

Filtration systems

Clean air in the factory

Environment is more and more an attention-getting matter, at least in western countries.

Thanks to modern and efficient filtration systems, factories are no longer the source of pollution as widely believed.

On the contrary, air in factories can be cleaner than in the city centre.

By Giancarlo Giannangeli

TMB Tecnomeccanica Betto SpA was established in 1961 and has since been devoted to the manufacturing of light metal components in several industrial fields of precision mechanics: electro-mechanics, pneumatics,

Quality of filtered air is very important in order to comply with Health & Safety Norms.



hydraulics, automotive, pumps, cars and safety appliances. The company, which is situated in Monselice (Padua), is formed by three production units close to each other and employs approximately 230 employees. It carries out machining processes of boring, milling, turning and thread on moulded pieces (through smelting or die-casting), achieving finished pieces ready for the assembly line (just-in-time). In some cases, preassembling is also done. Over the last years, important orders have been acquired in the automobile field with multi-year contracts; the company has therefore decided to extend by building a third plant, and investing in new machineries and automation systems,



robots for loading and unloading machines and automatic washing systems.

This new plant is entirely devoted to the manufacturing of automobile components of medium dimensions. It includes three manufacturing cells entirely robotized and a fourth, currently under development with manual loading and unloading, that will be soon robotized as well.

Typical components are carters for water pumps, oil pumps, EPAS steering boxes, rack seats for hydraulic power steering, printed-circuit board housing and components for braking systems. The finished pieces go through machining processes of core blowing - to eliminate chips - and of washing. They are also submitted to a tightness test, controls of porosity and cracks and dimensional checks consistent with the overall production.

Quality is imperative.



Stefano Betto, Production Manager of the Veneto based company, explains that "the machineries in the manufacturing cells are standard, but the implementation of the robots, the connection between the PLC, the machining sequences, the assembly, the adjusting of the material handling and the organization of the cell have all been studied and carried out internally. We have a technical office able to integrate appliances of different manufacturers. We also project with CAD 3D working-stations all the equipments, which are built in a specialized area of ours, for the clamping and collection of the pieces. We usually do not buy machines which are already equipped, not only for cost reasons but also because this ability is a real competitive advantage to us." The same piece can be worked in 30 seconds, but also in 50 or in 20 - it all depends on how it moves

through the manufacturing cell, how it is placed in the machines, how quickly it is milled and so on. Being able to come up with the solution that will enable us to obtain it in the shortest possible time and with the best quality is our daily challenge and summarize the added value that our company can offer." "And that's not all: we also project the tools. We have had this technological ability for some years now and it has been developing more and more because of the necessity of precision and containment of time and costs. Actually, we have learnt that a tool can be more appropriate than another for a certain machining process and this can make the difference in the global competitiveness. We can today build a special tool, depending on its complexity, in a few hours- if a plant needs a replacement or the project office

creates a better solution, we can carry it out quickly.

Earlier, a shaped tool ordered outside could be waited for even a few months!" For example, TMB Tecnomeccanica Betto Spa also produces tools for high speed machining processes, technologically advanced and not available on the market. They can thus carry out boring of shaped holes, of different diameters and with more steps in very short times and with high precision. Particularly interesting is the working of fine finishing with very low roughness (less than 0.1 Ra). It is very often necessary to resort to non-conventional tools, such as creating the housing for a bearing or a seal gasket and so on.

Health first

Stefano Massimo and Pietro Betto welcome us at their headquarters on a Saturday morning - the company is in

full swing. Working continually on three shifts, very often at high speed, the tool is continuously in contact with the metal, removing swarf and creating heat. The coolant vaporizes sprinkling with other elements; in lack of interventions, these oil fumes would disperse in the environment, contaminating everything, including the lungs of those who work in the plant.

TMB works at a continuous flow production



TMB Tecnomeccanica Betto is very sensitive to this problem and for many years all the machines have been equipped with filtration systems. However, in 2003, during the last extension with the addition of the plant n. 3, some defects of the old systems had advised against their use. Stefano Betto explains that "Their maintenance has always been very difficult. They have been built in such a way that it is very easy to damage them and therefore need to be fixed frequently. Moreover, their filtration efficiency is not really effective. We have thus opted for another solution, that seemed to us more efficient since the first contact with the builder. This new system has been compared with other ones on the market before being installed."

"The comparison was made on the basis of the structural stoutness, the degree of filtration and cleaning of the environment, and maintenance. We therefore gave our trust to AR Filtrazioni, a company based in Bergamo since 1988."

A year after the choice was made, Mr. Stefano Betto clarifies that "With AR

Filtrazioni air cleaners our shed has been purified. The published pictures show the degree of cleanliness of our plant.

The comparative tests with other brands have demonstrated that only AR Filtrazioni air cleaners remove that deposit of oil that sediments everywhere and that once on the floor creates safety problems for the operators." Today on all the machines of the new factory there is an AR Filtrazioni plant: "One year after the installation and after having carried out the normal maintenance, without any extraordinary intervention, there is no trace of oil on the grates positioned on top of the air cleaners, from which the purified air is pumped back into the environment.

