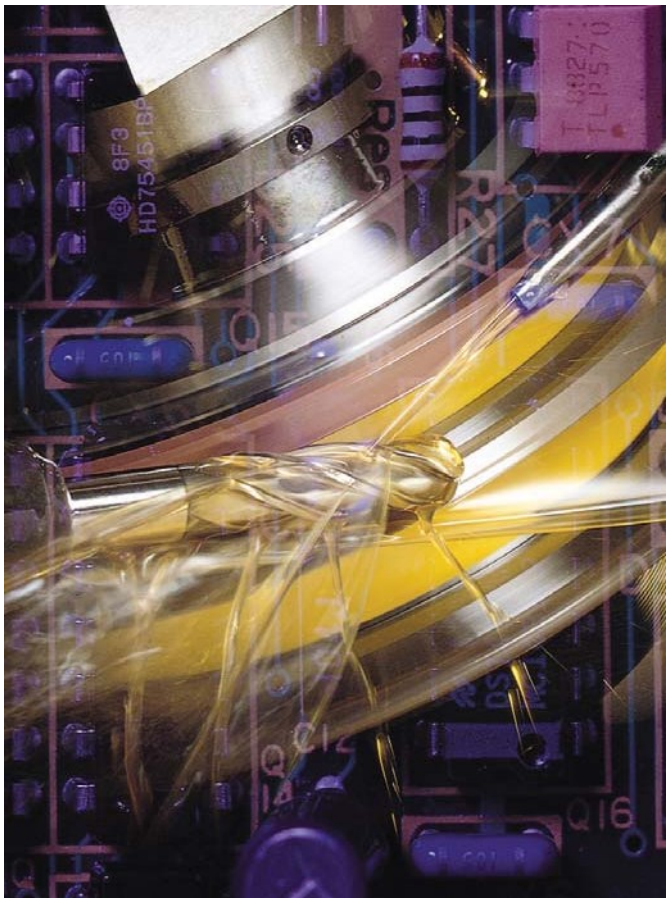
filtration news 9
September 2005



Tool grinding in a JUMAXIMAT-Machine from Erwin Junker Maschinenfabrik GmbH

Filtration of cutting oils and synthetic emulsions in the manufacturing of carbide tools

The high performance of stock removal processes thanks to the latest technologies applied to the construction of machine tools has given way to a great development, both in quality as in quantity, of the manufacturing of carbide tools, by taking all the productive advantages of the latest generation's machine tools.

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This change does not represent any modification concerning staff or share ownership.

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KENFILT

Quality around the world

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INCREASING DEMAND OF CARBIDE TOOLS IN THE POOL OF TOOL FACTORIES

The increasing consumption of carbide tools has meant that most tool manufacturers invested widely in the acquisition of new grinding machines which incorporate the latest technological advances and are specially designed for carbide grinding.

EXISTING FILTRATION SYSTEMS IN THE TOOL FACTORIES

The new, highly productive grinding machines pointed out the necessity to equip these machines with filtration systems that were specially designed to keep the synthetic solutions and/or cutting oils clean and transparent. Apart from this, these filters should be able to absorb the huge volume of carbide accumulated during the grinding process.

It must be bared in mind, that the dimension of the very fine particles forming the sludge that accumulates during the grinding of carbide tools lies between 1 and 10 microns, which makes it strictly necessary to use a filtration system that allows to retain these particles, in order to achieve a filtration quality which leads to the highest efficiency of the diamond grinding wheels and the grinding machines themselves, thus incrementing the production and reducing the factory costs.

NOT SUITABLE FILTRATION SYSTEMS FOR COOLING LIQUIDS IN CARBIDE GRINDING PROCESSES

In order to determine which kind of filtration should be used to purify the cutting oils or synthetic solutions applied during the carbide grinding processes with highly productive machines, firstly we need to identify systems which are not recommended for the grinding of carbide. Some of the purification systems frequently used in the conventional grinding procedures, and with highly satisfying results, are not suitable for carbide grinding.

Why are some of the purification systems not suitable for the grinding of carbide cutting tools?

1. Because of an insufficient filtration quality

The following filtration systems do not achieve the filtration quality for carbide grinding processes:

- Paper band filters
- Endless band filters
- Filters with self-cleaning cartridges
- Centrifuges

2. Because of excessively high costs of filter material and maintaining

- Cartridge filters

It is true that there are cartridge filters with a nominal filtration grade that would be sufficient to retain carbide particles, but with the inconvenience that in case of being used in grinding machines that remove a huge quantity of carbide chips, as for example in channelling machines of milling cutters or drills, the filters get clogged very quickly.

