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Benefits of modern vacuum pumping systems for WEB applications

The last years there was a rapid change going on in vacuum systems. A general trend was to replace oil sealed pumps with dry compressing pumps. With this trend additional improvements were introduced.

All new generation pumps are controlled with electronics to work at the highest efficiency point and to be fully protected against overload or other pump harming incidents. This reduces your unplanned down times and helps to avoid expensive pump damages.

Furthermore new pumps are designed with the platform background and are optimized to work in a combination and are able to be assembled directly onto each other without additional base frame.

This saves installation space and makes a system looking more modern.

Dry compressing pumps have several advantages that are pointed out into this presentation.

The main problem is the different situation of OEM and End-users. Both companies are looking for a reliable system, but as the focus of an OEM goes towards initial costs, the focus for an end-user is clearly Cost of Ownership and upcoming maintenance work.

Both, CoO and service costs, are better covered with dry pumps, but these pumps are more complex and therefore also more expensive.

OEM	vs.	End-user
Reliability	=	Reliability
Good application support	≠	Good service support
Low initial costs	≠	Low follow-up costs
	≠	Low noise emission
Solid construction	≠	Small footprint



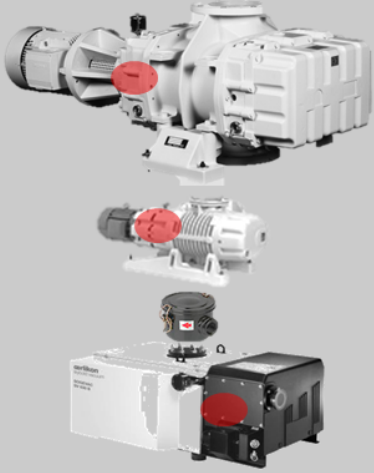


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As reliability is very important for both, OEM and End-user, there was a lot of development the last years, coming from dynamic shaft seals at all stages of the pump system, to hermetically sealed pumps without any dynamic sealing. This reduces the risk of unplanned down times due to oil leakage to an absolute minimum. Furthermore it avoids expensive sealing exchange every two years.

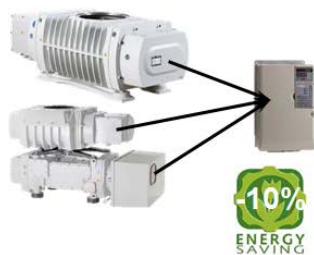
Traditional System	Current System	Modern System
		
<p>All pumps have dynamic shaft seals and the booster stages have to be exchanged every 2 years. Oil sealed pump protected by dust filter, but normal exchange like mentioned in the manual is required</p> <p>high cost impact oil leakages unplanned down times</p>	<p>Booster pumps without shaft seal to avoid regularly exchange. Oil sealed pump protected by dust filter, but normal exchange like mentioned in the manual is required</p> <p>low cost impact</p>	<p>All pumps are hermetically sealed and have no dynamic sealing to atmosphere. All pumps are dry pumps. Pumps running with PFPE oil are absolutely service free for 4 years</p> <p>no cost impact</p>



With the possibility of electronic control of the pumps energy could be saved what leads to saving for power costs up to 12.000€/a; app. 1/3 of the total costs for the vacuum system. The main energy saving comes from the Diffusion pumps. These pumps have been always uncontrolled in the past and this led to high power consumption as the oil was heated continuously.

With an intelligent electronic that levels the oil temperature, the oil can be protected from overheating and furthermore 30% of electrical power can be saved.

These savings are very easy to get at all existing systems can be upgraded with such an electronic device.



System: 2xRA9001 2xWA2001 2xSV630B 4XDIP20000	System: 2xWH7000 2xWS2001 2xSV630B 4XDIP20000	System: 2xWH7000 2xWH2500 2xDV650 4XDIP20000ECO
Required power below 10mbar: 76.5kW	Required power below 10mbar: 75kW	Required power below 10mbar: 52kW
Energy costs per year: 39.000€	Energy costs per year: 38.000€	Energy costs per year: 26.000€

An ongoing problem for the working environment ist the noise emission of a system. Old systems are running with oil sealed pumps where you can hear the sound of the rotating blades and this leads to high noise emission. The old booster pumps are air cooled and the cooling fan of a motor has a very high noise emission, too.

These 2 sources of noise emissions are removed with new systems. Furthermore many other noise creating parts like impellers, gears,... are improved. This leads to a general reduction of noise emission.

System: 2xRA9001 [82dB(A)] 2xWA2001 [80dB(A)] 2xSV630B [75dB(A)]	System: 2xWH7000 [63dB(A)] 2xWS2001 [75dB(A)] 2xSV630B [75dB(A)]	System: 2xWH7000 [63dB(A)] 2xWH2500 [63dB(A)] 2xDV650 [62dB(A)]
Noise emission below 10mbar: App: 88dB(A)	Noise emission below 10mbar: App: 82dB(A)	Noise emission below 10mbar: App: 70dB(A)
Unpleasant stressful noise level	Average industrial noise level	Pleasant noise level

60dB(A) is a level of normal conversation!

Consider that above 90dB(A) the stress level is reached and 60dB(A) is the level of normal conversation. Then you can get an impression how silent new systems with 70dB(A) are running.



