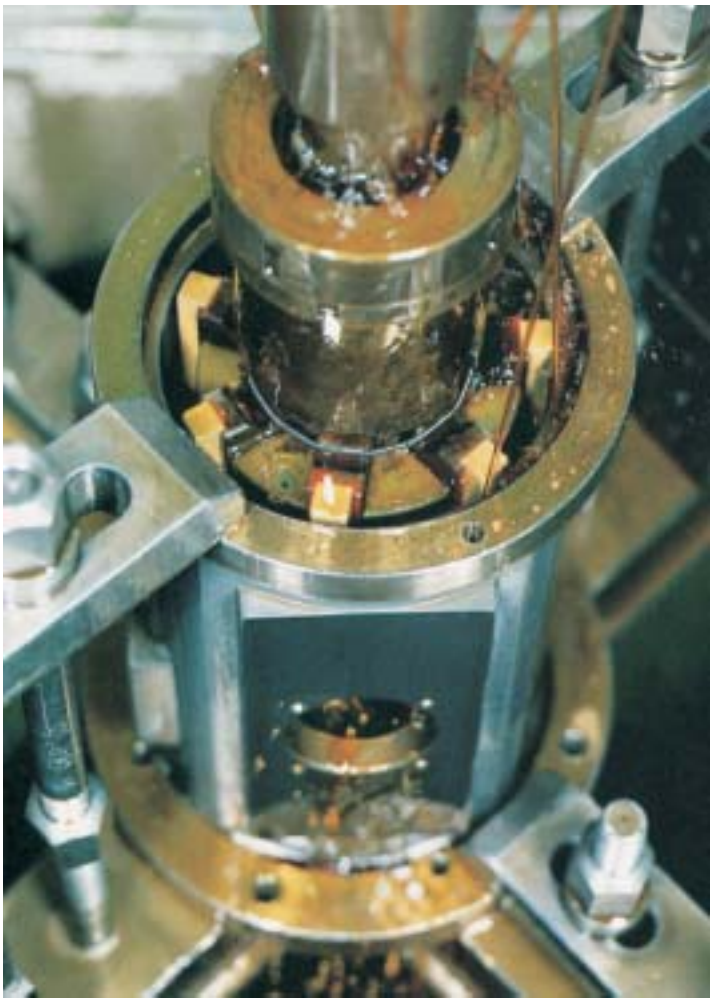
FILTRATION news
5
2002



Coolant liquids filtration in honing processes

HONING PROCESS

In spite of the fact that the objective of the Honing process is an improved surface quality, in the last few years this has become an authentic material stock removal process in order to achieve within-tolerance parts.

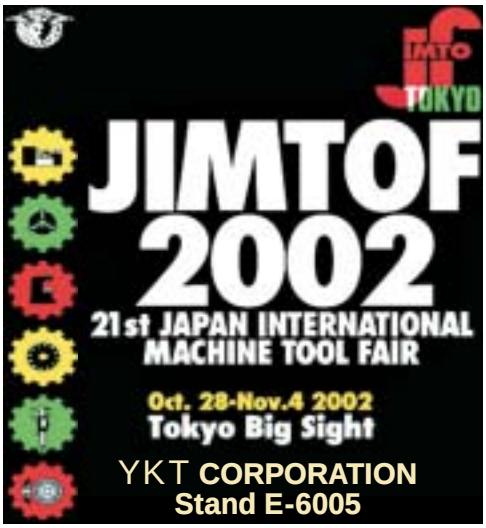
For the purpose of increasing production, stock removal levels of 0.1 to 0.5 mm, and even higher, are currently being achieved, compared with the 0.02 to 0.03 mm previously obtained.

Continued on following page.....

New representative in Japan

KENFILT-NOVOTECNIC has reached an exclusive representation agreement, for the Japanese market, with the prestigious company **YKT Corporation** - Tokyo. This is the name that succeeded Yamamoto, which was founded in 1924.

YKT is a firm that specialises in the importation and exportation of industrial machinery, machine tools and precision measuring instruments.



KENFILT novotecnic

....continued from previous page

With the increase in the stock removal levels, optimum advantage of the possibilities of this process are obtained in order to improve the geometric quality of the parts (roundness and cylindricity).

FACTORS WHICH INFLUENCE THE HONING PROCESS QUALITY

The modern Honing process is divided into two phases: **first**, the rough-grinding or pre-Honing operation with its significant removal of material and **second**, the actual quality Honing or polishing operation itself.
In order to achieve that these two operations result in a precise geometric form, together with optimum surface quality for the machined part, the following factors must be combined in a "universal" fashion: Honing machine, Honing tool, conventional abrasive stones, CBN stones, diamond stones, Honing oil and filtration plant.

