

Why go for electric conveyors?

With the growing concern in working environment pollution and upward trend on promoting green technology among global industries, electric shaker conveyors become the obvious replacement for traditionally compressed air/pneumatic driven shaker conveyors in current market. Here is our analysis of the benefits based on four categories: Safety, Energy Consumption, Reliability and Overall Economy.

Safety

The Work Environment Authority warns of harmful oil vapour in the air. Sweden has implemented an exposure limit of 0.1% (1 mg/m³) oil mist in the air in the work environment. Oil mist is an inevitable emission from using pneumatically driven conveyors. Open air-oil mist lubrication spreads microscopic oil droplets that contaminate the air we breathe. A significant amount of oil-saturated air often fails to reach the ventilation extraction intake and keep polluted air staying at the lower altitude. The oil mist containing metallic particles and other harmful substances within this polluted air that have severe human health effects. Below are the risks of oil mist:

Occupational diseases:

- Inhalation: Larger droplets irritate the respiratory tract, causes pain in the nose and throat, coughing and hoarseness and lesions in the nasal passages. Smaller drops reach into the lungs where they spread out, affect lung function and can cause “oil lung”.
- Physical contact: Skin problems can arise, including oil acne, eczema, and skin cancer at worst.
- Hearing: Loud noise produced by the pneumatically driven conveyors can induce not only the negative mood on employees but also hearing impairment and tinnitus.

Negative working environment:

- Slippery floors: Oil accumulates on the floor which reducing productivity of workers due to the inconvenience of extra cleaning, moving cautiously, and risk of accidents.
- Bad ventilation: The oil trapped in the ventilation system impairs indoor air quality.
- Other damages: Sensitive electronics will be affected and potentially destroyed over time.

Improved working environment by using our electric conveyor:

✓ **Zero-emission**

All Conveyor 22 products are extremely clean without any form of emissions (e.g. oil mist) and are an excellent replacement for pneumatic conveyors. Thus, operation of Conveyor 22 conveyors has no influence on the air quality.

✓ **World best quality**

The electric conveyor is designed to be environmentally friendly. There are no harmful effects on physical contact with our products. The material used is certified by world standards: RoHS, SA, UL, CE.

✓ **Low-noise**

The electric conveyor is very quiet, only 60 dB(A). All mechanical parts are self-contained and work in a sealed oil bath. The reduced noise enhances the working environment significantly.

✓ **Green environment**

Our new technology contributes to a more environmentally conscious future. In use of Conveyor 22 products, we can guarantee a safe and productive work environment.

Energy Efficiency

Low energy-efficiency caused by compressed-air/pneumatic driven operation has been highlighted in the manufacturing industry for more than a decade. Much industrial research has been done on this issue. Here we present some analysis from “The Factory without Compressed Air” conducted by National Energy Authority in 2003, which is about energy-saving measures used in Volvo Cars Corporations Torslanda and Olofström Plants.

The results show as following: Compressed air in industrial applications results in a low energy efficiency. “The energy losses from the electric input to the compressor to the output of specific work operation could however be as high as 96%, due to heat losses, pressure drops, leakage and low-performance tools.”

Electric equipment only uses the energy that the current load demands. Therefore, it is suggested to replace compressed air with direct electric drives. The report explains: “In application where compressed air is used, by using electricity for direct drive, gives almost all applications significantly higher system efficiency and lower total cost. These pneumatic applications should therefore be eliminated.”

The replacement trend is on-going as it points out: “Pneumatic screwdrivers are nowadays often replaced by electrical ones, both in relatively simple tools and in quality equipment with programmable movements.” In the report, it also highlights the reliability in use of electric force: “Electrical drives give a higher control (and are more lenient to both tool and work-piece) than pneumatic system.”

In another publication from Energy Authority in 1999, “Compressed Air”, it also argues about low energy-efficiency caused by compressed-air. “Leakage of compressed air is likely to occur in all compressed air system. A leak of about 20-50% of air requirements during regular operation is not unusual and which is most often 80-90% of the leak closest to the consumer in the hoses, fittings and fixtures.” The leakage is costly, as it calculates: “A leak with a diameter of 5 mm can provide an extra energy cost about € 2200 per year. 8% of the total energy Swedish manufacturing industries use goes into production of compressed air, which is equivalent to about 0.6 Terra Watt Hours.”

Therefore, using compressed air results in a huge economic loss for the industry.

