INDUSTRIALS GROUP

Runtech
by Gardner Denver

Energy and Vacuum Systems

Cutting edge vacuum solutions

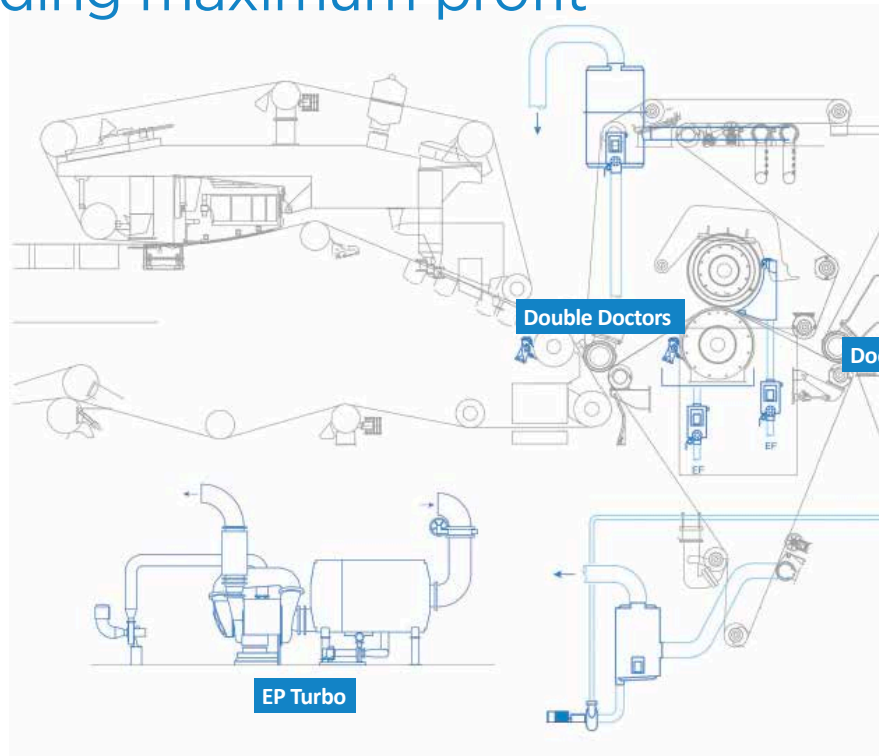
Engineered Solutions for
the Pulp and Paper Industry

Environmentally friendly and energy efficient vacuum system providing maximum profit

RunEco is an environmentally friendly and energy efficient vacuum system concept providing a reliable solution that is ideal for the paper industry applications.

RunEco saves 30% to 70% energy compared with traditional vacuum systems and it is completely water-free. RunEco's improved energy and water consumption leads to a payback time of just 1-3 years.

We also offer a wide range of analysis services and maintenance for you to keep your machine in excellent condition for maximum profit.



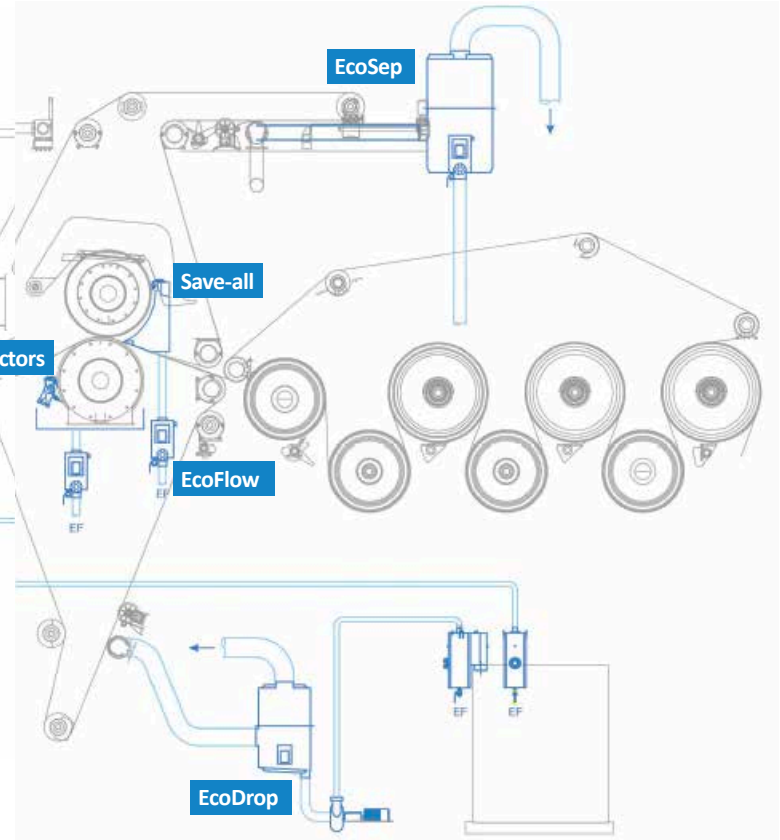
RunEco concept includes:

- EP Turbo blower
- EcoDrop water seperator
- EcoFlow dewatering measurement system
- Heat recovery
- High dew point closed hood
- Machine hall ventilation
- Optimized doctoring

EP Turbo is the first variable speed and variable capacity turbo blower available. It offers a completely water-free vacuum solution with significant heat recovery potential.

RunEco installation can be performed quickly during a normal machine shutdown or even with the machine still running to avoid unnecessary production losses. Runtech support goes beyond a total vacuum system rebuild. Runtech can also design and deliver doctoring and save-all systems that support the optimal water removal and performance of the vacuum system.

Heat recovery systems normally include air-to-air or air-to-water heat exchangers. Systems are used to supply air preheating, fresh and white-water heating, machine hall heating, roof heating and hood exhaust humidity control. Optimized heat recovery improves overall heat recovery output and energy efficiency.



EcoDrop water separator separates water, fibre and fines. It ensures reliable and efficient vacuum generation.

High dew point closed hood improves overall energy efficiency of the dryer section ventilation.

EcoFlow dewatering measurement system optimizes dewatering and vacuum levels in the forming and press sections. This results in maximized sheet dryness after the press section, improved machine runnability and maximum energy efficiency, while providing paper makers with accurate real-time feedback about the dewatering performance along the paper machine.

Case study

Leipa Schwedt PM4

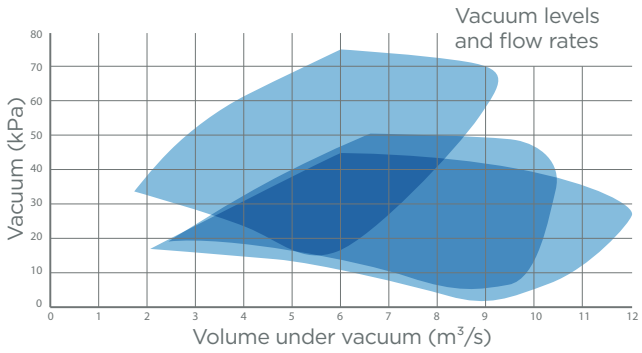
Vacuum system rebuild in Germany reaches impressive energy saving results

In 2014, the mill commissioned a study of its original vacuum system from 2004. The study showed a very attractive ROI, making the investment decision easy. One of the original multistage blowers was replaced with an EP Turbo and the energy savings amounted to an impressive 900 kW. This turnkey project was carried out together with local subcontractors.

Leipa Schwedt's PM4 is an 8.9-metre online coating and calendering paper machine running at 1,600m/min, located in Germany near the Polish border. Production is 300,000 tons of high-quality LWC paper.