This may occur within periods of only several hours, and afterwards the filter cartridge has to be changed. This means very high costs of maintenance and filter cartridges, with frequent production downtimes during the change of the cartridges.

3. Because of the inability to retain huge volumes of carbide sludge

- Candle filters with sealing washers of paper or plastic.

These kind of candle filters with sealing washers of paper or plastic work satisfactorily, when the type of produced sludge allows a filtration of large quantities.
This is the case when most of the particles to be retained are larger than 20-50 micrometers, or when they produce grains which build a kind of porous pre-coat covering the candles, as occurs when other kinds of material, as for example high speed steel, are ground.



Candle with sealing washer of paper.



Paper candles sated with carbide.

Purification of cooling liquids during the grinding of carbide tools

Equipment	Filtration quality	Filter material costs	Maintenance costs	Appropiate to large sludge quantities	Appropiate to large flow rates
PAPER BAND FILTER	●●●	●●	●●●	●●	●●●
ENDLESS BAND FILTER	●	●●●●	●●●●	●●	●●●
CARTRIDGE FILTER	●●●●●	●	●	●	●
CANDLE FILTERS WITH PAPER WASHERS	●●●●	●●	●●●	●	●
CENTRIFUGE	●	●●●●●	●●	●	●
HYDROCYCLONE	●	●●●●●	●●●●	●●●	●●●
SETTLING TANK	●	●●●●●	●●●●●	●●●●●	●●●●●
PRE-COAT FILTER	●●●●●	●●●	●●●●●	●●●●●	●●●●●

●●●●● Very good ●●●● Good ●●● Reasonable ●● Bad ● Very bad

On the other hand, when large quantities of carbide sludge are produced, as in the grinding of flutes or profiles in cutting and drilling tools, this very fine sludge retained on the candle surface builds a fine impermeable coat.

This coat blocks the filters completely, making it necessary to clean the filters with sealing washers frequently by a counter current, and also often to dismantle the filters in order to clean the candles, as the filtration surface is totally clogged up with carbide sludge.

This kind of filters are also produced by KENFILT, with the brand name TRANSFILTRE®, but only applied in those cases where the produced sludge volumes are very small, for example in the re-grinding processes of tools.



Filter with paper candles TRANSFILTRE®

It must be pointed out that these filters use a very simple technology existing for more than 40 years, which is still applied today, basically due to the competitive cost-performance ratio.

4. Because of the need of installing large filtration surfaces when big flow rates have to be filtered

- Candle filters with paper or plastic washers.

It should be advised that in the candle filters with washers the filtration only takes



Central filtration plant FTD 90 ADTA for the filtration of 3.000 l/min of cutting oil with 10 cSt, used in grinding processes of carbide cutting tools.

place on the candle surface. The so called GAP, that is the distance between the paper or plastic washers, is responsible for the nominal filtration quality from 3 to 10 micrometers.

This is the reason why the free filtration surface is very small compared to the nominal filtration surface, and thus the flow rate per m^2 of nominal filtration surface is normally much lower than other candle types.

And that is why the most frequently used filter, with a surface of 7 m^2, allows a flow rate of only 60 l/min, which in some cases may reach up to 100 l/min.

As this flow rate per m2 is quiet low– when filtering medium or large flow rates from 300 l/min to 3000 l/min – plenty of filters with a flow rate of 60 to 100 l/min have to be installed which may result in a quantity of as far as 50 filters, each with a nominal surface of 7 m^2. This makes these filtration plants very complicated, both in construction as in maintenance and control.

This is one of the reasons why this filter type TRANSFILTRE® is appropriated just to be applied in those cases where, apart from the fact that only a very small quantity of sludge is produced, the flow rate is also a small one, that means, inferior to 200 l/min. With higher flow rates it is preferable to use precoat filters, capable to filtrate 3.000 l/min of cutting oil in one single precoat filter type FTD 90.

As we have already indicated in our Filtration News 4: *the Filter is never guilty*, the bad results of the filtration systems are due to an improper application. Therefore it is of such importance to choose the adequate filtration system for each type of machining.

To filtrate the coolants used in carbide metal grinding, precoat-filters should be used

WHY ARE THE PRECOAT-FILTERS THE MOST APPROPIATE TO FILTRATE THE COOLANTS USED IN CARBIDE GRINDING?