HOW IS OPTIMUM ABRASIVE ACTION OF THE MATERIAL ACHIEVED?

1. There must be a certain degree of friction between the honing stone and the surface to be honed, which increases the effectiveness of the abrasive action of the material.
2. The entire surface of the Honing stone must be in contact with the part being worked.
3. The cutting geometry of the Honing abrasive stone should be well defined so that it does not change during the operation and therefore produce inconsistent results.
4. **The Honing abrasive action must be controlled since this could be counteracted by the particles in suspension in the cutting oil** since these are located between the Honing stone and the surface being machined and act as an anti-friction additive which considerably reduces the abrasive capability of the honing stone.
5. The honing swarf acts as if it was a film of extremely fine spheres, which cause the abrasive stones to slip over the surface being honed (cast-iron parts Honing).
6. When sulphur Honing stones are employed, the sulphur content in the Honing oil increases and noticeably exceeds the proportion of sulphur in the inactive base cutting oil, reducing the abrasive action of the material.

HOW TO GET THE BEST HONING RESULTS ?

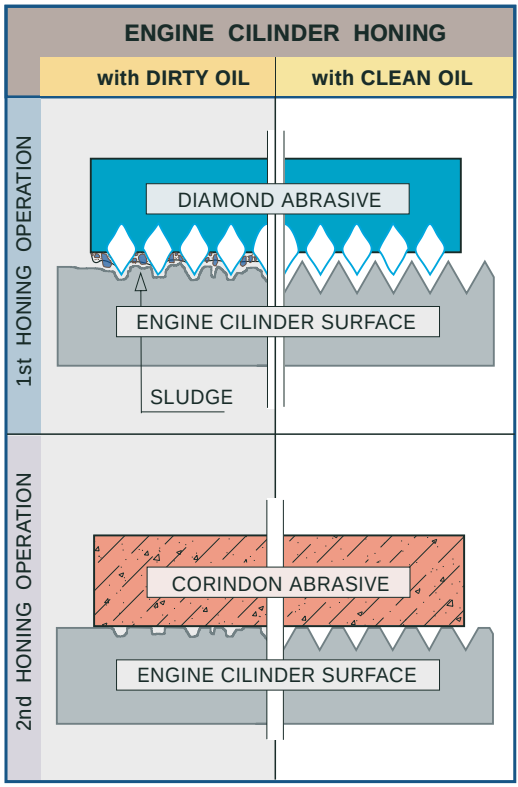
a) **By employing a good quality Honing oil**, with an adequate proportion of additives to improve the cutting capacity of the Honing abrasives so that these can achieve a high material abrasive capability.
b) **By employing good filtration equipment**, which is able to eliminate both the amorphous abrasion particles, such as graphite and the sulphur, which has been partially absorbed in the solution, the initial oil quality is maintained, which is essential for an efficient cutting operation.
c) **By the complete elimination of the abrasive particles from the Honing stone and from the machined material**, the abrasive medium cutting pores are prevented from becoming obstructed thereby not resulting in a loss of cutting capability and at the same time preventing these particles in suspension affecting the surface quality.

HONING OIL FILTRATION

There is an obligatory golden rule which states: **FILTRATION EQUIPMENT MUST ALWAYS BE INSTALLED THAT CAN GUARANTEE MAXIMUM FILTRATION QUALITY.**

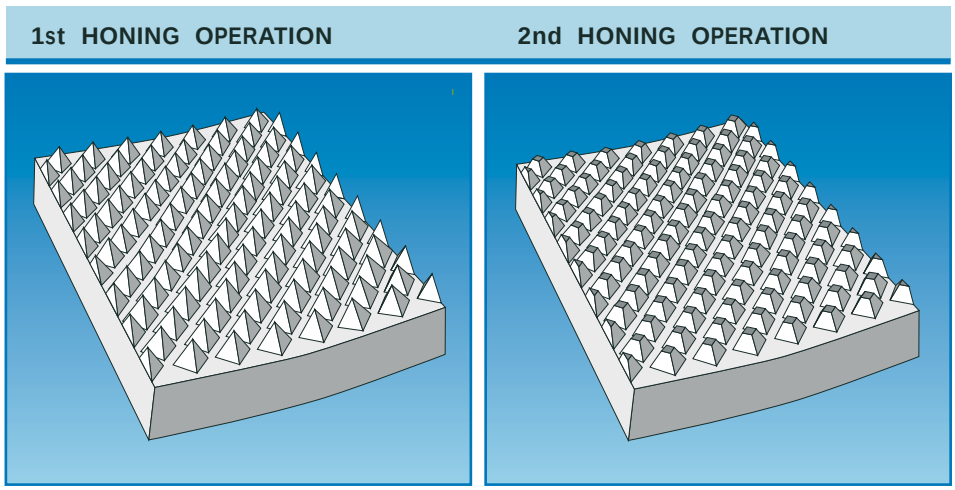
This is why **IT IS NECESSARY TO USE PRECOAT FILTERS**, in both internal and external Honing operations.