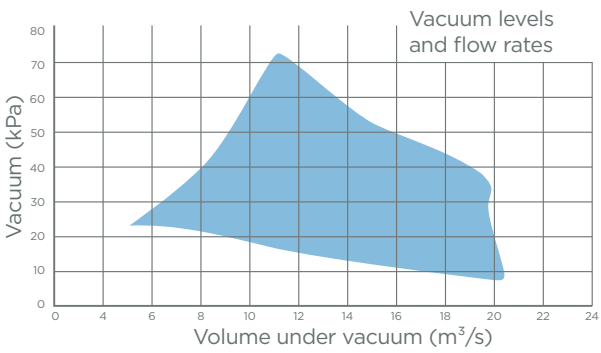
EP Turbo blowers

EP600 Turbo

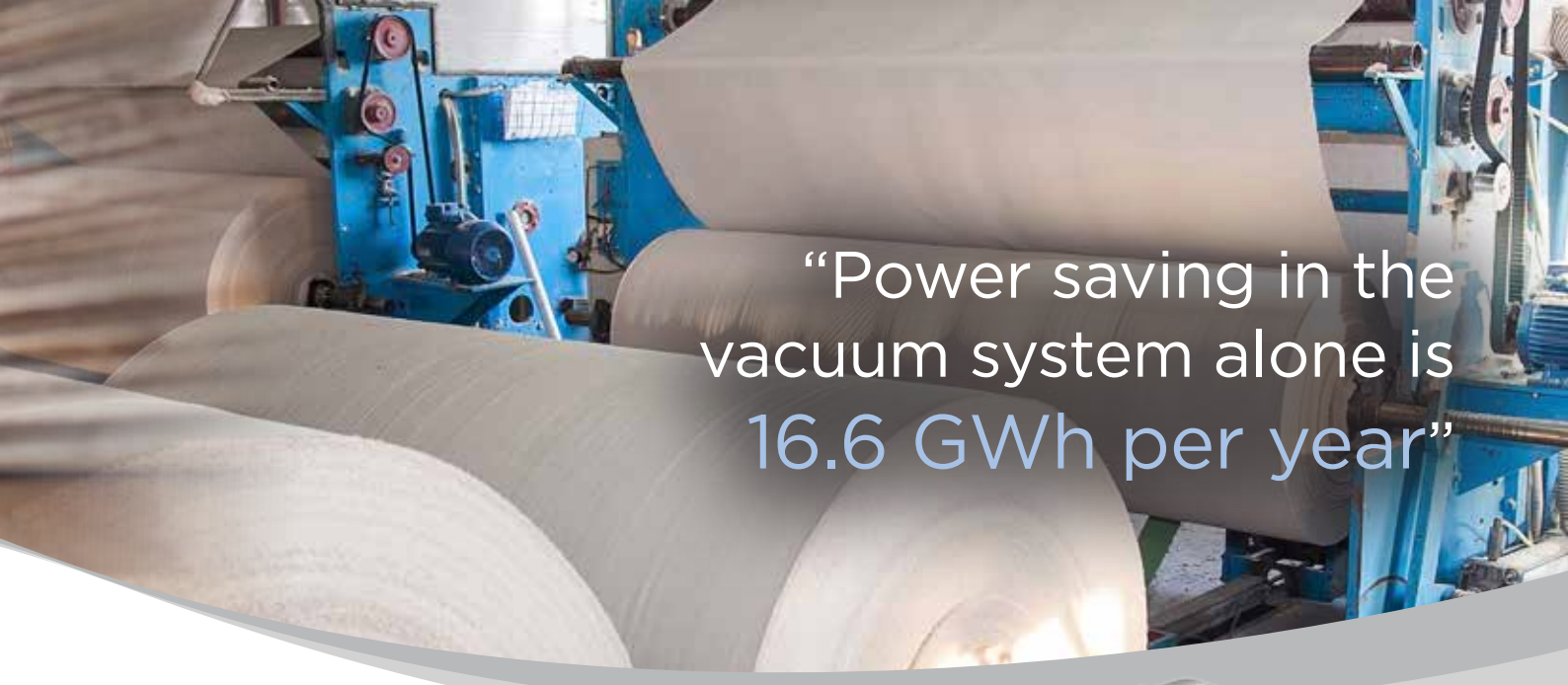


Variable air flow	Single stage: max 11 m³/s (23 000 cfm)
Adjustable vacuum level	max 70 kPa (21 inHg)
Electric motor	600kW 800 Hp
	L 2,620 mm x H 2,250 mm x 1,715 mm (L 103″ x H 89″ x W 68″)
	5,000 kg (11,000 lb)
Impeller material	Carbon composite or cast titanium
Blower body	Coated mild steel
Bearings	Ceramic ball bearing with oil lubrication unit
Motor cooling air (EUS)	1.2 m³/s, +30 °C, 3,5 kPA (2,500 cfm, 90 °F)
Frequency converter	Built to customer specifications
Voltage	400/690 V
Other features	Compact design, easy maintenance and installation

