

Metalworking: Clean air for manufacturing plants

"Healthy and motivated employees are the foundation of our success," says Thomas Zeiträg of tool manufacturer Emil Arnold GmbH & Co. KG in Ostfildern near Stuttgart. First-class extraction technology to ensure clean air inside the manufacturing plant is the primary goal for the company. Keller Lufttechnik has been their reliable partner in this effort for over ten years.

In support of Karl-Heinz Arnold GmbH, Emil Arnold GmbH & Co. KG produces the well-known ARNO tools for the metalworking industry. Three million indexable inserts and numerous other tools, merely a few millimeters in size, are produced annually on a total of 18 grinding machines from carbide blanks supplied by outside manufacturers. These tools are later utilized in milling, turning, boring and grooving.

It's the manufacturing environment that counts

"Our market is currently under pressure. Only manufacturers who operate reliably and deliver high-quality products in a timely manner can achieve success," says Thomas Zeiträg, head of Carbide Processing at Emil Arnold. In order to achieve some measure of success, both personnel and machines must operate efficiently. The only equipment that can operate in an environment saturated with cooling lubricant aerosols are CNC grinding machines, or edge rounding machines which provide the end product with the proper finish. For the employees, however, the situation is significantly different. "They require clean air at their workplace to remain healthy and motivated, to which they are legally entitled," states Thomas Zeiträg.

Thirty years ago: Aerosol mist during production

Times have changed. Thomas Zeiträg remembers the 1990s when only a large fan exhausted aerosol fumes from basement level workshops where many open grinding machines were installed. "Oil mist and fumes would coat skin and hair," he says. "No one expressed any concern regarding the inhaled substances." Meanwhile, it has been proven that aerosols contaminated with heavy metals are carcinogenic and their separation is mandatory.

Technological progress is growing

Today, Emil Arnold displays a completely different image: employees and visitors benefit from clean air in both the heavy and light manufacturing plants. Robots perform most of the work in modern, completely enclosed grinding machines. Oil mist extraction systems continuously remove aerosols from occupied spaces so that the air remains clean even when employees access the machinery. The employees work in two shifts; the machines operate 'round the clock, including weekends.

Annual service ensures availability

"We can only deliver reliably if we can depend on our machines. This also includes our extraction systems," says Thomas Zeiträg of Emil Arnold, a customer of Keller Lufttechnik since 2006. The personal

contact and the close proximity of the air pollution control experts at Keller were key considerations at that time. "A wise choice," says Zeiträg. "Our systems run reliably and rarely demand any extra labor. We have completed a service contract with Keller Lufttechnik for all inspection, maintenance, filter changes and ductwork cleaning that must be performed annually."

Purchased a new AERO

Emil Arnold currently operates three Keller extraction systems. Recently, a coolant mist separator ENA, was replaced by the oil mist separator AERO, after the company had switched the remaining machines operating with coolants to the cooling lubricant oil. "With the AERO, which filters 99 percent of even the finest aerosols from the air, Keller Lufttechnik set a new separation standard a few years ago," explains Keller sales representative Thomas Schneider. >



Three Keller extraction systems operate at Emil Arnold. One of the units, the oil mist separator AERO, filters 99 percent of even the finest aerosols from the air.



Both employees and visitors benefit from clean air inside the heavy and light manufacturing plant. Oil mist extraction systems continuously remove aerosols from the modern, completely enclosed grinding machines.

"The unit uses Micos-P fine fiber filter elements. These tubular filter cartridges have a particularly large surface making them more effective." A metal mesh screen is used as a pre-separator for larger particles. Simultaneously, the AERO directs the air flow smoothly through the cartridge filters into the main filter stage where the aerosols are liquefied and discharged at the bottom. The company adds these residues to the oil circulation system. With the addition of cellulose powder, an oil filter removes the micro carbide residue from the process oil so that it can then be reused in grinding machines.

Conclusive results

With limited plant space and limited time, the dismantling of the old separator and installation of the new one in January 2019 proved to be a very challenging task, report Zeiträg and Schneider. "Production had to resume as soon as possible. We had scheduled three days -Thursday through Saturday, for the exchange. Because the process ran so smoothly, we were finished by Friday evening." The result convinced our customer: "The AERO runs like clockwork", laughs Zeiträg, who is pleased to recommend Keller Lufttechnik to other companies.

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Extraction support: Centralized system or decentralized units?

Companies planning a new extraction system are faced with a key dilemma: Should they equip each machine separately with an extraction unit? Or is a centralized solution better? Keller expert Thomas Schneider often recommends - as with Emil Arnold - achieving a balance with extraction in groups. He has summarized his arguments for and against the different solutions:

Decentralized unit

Pros:

- flexibility
- high availability (if one extraction system fails, only one machine is down)
- low pressure loss, since less piping/ductwork is required (external resistance)

Cons:

- numerous sources of emission (noise, aerosols)
- many disposal points
- increased labor for maintenance and filter changes
- problematic access due to positioning of the machine (dependent on the position of the separators)
- exhausting to the outdoors is often difficult to achieve
- smaller units frequently have lower filter performance
- can be extremely expensive

Sample application:

Retrofitting a single machine, if the on-site situation makes connection to an existing central system or group extraction system impossible.

Centralized system

Pros:

- optimal extraction results
- single access
- one disposal point
- optimized exhaust air ducting (if necessary, with heat output to supply air for heat recovery)

Cons:

- reliability (when the extraction system fails, the entire production shuts down)
- pipe dimensioning difficult with frequently fluctuating use (pipe resistance)
- additional space required

Sample application:

An ideal solution for a total production redesign. Features such as predictive monitoring (PREMOS) and the storage of critical spare parts improve reliability.

Combined solution

Pros:

- less piping/ductwork
- optimized pipe dimensions
- superior reliability
- filter types optimally adapted for the extraction task
- when necessary, circulation of coolants and lubricants

Cons:

- additional space required

Sample application:

This is often the ideal solution when production plants are retrofitted and when existing machines and space availability are calculated in the planning process. <