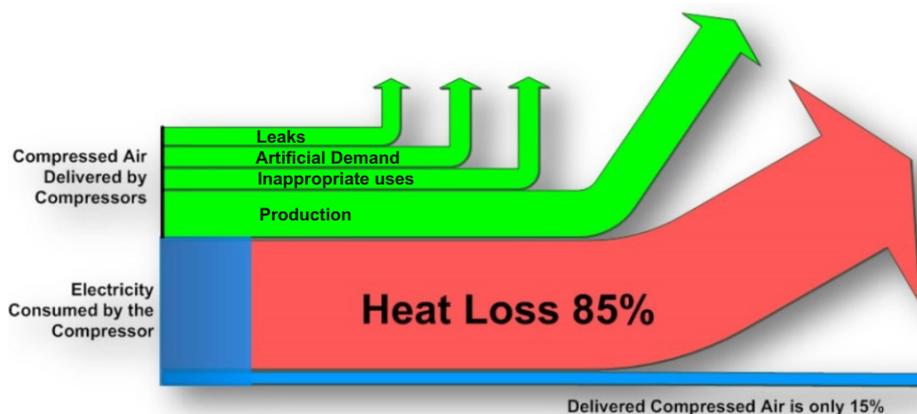


Fig. 1. Heat of compression represents 85% of the energy in compressed air production.
(Source: Draw Professional services.)

p1 (rel.)	Costs/Year					
	0,5mm	1,0mm	1,5 mm	2,0mm	2,5mm	3,0mm
3 bar	€ 90	€ 361	€ 812	€ 1,444	€ 2,256	€ 3,248
4 bar	€ 113	€ 451	€ 1,015	€ 1,805	€ 2,820	€ 4,061
5 bar	€ 135	€ 541	€ 1,218	€ 2,166	€ 3,384	€ 4,873
6 bar	€ 158	€ 632	€ 1,421	€ 2,527	€ 3,948	€ 5,685
7 bar	€ 180	€ 722	€ 1,624	€ 2,888	€ 4,512	€ 6,497
8 bar	€ 203	€ 812	€ 1,827	€ 3,248	€ 5,076	€ 7,309

Fig. 2. The costs of air leakage (Source: Reducing Energy Costs in Compressed Air Systems)
Note: Leakage costs within one year for operation 24 h/365 days, calculated using compressed air costs of 1.9 ct/Nm³

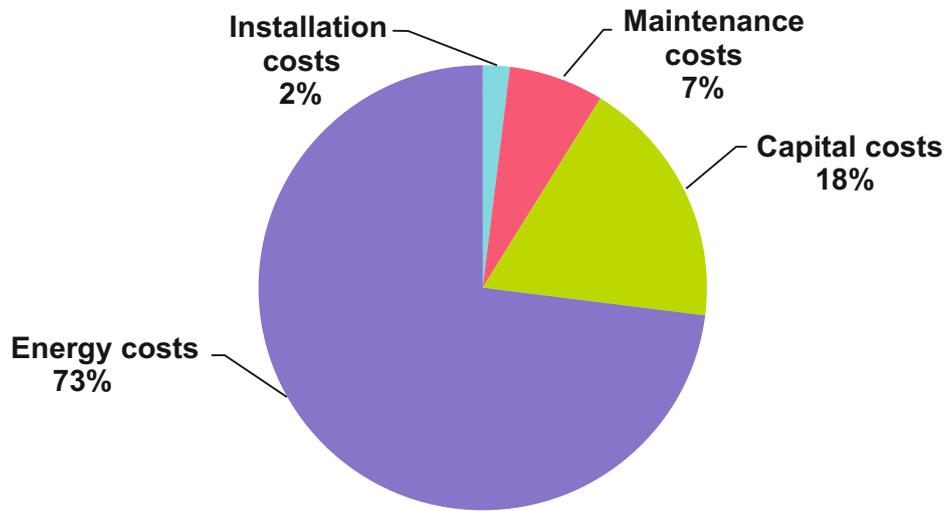


Fig. 3. Compressor Cost over 10-years Life Time (Source: Carbon Trust, 2012)

Overall Economy

Many are surprised to discover that the operating costs throughout the life of compressed air equipment greatly exceed the initial purchase price in fact. In most cases, energy cost alone in the first year of operation will exceed the purchase price of the equipment. Fig 4 shows that to operate a 1 hp air motor requires 7-8 horsepower of electrical power into the compressor. At higher than typical pressures, even more power is needed.