EP1000 Turbo



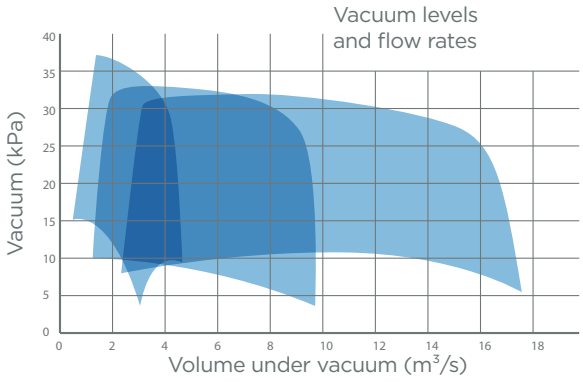
Variable air flow	Single stage: max 20 m³/s (42 000 cfm)
Adjustable vacuum level	max 73 kPa (22 inHg)
Electric motor	1,000kW 1300 Hp
	L 2,000 mm x H 1,620 mm x 1,880 mm (L 78″ x H 64″ x W 74″)
	model: 5,500 kg (12,125.5 lb)
Impeller material	Carbon composite or cast titanium
Blower body	Coated mild steel
Bearings	Ceramic ball bearing with lubrication unit
Motor cooling air (EUS)	1.2 m³/s, +30 °C, 3 kPA (2,500 cfm, 90 °F)
Frequency converter	Built to customer specifications
Voltage	690 V
Other features	Compact design, easy maintenance and installation



“Power saving in the vacuum system alone is 16.6 GWh per year”

EP Turbo blowers

Variable air flow	Flow range*: 1.0-16.0 m³/s (2,100-34,000 cfm)
Adjustable vacuum level	Vacuum range: 1 - 30 kPa (0.3 - 9 inHg)
Electric motor	Up to 600 kW 800 Hp
	Standard electric motor
Impeller material	Carbon composite or stainless steel
Blower body	Stainless steel
Bearings	Oil-lubricated or grease-lubricated ball bearings
Motor cooling air (EUS)	-
Frequency converter	Built to customer specifications
Voltage	Built to customer specifications
Other features	Labyrinth shaft sealing



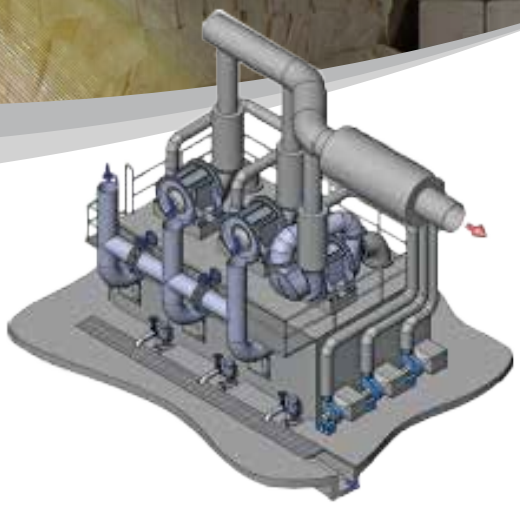
Case study

Stora Enso Skoghall BMB

Vacuum system rebuild in Sweden fulfills its energy saving target

"In total, 7 liquid ring pumps were replaced by 1 Runtech Turbo and 2 EP blowers. Power saving in the vacuum system alone is 16.6 GWh per year. We have also achieved a significant savings in water and a reduction in maintenance costs," says Mill Supervisor Pehr Mithander.

Stora Enso Skoghall BM8 is the biggest primary fibre board machine in Europe with a width of 8.1 m and annual capacity of 450,000 tons.