Because of the following advantages:

- HIGHER FILTRATION QUALITY

The precoat-filters, in which cellulose or diatomite earth are used as filter aid, have the advantage to filter not only on the surface, but also in depth.

Besides, there is a part of very fine particles of carbide inferior to 1microns which are absorbed by the cellulose fibres or the micro-pores of the diatomite earth, and thus an optimum filtration quality is reached, not possible to reach with other systems.

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• EXTENSION OF THE CUTTING OIL'S LIFE AND PROTECTION OF THE ENVIRONMENT

With precoat-filters, the oil keeps always clean and transparent. We have clients of the carbide tool industry who have not changed the cutting oil of their tool-grinding machines for the last 15 years. For synthetic solutions, some of our clients have not changed the cooling liquid for 6 years.

We are sure that, thanks to an optimum filtration, the cutting oils as well as the synthetic solutions will still be useable for many more years.

• REDUCED CONSUMPTION OF DIAMOND GRINDING WHEELS

As the precoat-filtered cutting oil is always clean and transparent, the diamond wheels do not get clogged, which means that the abrading pores of the grinding wheel keep open and their abrasiveness is permanently maintained; thanks to that, the pressure that the wheel applies on the workpiece is always the appropriate and the cutting burrs of the diamonds wear less. It should be advised that when the oil is polluted, the abrading pore of the diamond wheel clogs with the sludge floating in the oil and the wheel looses abrasiveness, which leads to a higher pressure of the wheel on the workpiece. Thus, the cutting burrs of the diamonds may break, and the service life of the grinding wheel becomes significantly shorter.



Filter FTD 20 AD TA for the filtration of 800 l/min of water-based synthetic solution for the grinding of carbide tools.

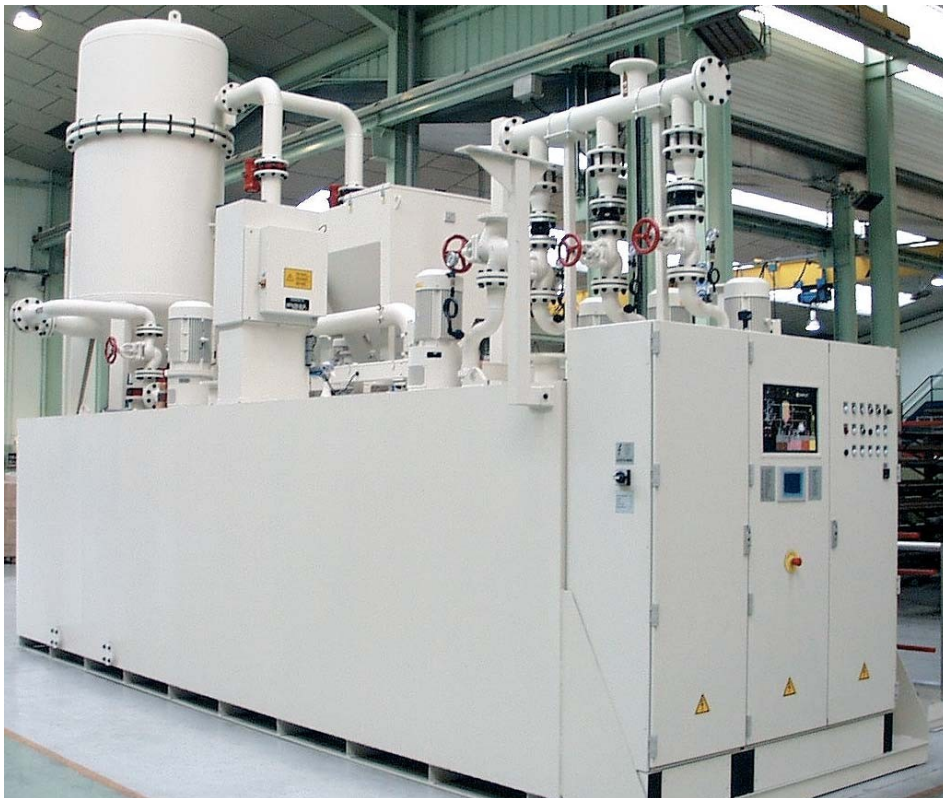
• BETTER MACHINE MAINTENANCE

The extraordinary filtration quality achieved through the use of precoat filters keep the machines permanently clean, reducing their maintenance work because the carbide sludge does not cumulate. It is known that the hard metal dust is highly abrasive and causes premature wear of the guides, the shaft sealing rings, the protection devices of the guidings and the micro switches, among others.

