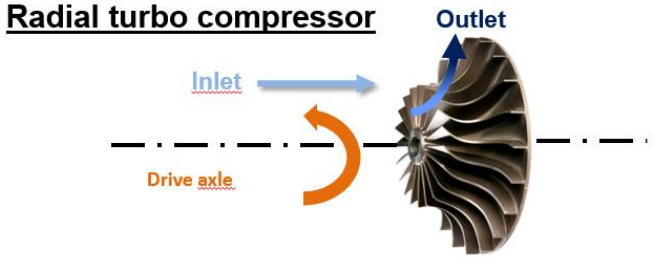


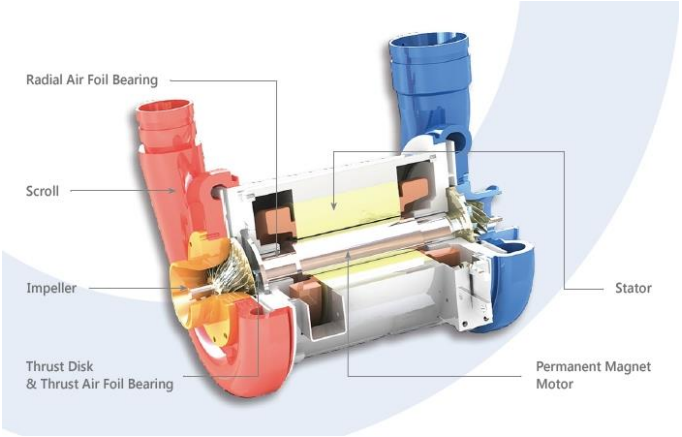
PD vs Screw blower
WWTP aeration – typical projects division by differential pressure

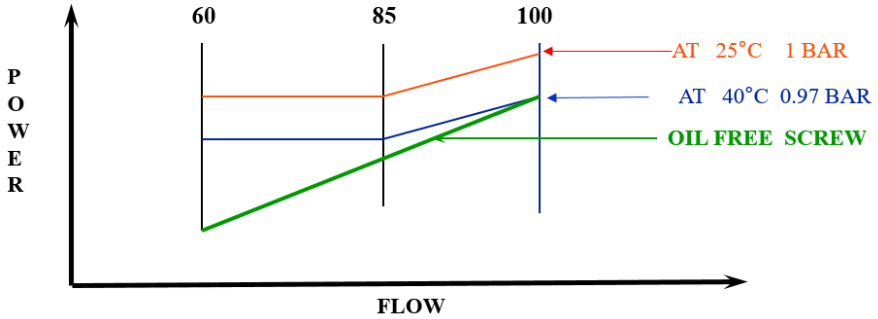
- PD blower
  optimal below +550 mbar
- Screw blower
  optimal above +550 mbar
- Optimized Sigma rotor profiles are available by pressure range
  keyword “over-compression”



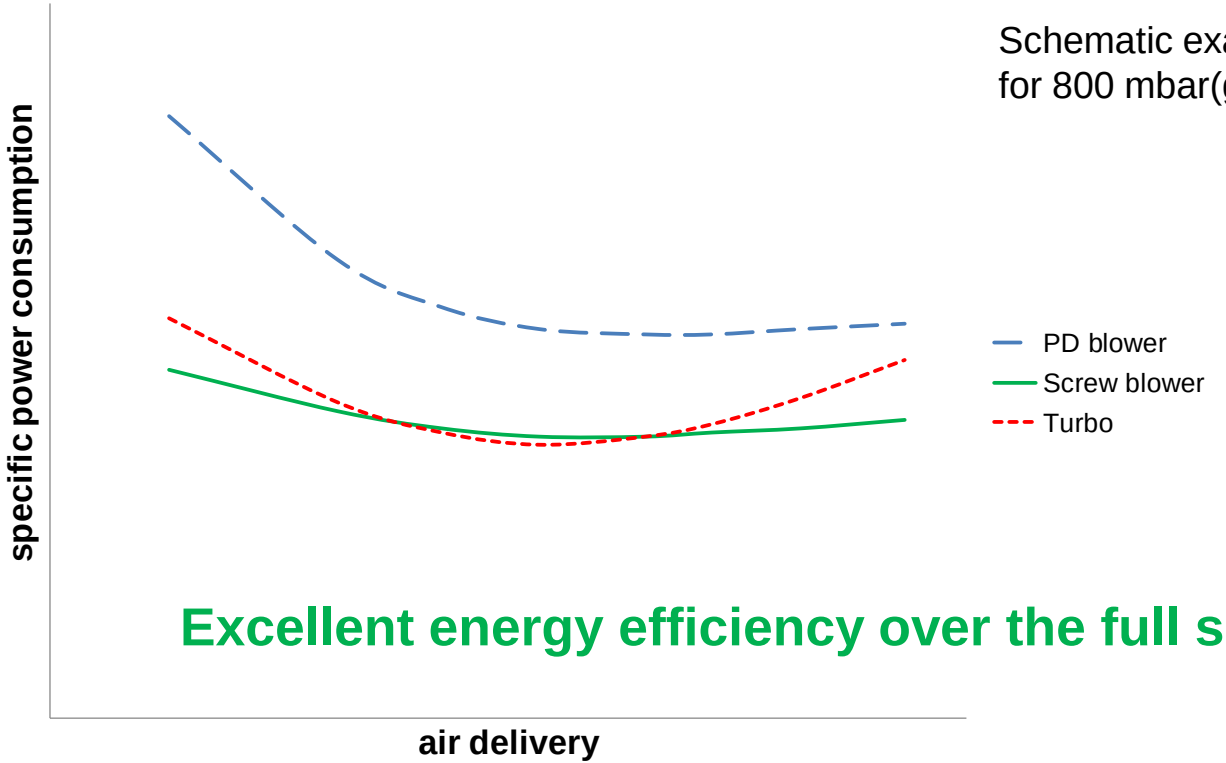
Turbo compressors







Lobe vs Screw vs Turbo
Which is better?