It is for these very same reasons, that any



filters that **DO NOT GUARANTEE SUFFICIENT FILTRATION QUALITY**, such as, hydro-cyclone separators, magnetic separators, centrifuges, paper band filters, endless screw band filters, pressurised filters without secondary filter consumption, pressurised filters with paper washer candles without filter media consumption should not be employed, since none of them can permanently or profitably offer the ISO 4406, code 18/15 level, which is required for correct filtration.

It is important to point out that all the above mentioned filters are manufactured by KENFILT-NOVOTECNIC, but are designed for other applications and should NEVER be used in Honing operations.



GRAFIC EXAMPLES

a) Honing operation with clean oil

The **first Honing operation** reveals deep regular grooves. The **second finishing operation** shows that only the upper surfaces of these grooves are removed, and that the depth (cavities) are maintained.

These are extremely important for the Honing of engine cylinders so that the oil is retained in the grooves to lubricate the movement of the piston rings.

b) Honing operation with dirty oil

It can be seen that in the first operation the oil used is dirty.

The sludge accumulates in the diamond stones so that they lose their capacity to cut material (more machining time required for the same amount of material and in addition, an irregular surface is produced with fewer, but much deeper grooves). When the second operation is carried out, even though the surface may appear to be better and even more brilliant, it does not provide the same characteristics that are necessary for perfect cylinder operation.

This is specially important in the case of engine cylinders where these cavities are intended to retain the lubricating oil for perfect cylinder operation and engine life.

(See drawing forward page)

MAXIMUM ACCEPTABLE HONING OIL CONTAMINATION

When the honing oil is black to a greater or lesser extent as seen by the human eye, it means that it is contaminated by solid particles from the actual extraction process itself or that the abrasives have become loosened from the abrasive stones.

This more or less dark colouration however, is not the determining factor for poor results, but instead, the amount of suspended particles in the honing oil, which leads to inadequate results.

This is the reason why the degree of oil purification should be at least ISO 4406 code 18/15, however, there are many companies that have already established filtration quality requirement levels of ISO 4406 code 17/14 and even ISO 4406 code 15/13, for certain Honing operations for common-rail diesel pumps.

Experience has shown that these levels of filtration quality can only be achieved in a profitable manner be employing using precoat filters (such as those of KENFILT-NOVOTECNIC) which provide the most adequate filtration for Honing operations, since they are able to maintain the honing oil as clean and transparent as it was the first day it was used in an uninterrupted fashion during many years of operation.

This is why the most prestigious engine manufacturers throughout the world always install precoat filters for Honing operations in order to guarantee large-scale engine production with the most exacting finish qualities.

COOLING OIL FLOW RATE IN CAST IRON CYLINDER HONING OPERATIONS

The following values should be taken into consideration in order to obtain optimum surface quality:

- Sufficient flow rate for honing operation lubrication.
- Sufficient flow rate with capacity to absorb all the heat produced by the Honing stones, with the oil temperature not rising more than 1°C between its entry and exit from the machine. This flow rate is fixed according to the spindle powers.
- Sufficient flow rate to guarantee that during the entire machining process, there is a strong honing oil flow which WASHES the honed surface and the honing stone in order to prevent the honing swarf from being trapped by the honing stones which could then affect the honed surface quality.

This flow rate is fixed according to the type of part to be honed and the type of honing stone being employed.



IMPROVEMENTS OBTAINED IN HONING PROCESSES BY EMPLOYING KENFILT-NOVOTECNIC PRECOAT FILTERS

After more than thirty years collaborating with our customers, we can confirm that by installing KENFILT-NOVOTECNIC precoat filters in Honing processes, this enables operation with clean, transparent oil, leading to the following improvements:

- **An increase in production performance of honing machines**, due to which it is possible to obtain up to a 15% production increase in honed cylinders per unit of time.
- **Unlimited lengthening of the "mechanical life" of the honing tools**, because all premature wear of the expansion cones is eliminated since the stones are always clean inside.
- **Reduction of premature wear of the contract areas** between the expansion cones and the honing stones because the oil is clean, and does not produce the wear in the expansion cones and the honing stones.
- **Prevents scratching of the honed surfaces**, as the honing stones do not "clog" and are free to move in the honing tool slots.
- **Reduction of CBN or diamond stones consumption by up to 20-30%** because the cutting surface of the stone is always maintained clean and does not lose cutting capacity and therefore, its abrasive capability and consequently production is held constant.