These are the reasons why currently more and more manufacturers of carbide tools are installing or have already installed precoat filtration plants from KENFILT. Equipment of purification by centrifuges is often discarded.

• INCREASED TOOL QUALITY

Thanks to the improved maintenance of the grinding wheels' abrasiveness, due to the clean cutting oil, it can also be achieved a better tool quality. The micro-fissures produced by the grinding wheel that cuts badly will almost disappear. Consequently, the wire path quality of the tools will also be improved.



Filter FTD 50 ADTA for a flow rate of 1.500 l/min of cutting oil used for the grinding of carbide tools.

CONCLUSION

Thanks to the KENFILT precoat-filters, quality, competitiveness and output can be improved and at the same time costs can be reduced.

SOLUTIONS

Country:
ISRAEL

Equipment / plant FTD 90 AD TA
Delivered 31.12.2002
Prd.-Nr.: 2101 / 5102

FILE
Nº 2101

Fabricant of:

CUTTING TOOLS

Technical characteristics

Cooling liquid:	**Cutting oil of 10 cSt at 40ºC**
Flow rate:	**2.750 l/min**
Machined material:	**Carbide**
Kind of machining:	**Grinding**

Problem to be resolved:

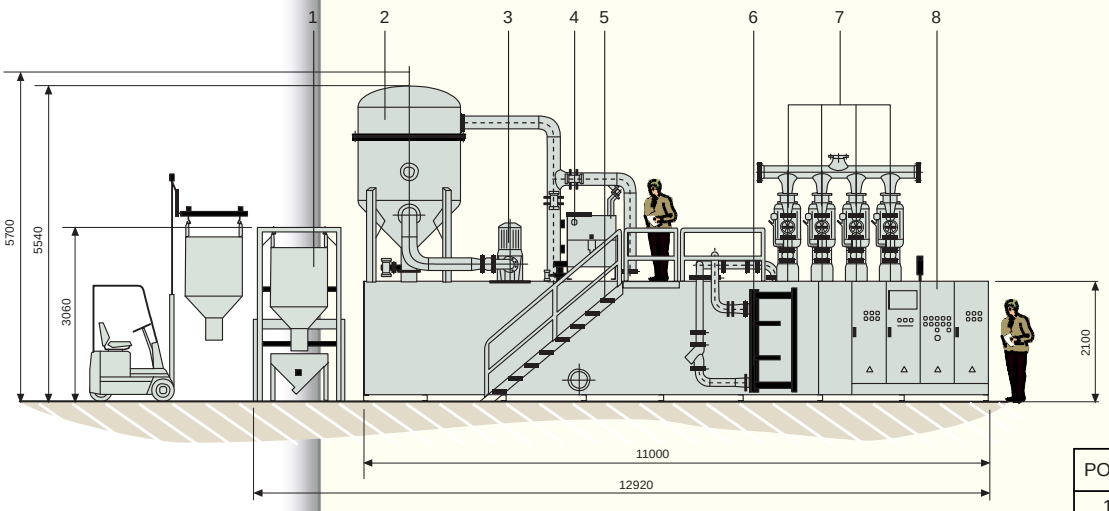
- Maintenance of the tolerance field and cellulose quality of the machined tools
- Improvement of the product's surface quality
- Optimisation of the product's efficiency
- Extension of the cooling liquid's durability

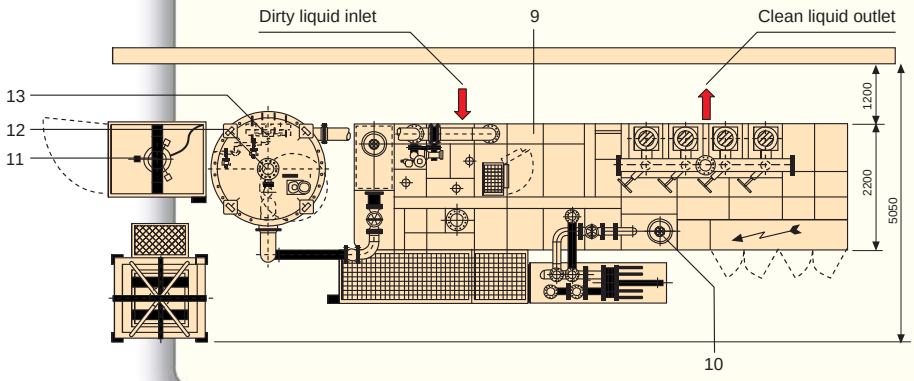
Adopted solution:

- **Installation of a precoat-filtration plant with cellulose, to filtrate 100% of the flow rate of the oil used for all the grinding machines, with a filtration quality of ISO 4406 code 18/15 (equivalent to a nominal filtration flow rate of 5 µm)**
- **Installation of a cooling system of 150.000 kcal/h, to maintain the oil temperature at 25 ºC constantly during the whole year**

Results obtained:

- **Retention of all the contaminants in the cutting oil**
- **Reduction of defective tools**
- **Repeatability of workpiece quality**
- **Preservation of the cutting oil in best conditions from the first day on**
- **Extension of the working life of the diamond grinding wheels**
- **Reduction of maintenance costs**
- **Enhancement of production**





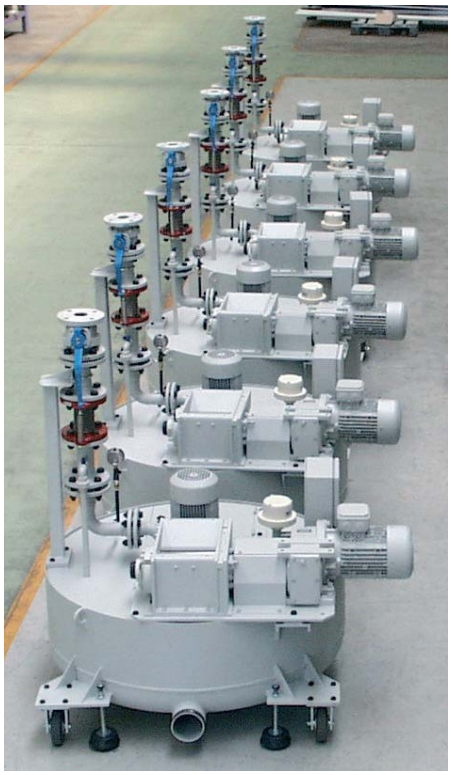
POS.	DESCRIPTION
1	Big-Bag
2	Precoat filter FTD 90
3	Filtration and precoating pump
4	Filteraid dosing device
5	Stairs
6	Heat exchanger
7	Distribution pumps
8	Electrical cabinet
9	Pneumatical cabinet
10	Recirculation pump
11	Sludge drying unit
12	Stirrer
13	Sludge drying pump

Environment protection at MAHLE 's



General view of the hydraulic vacuum filtration plant TADE 16 DA 40.

The company MAHLE, an important group within the industry subcontracting to automotive manufacturers, made in the bygone year of 2004 – in line with its policy to improve the environment protection – a big investment in its factory of engine pistons in Vilanova i La Geltrú, where a KENFILT filtration plant type TADE 16 DA 60, provided with an automatic transport and drying system for the aluminium chips, has been installed to filtrate the emulsion by means of a hydraulic vacuum filter.



Transfer tanks with incorporated crusher.

This concerns a filtration plant comprising the following elements:

- A crushing and return system for the emulsion and the chips, by means of transfer tanks specially designed to realize this operation. These tanks push the contaminated emulsion together with the chips through a pipe network towards the filtration plant.
- A pre-purification before the filter, by means of a 10m^3 chip extractor.
- A hydraulic vacuum filter with filtration paper band and a filtration flow rate of 10.000 l/min and a capacity of 60 m^3.
- A pipe network to conduct the filtrated emulsion towards the machines.
- A superficial de-oiling device.
- An automatic dosing system for the new emulsion.
- A winding system for the dirty paper.
- A dust extraction system.
- A cooling system for the emulsion, by means of a heat exchanger emulsion / cold water.
- A water chiller with a capacity of 240.000 kcal/h.
- A system for transport, centrifugation and drying of the aluminium chips, with automatic chip storage in movable containers.



General view of the aluminium chip drying and its storage in mobile containers

ENVIRONMENTAL ADVANTAGES THANKS TO THE "KENFILT" SYSTEM

- Extension of the cooling liquid's service "life". The correct filtration and cooling of the emulsion can give an extension of its service life for up to periods of 10 years or more.

- Preservation of the liquids in better hygienic conditions. The cooling of the emulsion reduces the quantity of bacteria and fungus which inevitably accrue in the emulsions. On the other hand, and thanks to the use of the correct filtration system, a large part of them might be eliminated and discharged with the polluted filter paper. Thus, *MAHLE* achieves important improvements protecting the health and safety of the staff handling the emulsion.

