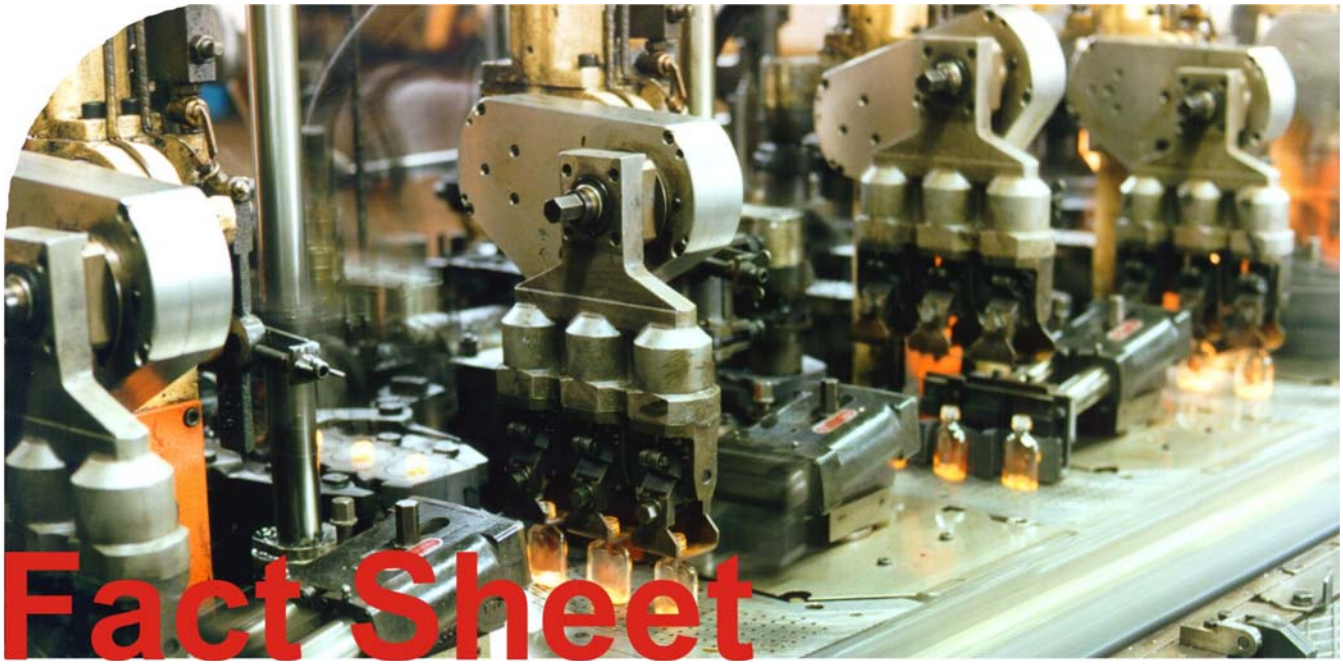


Fact Sheet

Tools

"Before" the tool

Compressed air as an energy source for tools has a strong influence on the efficiency of the work performed by the tool.

Measures at the workplace to optimise the air supply of the tool can often contribute to clearly increasing productivity and lowering energy costs.

Correct system design, from the compressor to the tool, is essential for the efficiency of the overall system. Many systems have "grown" over time, with older components which have not always been adapted to current conditions. Wrongly sized compressors or too long running times cause high costs in the same way as pipe losses and leaks (see "correct working pressure").

More detailed information on the design of individual components and their coordination can be found in the fact sheets "Production", "Control" and "Distribution".

Massive deterioration of productivity because of too low working pressure!

Compressed air tools are designed for a particular working pressure (usually 6.3 bar). It should be noted that this concerns the flow pressure and not the static pressure often shown at the service station.

The flow pressure can either be measured by a manometer positioned upstream of the tool or by a tool simulator. Anything below the optimum working pressure results in reduced performance of the tool. As an example, here the cutting performance of an angle grinder:

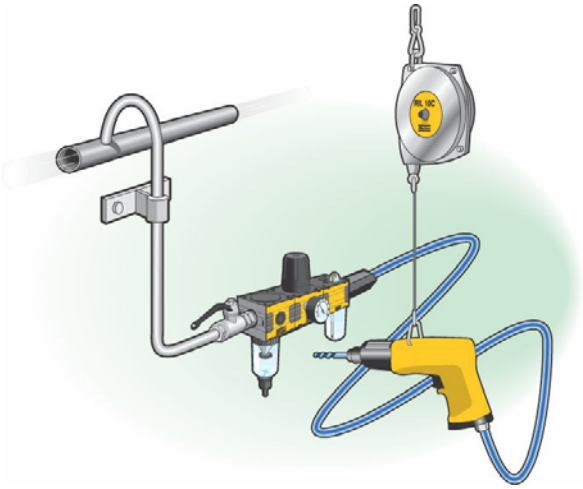
Working pressure in bar	Material removal in kg/h
6.3	5.5
5.8	4.5
5.3	4.0

The example shows that even a reduction of 0.5 bar in the working pressure results in a clear reduction in productivity. As a result, not only the necessary working time is increased, but also the energy costs.