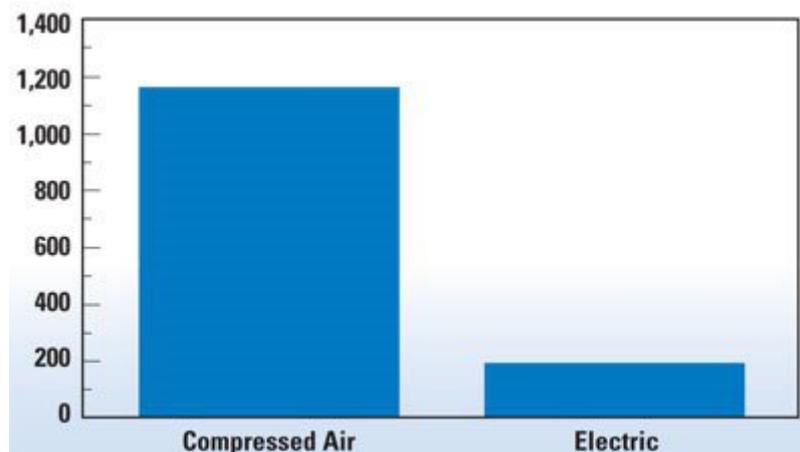


Fig. 4. Energy cost comparison of air vs. electric (Source: Compressed air Challenge)

In order to give a true and fair economic comparison between two different systems, it is important that all costs over the life cycle are included in the comparison.

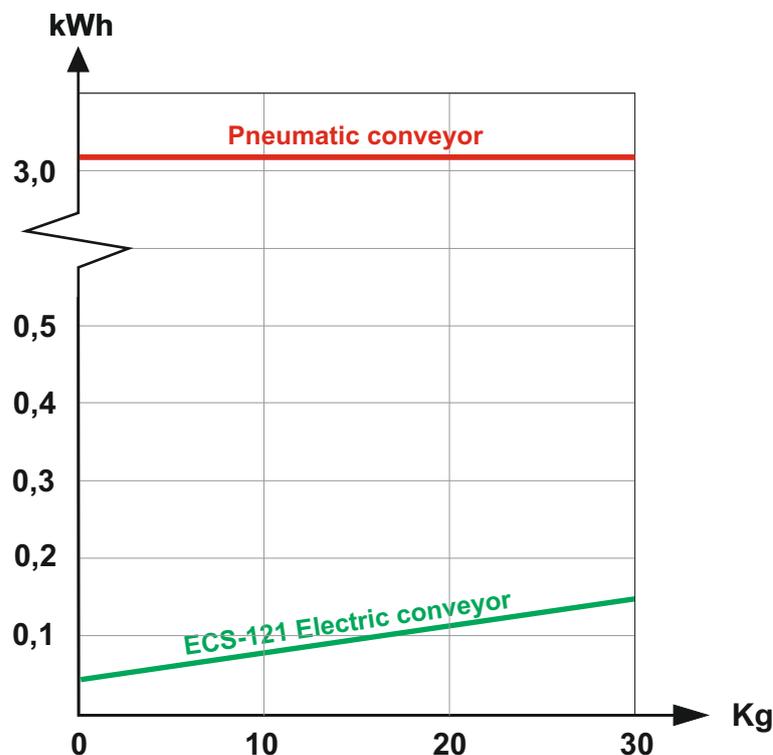
The report “The Factory without Compressed Air” also explains: “The reason for that one in many cases do not switch to electrically powered tools are mainly economic and tradition. Above all, the purchase cost of electrical equipment is higher than for the pneumatic option. The total life cycle cost, incl. heavier investment in such compressors, maintenance of machinery, operating costs and operating efficiency would instead call for the electric option.”

“Typical of pneumatic equipment is the fact that it is inexpensive and simple, which is its greatest strength. **The expenses are incurred in the Compressor room.**”

When the Energy Authority report was written, compact electric conveyors were not an available alternative, but today Conveyor 22 offers its electric solution. Here we make a comparison on the cost of pneumatic conveyor and our electric conveyor.