Excellent energy efficiency over the full speed range!

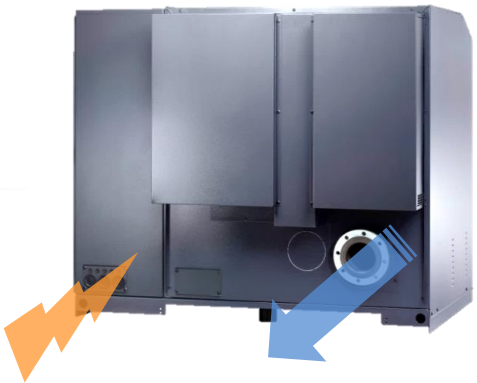
3. Specific power explained
Verification of performance ‘wire to air’ – ISO 1217 part C & E

ISO 1217 = Measured and stated performance for displacement compressors
Part B = airend
Part C = complete machine, part E = machine complete – variable speed

Range	Air delivery	Specific power	Idle power
1,5-15 m³/min	5 %	6 %	20 %
> 15 m³/min	4 %	5 %	20 %

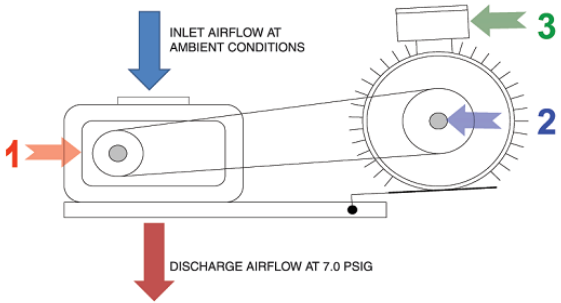
Example: max. deviation to part C

Specific power = total power input/air delivery
= kW / m³/h = kWh/m³, also J/m³

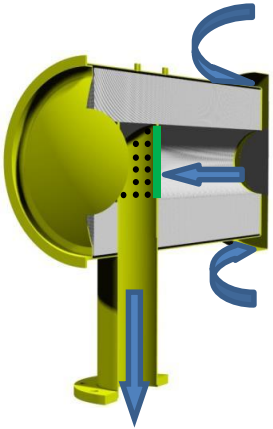


Contributors to power loss

- Drive transmission systems
- Electric motors
- Internal components
- Frequency drives
- Blower blocks



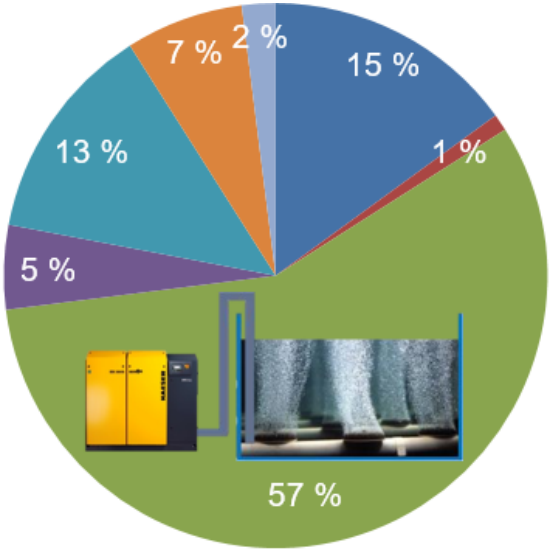
Blower consumption (1), drive losses (2), and motor efficiency (3), all impact specific power



Why look at blowers in regards to energy savings?
Energy distribution at typical waste water treatment plant (WWTP)

Aeration biology:

- biggest cost factor energy
- nearly constant differential pressure
- machine run time 4000 – 6000 hours per year



Energy share (%)

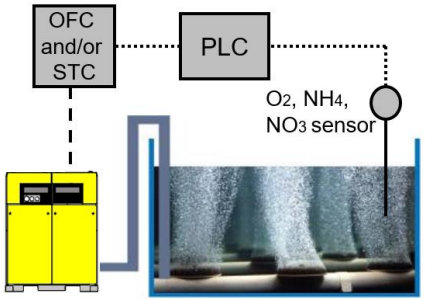
- Sewage lifting
- Mechanical treatment
- Biological treatmt.
- Sludge dewatering
- Sludge treatment
- Air treatment.
- Other

4. Packaged blower units

Fixed speed / frequency control with a complete set of sensors, linked to the controller; all components completely mounted and cabled

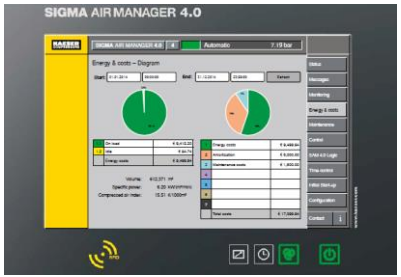
- Suction temperature
- Discharge temperature
- Suction pressure
- Discharge pressure
- Oil level monitoring
- Oil temperature monitoring by Pt100
- Filter differential pressure
- Sound enclosure temperature by Pt100
- PTCs main motor
- Vent fan overload protection

5. Energy efficiency in correct control
Clarity and connection with onboard control



- **Onboard PC based controllers**

- **Central PC based controllers**



6. Summary

1. Blowers are large energy consumers
2. Turnkey plug and play blowers reduce installation time and commissioning
3. Blower package should be compared using ISO standards
4. Specific power of the **complete** package is important
5. Complete systems control is important

Thank you for your attention

Questions