The results achieved confirm that we have made the right investment - the simplicity and rapidity of maintenance are exemplary, also thanks to the visual detector revealing the clogging of the filters. To tell the truth, the filters are slightly more expensive than the competitors', but their use is anyway justified by a higher efficiency and by the fact that their replacement can be carried out in only a few minutes."





and important manufacturers of machine tools, which equip their machines directly with our air cleaners. As well as the products, we also offer the service ("turn-key" installation and maintenance)."

"The frequency of interventions and the maintenance itself are planned and certified with an expressly created programme. The value of this programme has been recently acknowledged by an important body that has granted the ISO 14001 certification to a

The presence of AR Filtrazioni at TMB is complete and very rational

Efficiency is of primary importance

AR Filtrazioni's corporate mission can be conveyed by their motto: "Solution of the problem and total satisfaction of the customer, by converting machine tools into ecological and non-polluting ones." Angelo Riceputi, Managing Director of AR Filtrazioni, states: "Our air cleaners have been designed for high-duty production machines, working on 3 shifts, processing cast iron and aluminium with electric pumps at high-pressure. Our aim was to have as a final result a clean environment, with clean air, and a stout, efficient, reliable and durable machine with easy and quick maintenance interventions, which reduce the costs related to the duration of the machine-downtimes. In 2000 we created ARNO, our today's flagship model. Its strengths begin with its structural stoutness, that includes a perfectly balanced impeller. But the heart of the machine is the filter sequence, a combination of filter sets that maximize its lifespan and efficiency and that enable to pump absolutely clean air back into the working environment.

As the third and last filter stage, a HEPA filter up to category H13 (tested according to the



European norms EN1822) is used; this is an absolute filter after which the residual concentration of pollutants exiting the air cleaner is less than 0.1 mg/m^3 , way below the international recommended levels.

The high reliability is decisive for the auxiliary equipment of machine tools, whose downtimes can entail big economical losses. The success of the ARNO series has exceeded our expectations; a product does not always achieve such a satisfying result."

Mr. A. Riceputi continues: "We are the supplier of big companies and also supply units to many

customer of ours working in the automotive field.

In 2002 we optimized the solutions devoted to the de-pollution of fumes on laser machines (new machining technologies).

Our last achievement is a new series of air cleaners for the machining of magnesium, a light and strong material that is more and more used in the automobile field. Nonetheless, this material is difficult to manage- it can set on fire easily and can explode. This new series of air cleaners has been on the market for two years and is already a success in numbers and performance.

High energy costs saving

The recent difficulties in finding power sources, the cuts in gas supplies, the huge oil demand from Asian countries, that have raised in a few years the cost of petroleum from 27 to 70 dollars per oil drum, the air that in our cities reaches, in winter, levels of micro-dusts way above the safety limits "confirm the necessity of our work" says Mr. A. Riceputi.

Italy together with all the other European countries have agreed to the Kyoto Protocol, according to which all the members commit to reduce the emission of any pollutant, up to an abatement of 10% by 2012. In the industry, the choice of a single system purifying effectively at source is decisive for any company sensitive to the containment of fix costs, to the respect of Health & Safety regulations and to the respect of the environment.

Just to make the issue clearer, we should remember that for N cubic metres of air that leave the factory, N cubic metres of air have to enter it - in each machine tool there are 1.000/2.000 m³/h of air to be purified.

It is thus obvious that dispersing polluted air directly

outside the factory is nonsense.

This means that not only is the problem (polluted air) simply transferred outside, but also that hot air is dispersed in winter or cold air in summer. This continual exchange of air creates depression in the working environment and implies that the heating system is always working. This is one of the factors responsible for environmental pollution and one of the major costs for a company.

AR Filtrazioni plants do not take away air but purify it. With regard to this matter, the company has made known the results of an analysis, carried out by a certified lab, on the removal of oil mist achieved through an AR Filtrazioni plant installed on MCM machining centres. The machines analysed work twenty-four hours a day, seven days a week. The sampling was done on the air exiting directly the air cleaners after 7 months of continuous use.

The evaluation is based on the reference system of UNICHIM and has shown that the concentration of pollutants in mg/m³ is less than 0.1.

In order to enable energy savings, Angelo Riceputi emphasizes that "a single system



removing pollutants at source is like a "made to measure dress", conceived to satisfy the needs of each single machine tool according to its dimension, type of fairing and air capacity, oil used, type of metal processed, periods of use of the machine tool. On the contrary, a centralised system always works at its highest capacity."

To a company, saving means that not only energy can be economized, but also that the factory lay-out can be changed - indeed single air cleaners follow the machine tool when moved.

Moreover each machine is equipped with a drainage to recover the coolant, that can be returned to the machine for re-use.

Two views of the workshop of TMB