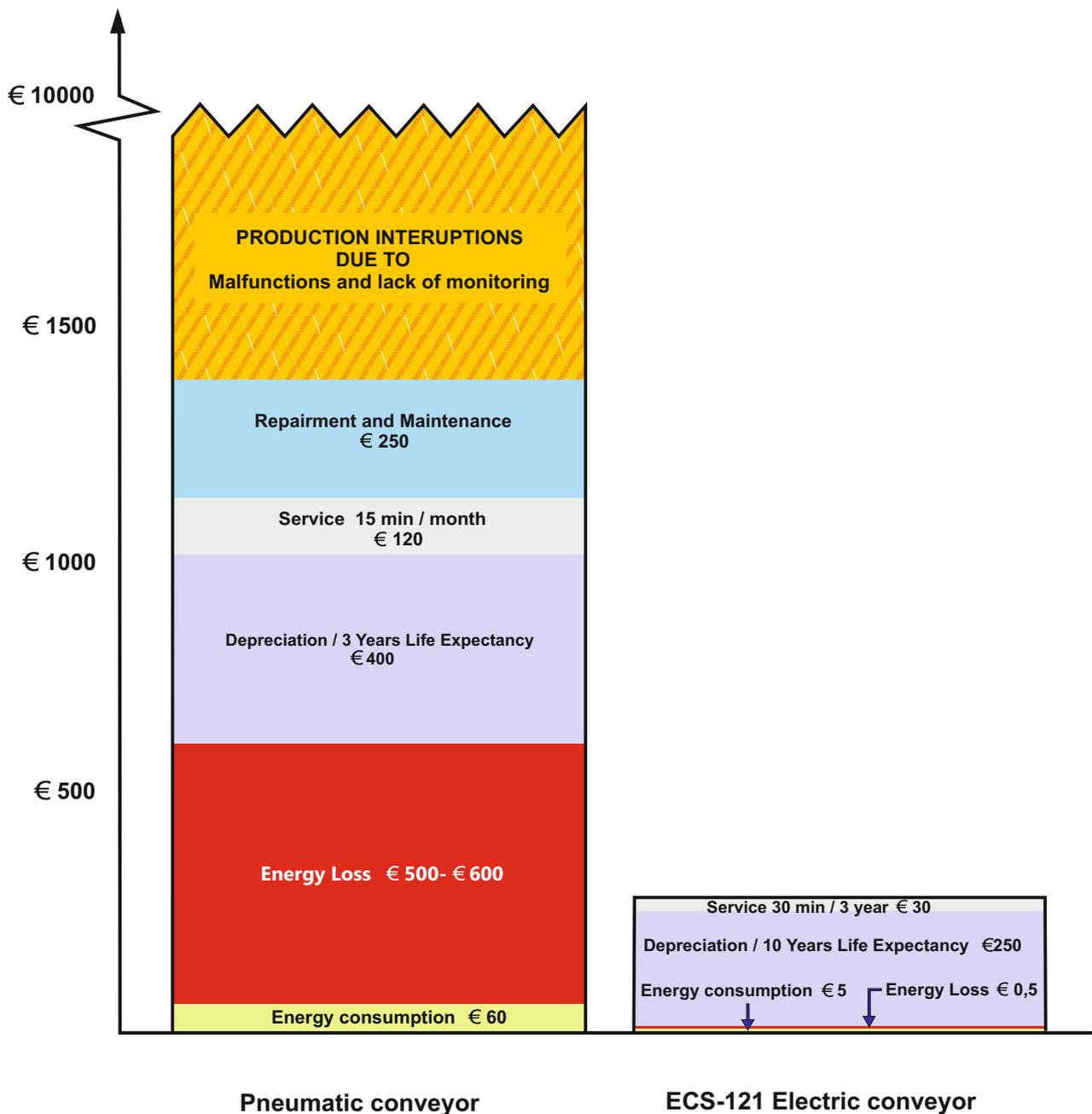
Electrical conveyor only consumes as much energy as it is required at present load.

Fig 5. Energy Consumption according to Transported Load



The following calculation example is based on our long experiences and general feedbacks from OEM (Original Equipment Manufacturer) in different industries. The steadily growing trend is to replace compressed air conveyors when the total cost is taken into account.

Fig 6. Typical Yearly Cost



Reliability

Conveyor 22 provides a technical inspection every three years for conveyor sold in order to ensure the optimum performance over time. A replacement conveyor is available while conducting the technical inspection by Conveyor 22.

An additional safety system needs to be purchased and installed when investing in a pneumatic conveyor, thus resulting in an extra cost of approx. € 1200. Conveyors from Conveyor 22 have a **built-in safety warning system**. Motor protection and a built-in motion sensor ensure the complete functioning of a Conveyor 22 conveyor.

Downtime due to malfunction can be very costly. In the event of a malfunction, the transporter immediately sends a warning via the M12 universal 24V output contact. This alert can be programmed to halt the whole production line **without the need of external sensors**, if needed by connecting to existing monitoring systems.

The built-in ball bearing mechanism can withstand high stress and has a long lifetime. An electromechanical transporter from Conveyor 22 is extremely reliable, which makes it the obvious choice.