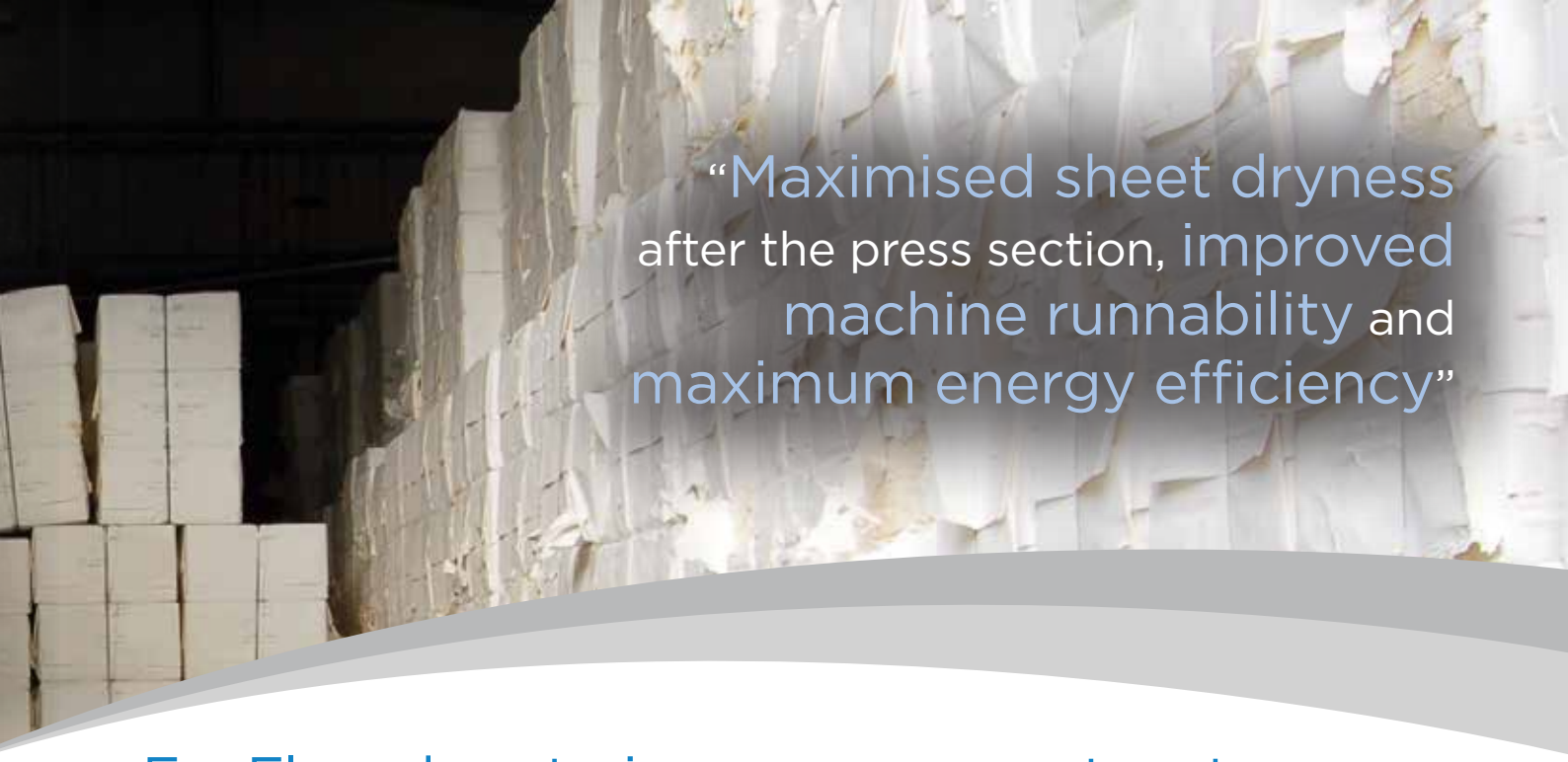
EcoDrop water separators

Concrete EcoDrop water separators

- 4 stage water separation
- Compact design saves civil and piping costs
- Eliminates the need for additional blower foundations
- Extremely effective noise isolation
- Easily removable EcoDrop filters
- Concrete separator for EP Turbo blowers
  L 12,100 mm x H 3,000 mm x W 5,000 mm
  (L 480" x H 120" x W 200")