The air consumption per time unit does fall but the longer working time still has an effect here.

Example

The total costs are listed based on the example of a drill as shown in Figure 1.



Working pressure in bar	Drilling time in s
6.3	2.0
5.8	3.2

Fig. 1: Power drill with air service unit and supply line

This means that the drilling time is increased by 60 % due to the lower pressure. And yet a working pressure which is 0.5 bar lower is by no means an exception, but often expensive reality.

In the drill example, the costs would increase as follows:

at	
Air consumption of drilling machine at 6.3 bar	15 l/s
efficient drilling time	1 h/day
working costs	20 €/h
energy costs	0.1 €/kWh
additional costs per month result for	
work	240.00 €
energy	5.97 €
TOTAL	245.97 €
	i. e. 2,700 € per year!

The way to efficient tool use

1. Optimisation of the environment

Long hoses = pressure loss!

Consequently, hoses should be kept as short as possible, spiral hoses should be avoided. Where spiral hoses are used, e.g. between mains and balancer, normal hoses could often be used. Attention must be paid to suitable hose diameters, this can help to avoid unnecessary pressure losses at couplings.

Install loss-free couplings!

The majority of self-venting quick release couplings - especially those made of brass - use up a lot of pressure (0.6-1.3 bar flow pressure). The reason is a ball positioned in the air stream. Modern quick release couplings drastically reduce the losses (to approx. 0.2 bar) and thus recover their initial cost within a short period of time.

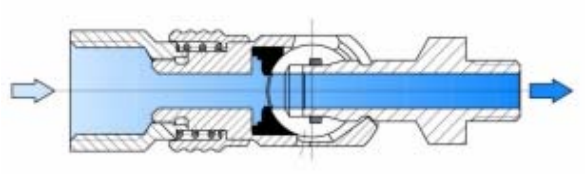


Fig. 2: Modern quick release coupling

Avoid too much tinkering!

Large diameter tolerances, more couplings than necessary, too many nozzles and incorrect hose diameters all add up to a large energy "gobbler". Tailor-made installations almost always pay off.

Fig. 3: Energy “gobblers“ in compressed air system

Oil lubrication in the air supply only where necessary!

Turbine-driven tools or those fitted with oil-free multi-disc motors do not need oil lubrication. Oilers cause pressure losses. If they are required, the oiler should be positioned 3-5 metres away from the tool.

2. Measuring and adjusting the flow pressure

After optimising the environment, the working pressure at the tool will probably be too high. This can now be reduced using the pressure controller of the air service unit. The tool then operates in the most efficient state, air consumption is minimised.

Flow pressure at the tool in bar	Air consumption in %
6.3	100
7.0	110
8.0	125

3. Adjusting the air mains pressure

The air mains pressure can also often be clearly reduced. This results in reduced compressor running times and thus massive reductions in energy costs!

Optimisations of the tool's surroundings often pay off within the shortest time!

Maintenance of the air pressure system

After optimisation has been completed, the efficiency gained has to be retained. Regular maintenance of the components is of fundamental importance here. Alongside the draining and cleaning of the filters, care should be taken to regularly check for leaks.

The supplier of the compressed air system will be able to assist you in making a maintenance plan.

It pays to remember that the condition of the tool itself has considerable effect on efficiency.

It is just as important to take into account that every change in the compressed air system has consequences for the pressure relations in the system.

Should this not always be possible because alterations occur very frequently, then the entire sytem should be checked at regular intervals.

Summary

Making a check of the environment pays off quickly where compressed air tools are being used. Incorrect sizing, adjustments and poor maintenance dramatically reduce productivity.

The "Druckluft Schweiz" campaign (efficient compressed air in Switzerland) motivates and supports the operators of compressed air systems in Switzerland in implementing measures to increase the energy efficiency of compressed air supply. The campaign is led by the Fraunhofer Institute for Systems and Innovation Research and sponsored by the Swiss Federal Office of Energy and the "Electricity Saving Fund" of ewz, the electricity company of the city of Zurich. It is part of the "EnergieSchweiz" Programme. Co-sponsors are the following companies from the compressed air sector: Airtag, Atlas Copco, Donaldson, Dopag, Kaeser, Oetiker, Prematic, Servatechnik, Vektor.

Further information can be found at www.druckluft.ch

This information sheet was compiled as part of the "Druckluft effizient" campaign, which was conducted in Germany between 2001 and 2004. The campaign was carried out by the German Energy Agency (dena), the Fraunhofer Institute for Systems and Innovation Research (Fraunhofer ISI, project management) and the German Engineering Federation (VDMA) with the support of the Federal Ministry of Economics (BMWi) and industrial enterprises (http://www.druckluft-effizient.de/kontakt/partner/industrie.php).

energieschweiz

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