- Reduction of the residues that have to be processed. Thanks to the liquid's "life"-extension it will not be necessary to renew wasted emulsion so frequently, in comparison to the past, when for each machine-tool individual and independent equipments were used. Consequently, the volume of wasted liquid which regularly had to be consigned to the waste processing companies decreases, and so do the considerable economic and environmental expenses .

- Reduced consumption of the emulsion concentrate. Due to the long durability of the liquid it is no longer necessary to buy fresh product to replenish the tanks of the filtration plant, except for small quantities to maintain the adequate levels.

- Reduction of the scrap volume that has to be handed to the waste processing companies, and thus of the energy consumption resulting from its treatment. The liquid's correct filtration affords a higher dimensional, geometrical and surface quality of the machined product, reducing clearly the defective pieces that have to be scrapped.

- Protection of the atmosphere. The water chiller type FW-245-A is designed to work with the eco-friendly gas R-404A which does not pollute the atmosphere nor contribute to the greenhouse effect. Besides, the functioning with an emulsion at a supervised temperature reduces considerably the formation of fogs near the machines and the atmospheric pollution produced by an inadequate emulsion temperature.

CONCLUSIONS

By installing this filtration plant, *MAHLE* expresses the will to produce the best product, satisfying the market requirements and reducing at the same time the environmental risks as well as contributing actively to the environment protection.

KENFILT's environmental implication

Apart from contributing to the environment protection with our filtration plants, we also do this in our factory. Last February we obtained the TÜV certificate of the environmental norm ISO 14001/1996. This norm aims to an efficient environmental management system in order to achieve the set objectives and preserve a system that involves continuous improvement as well as it assures its correct implementation. The principal object addressed by KENFILT through the implantation of this system is to minimise the generation of residues, economise the consumption of natural resources like water and energy, comply with the European legislation, conscience the personnel and, consequently, increase the totally awareness of the importance of environment protection regarding our planet's future.



40 years of Innovation, Development and continuous Improvement

It all began in the year 1964, when Jaume Lleal, after studying Mechanical Engineering and at the age of only 24 years, opened a small workshop in his native town Badalona, near Barcelona. That workshop, with a staff of eight employees and a small machinery equipment, attended to the manufacturing of products such as router-polishers for marble floorings PULMAX, welding machines for domestic rubbish plastic-bags SERNIK, fire clay moulds, textile machines and also subgroups and assemblies for tool machines and small series of special pieces for third parties.

In the year 1970, the brand NOVOTECNIC was created, and the company's activity in the sector of filtration for the Metalworking Industry began.

Two years later, the commercialisation of the first two filters developed and patented by NOVOTECNIC began.

The technical and commercial strategy of KENFILT, S.A. and its whole staff had always been based on two essential premises:

- Personalised solutions for specific problems of each client.
- Customer satisfaction.

In the Eighties, the enterprise began to grow fast, while many commercial efforts were dedicated to the exportation, appointing representatives in most of the industrialised countries.

This commercial expansion contributed very positively to the opening of new markets and in 1987 the building of a new production plant in Sta. Perpètua de M. (at app. 20 km north of Barcelona) on an area of 10.000 m² became necessary, of which 2.700 m² were covered with the building.



Present location of the company in Sta. Perpètua de Mogoda (Barcelona).



Former workshop in Badalona, 1964.

The company's continuous growth required the amplification of the plant up to 6500 m², which was finished in 2002. Today, 5.100 m² of the company's surface are designed for the manufacturing and the stock, and 1.400 m² for the offices. Thanks to the increased production capacity achieved through the new factory and a strong growth of the export rate, in 1990 a 91% of the whole turnover was exported.

Since then, an increased export rate ranging between 85% and 95% has been maintained.

During these 40 years, there the company investigated continuously in the field of filtration engineering applied to the Metalworking Industry, with annual programs of I+D+i, which allowed the development and improvement of the filtration techniques in order to adapt them to the new requirements arising in this sector.

Last April, the enterprise adopted the name KENFILT, which yet in 2001 had been registered as a brand name.

KENFILT, S.A. thus disposes of a solid technical and human base, as the result of 40 years' experience, and production facilities which guaranty a series of merits within the filter engineering and the customer services, in order to resolve any filtration problem that might arise in companies dedicated to metalworking.

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