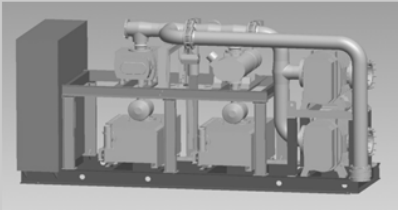
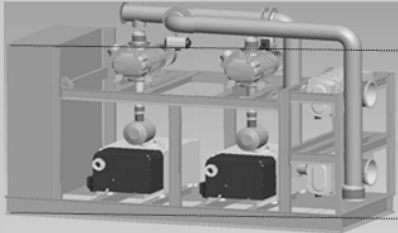
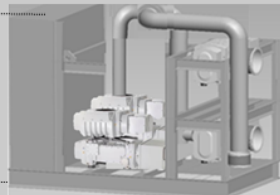
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Another very important attribute is the space requirement in your production hall. New systems can be assembled smaller and therefore they can save space. Furthermore a new system also looks more modern and fits to the high standard of a WEB-Coater.

Traditional System	Current System	Modern System
		
<p>System: 2xRA9001 2xWA2001 2xSV630B</p> <p>Length: 5.5m Footprint: 10m²</p>	<p>System: 2xWH7000 2xWS2001 2xSV630B</p> <p>Length: 5.3m Footprint: 9.5m²</p>	<p>System: 2xWH7000 2xWH2500 2xDV650</p> <p>Length: 3.2 Footprint: 5.8m²</p> <p>Vacuum system saves 40% installation space</p>

Summary:

New vacuum system offering a lot of advantages

For OEM:

- ✓ Offering a more reliable system
- ✓ Using "maintenance free system" as a competitive advantage
- ✓ Using reduced noise level as a competitive advantage
- ✓ Offer "dry system" as an option and show customer innovation and flexibility
- ✓ Having a more modern looking pump system that fits to the modern design of the coater

For End-user:

- ✓ More up-time with static sealing (no wear out; no oil leakage)
- ✓ Saving energy costs up to 12.000€/a
- ✓ Saving maintenance costs
- ✓ Saving maintenance time = more up-time
- ✓ Creating a more comfortable working environment with reduced sound level
- ✓ Need less installation space for your system



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Maintenance and CoO of vacuum pumping systems for WEB applications

The maintenance work of the described pumping systems differ fundamentally from each other.

While at the traditional systems a lot of manual and regular maintenance work needs to be done at the modern systems only after 4 years a replacement of the synthetic oil is necessary.

The maintenance work of traditional pumping system:

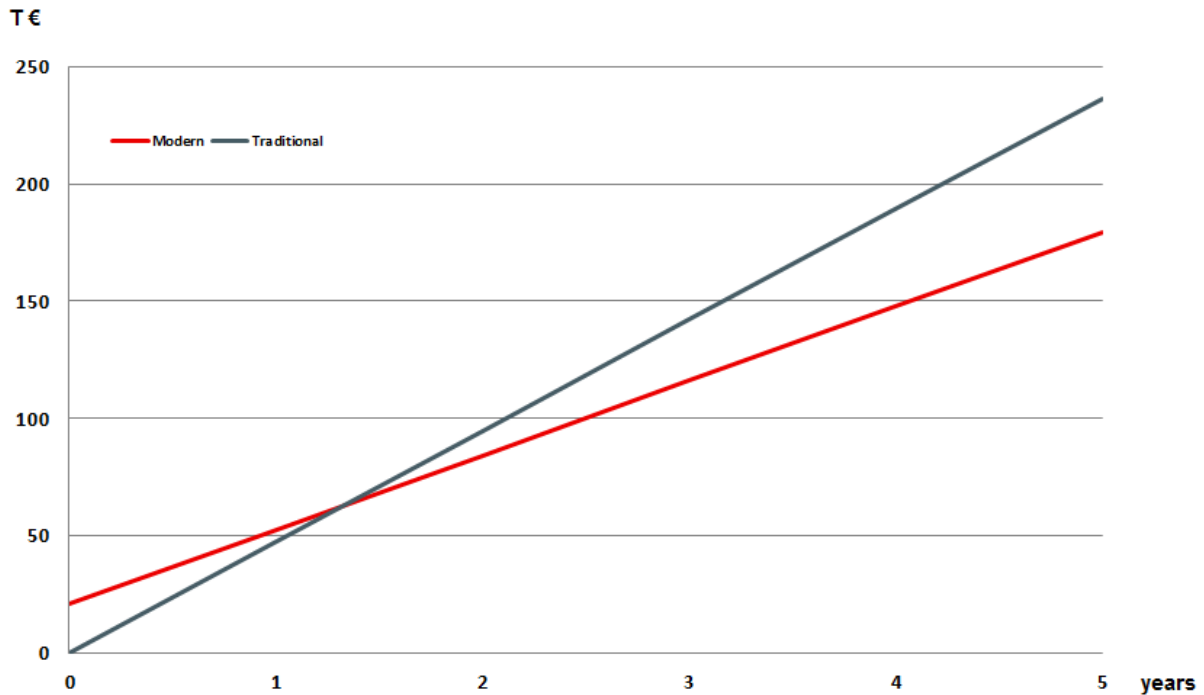


	Total material/5 years	Total labor/5 years
	710 L	70 hours
	20 pcs	10 hours
	8 pcs	24 hours
	60 pcs	40 hours
	6 units	140 hours

To meet the expected MTBM (mean time between maintenance) it is highly recommended to use original parts and OEM service provider!



The difference in maintenance work and expenditures has a direct result into the CoO comparison as visible in the following graph (figures are averaged):



The initial cost for the modern systems are higher but after 1,5 years the CoO comparison is even with the traditional once.

It is not the idea to talk the traditional systems down as they have their position in the market as very strong and robust systems with a proven very well reliability. Technology is proceeding and today's state of the art systems are reducing maintenance work and power consumption in order to meet the demand of tight energy resources. Companies who have a strong focus on CoO of their system should consider options to optimize their actual pumping system or to consider which technology they will pick for their next investments.