Steel EcoDrop water separators

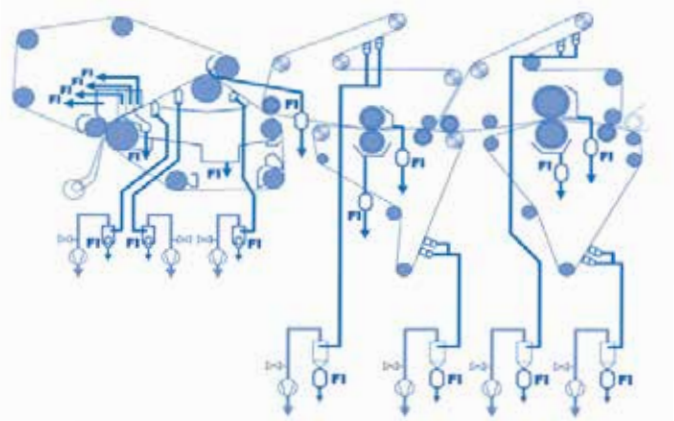
- 4 stage water separation
- Unique dual filter system separates
  the smallest drops and fibres carried by air
- Flexible process connections
- Easily removable EcoDrop filters
- Removable sight glasses
- Standard sizes
  Diameter 1,600 mm / inlet 500 mm (63" / inlet 20")
  Diameter 2,000 mm / inlet 600 mm (79" / inlet 24")
- Extraction pump connection
- Material: AISI316
- Dry weight: 2,000 kg (4,400 lb)



"Maximised sheet dryness after the press section, improved machine runnability and maximum energy efficiency"

EcoFlow dewatering measurement system

- EcoFlow online dewatering measurement system for the wire and press sections
- Optimizes dewatering and vacuum levels
- Minimizes start-up time of the new felts
- Improves machine runnability
- Maximizes felt life and optimizes felt type
- Easy and inexpensive installation reduces downtime and start-up time
- Allows full optimization benefit of EP Turbo blowers
- Over 4,000 units installed to date



Case study

Lee & Man Tissue PM9, PM10, PM11 and PM12

Vacuum systems to the new tissue lines

Lee & Man tissue starts up new tissue lines PM9, 10, 11 and 12. All these machines are 5.6 metre-wide tissue machines with a top speed of 2,000 m/min. Delivery included two EP Turbos and full EcoFlow system for each machine, If needed, all machines can be operated with one turbo.

Machines are already running normal speeds >1900 m/min and vacuum system power consumption is at a very good level of 300 - 350 kW. For example, TM9 SEC is one of the best in the world 45 kWh/t. Just as a comparison, older L&M TM8 (-01/2017) uses liquid ring pumps and power consumption is over 650 kW.

Engineered Solutions

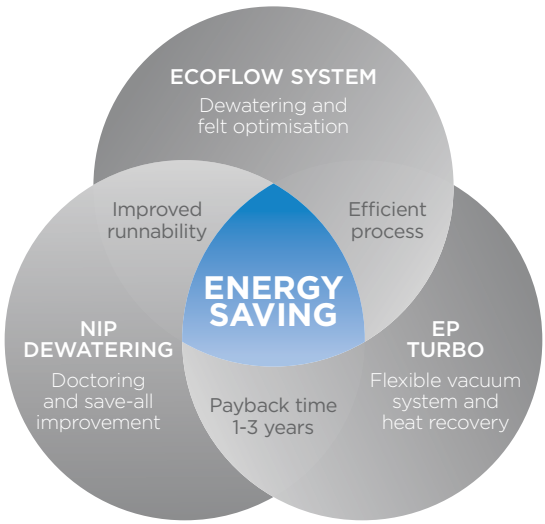
for Pulp and Paper Industry

Runtech is a global provider of engineered systems tailored to the pulp and paper industries. Runtech works with customers to better understand and control their operational conditions to maximize efficiency and cost effectiveness.

Runtech's patented solutions include vacuum system and heat recovery optimization, runnability optimization with web stabilizers, press and forming section dewatering and doctoring optimization, forming and dryer section cleanliness systems, as well as ropeless tail threading.

Our customers are paper mills and paper machine suppliers globally:

Arjowiggins, Asia Pulp & Paper, Belmer, Burgo, Domtar, DS Smith, Hamburger Recycling Group, Holmen Paper, International Paper, Kruger, Lee & Man Paper Manufacturing, M-Real, Metsä Board, Mondi, Mpact, Nine Dragons Paper, Norske Skog, PMP Group, Pratt Industries, Sappi, SCA, Smurfit Kappa, Stora Enso, UPM, Valmet, Voith and many more references in all different grades.



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For additional information please contact Runtech or your local representative.

Specifications subject to change without notice.

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