Temperature regulation systems for liquid refrigerants

Maintaining the temperature of the liquids employed in metal cutting processes, whether they are emulsions, synthetic solutions or cutting oils etc, is a key factor in obtaining optimum final manufacturing results (see the previous article, FILTRATION NEWS 4).

For medium and large cooling powers, water refrigeration is one of the most widely employed systems for controlling the temperature of process liquid refrigerants.

It is necessary to clarify two different methods for controlling liquid refrigerant temperature which, in the end, is what is actually required, by means of a water cooler.

This difference is based on where the cooling equipment temperature regulation sensor is located.



Heat exchanger system with 3 way valve, as scheme 1. (50.000 Kcal/h).

A COLD WATER TEMPERATURE REGULATION

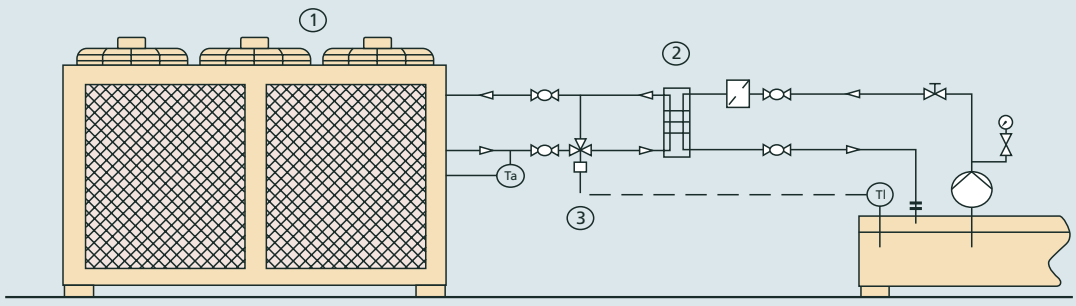
This is the most common solution (see Diagram 1).

The purpose of the water cooling equipment is to maintain the cold water circuit at the fixed setpoint temperature, for example 10°C, independently of the temperature required for the liquid coolant.

The heat is removed from the liquid coolant by means of a heat exchanger.

The three-way valve installed at the circuit input enables the liquid coolant temperature to be controlled.

Diagram 1. **COLD WATER TEMPERATURE REGULATION**



1. Water cooling equipment
2. Heat exchanger
3. 3-way valve

Ta. Water temperature sensor

Tl. Liquid temperature sensor

COLD WATER TEMPERATURE REGULATION	
Advantages	**Disadvantages**
• The possibility of installing other heat exchangers in parallel using the same cold water. • The possibility of installing the cooler within a centralised cold water system.	• The cooling capacity of the water cooler is not optimised. • The operating frequency of the three-way valve can cause repeated operation of the water cooler compressors. • The need for two regulation systems in series (Tª water + Tª liquid) when the objective is to control the temperature of the liquid.

B DIRECT LIQUID REFRIGERANT TEMPERATURE REGULATION

Just as shown (see Diagram 2), the cooling equipment temperature regulation sensor is directly installed in the liquid refrigerant tank.

In this way, the cold water temperature is maintained constant, which depends on the temperature required for the liquid refrigerant and the heat exchanger transfer capability.

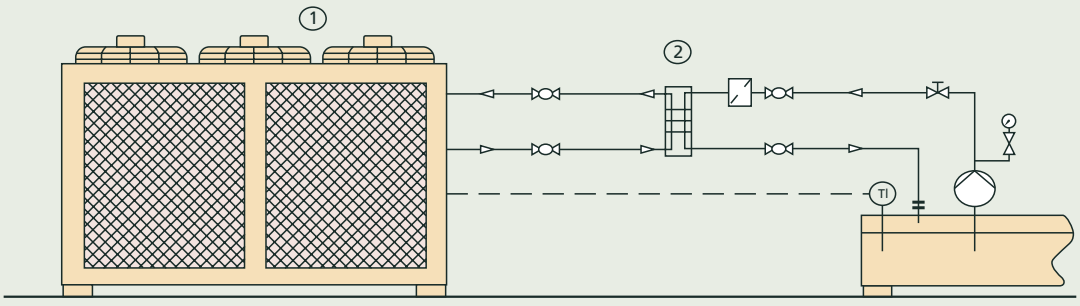
It should be emphasised that it is quite feasible to perform the necessary modifications on the water cooler equipment to change from one regulation type to the other.



Watercooling chiller KENFILT-NOVOTECNIC type FW-215-A.
(77.000 Kcal/h.).

KENFILT-NOVOTECNIC designs its water coolers employing both possible types of temperature regulation depending on the customer's needs.

Diagram 2. **DIRECT LIQUID REFRIGERANT TEMPERATURE REGULATION**



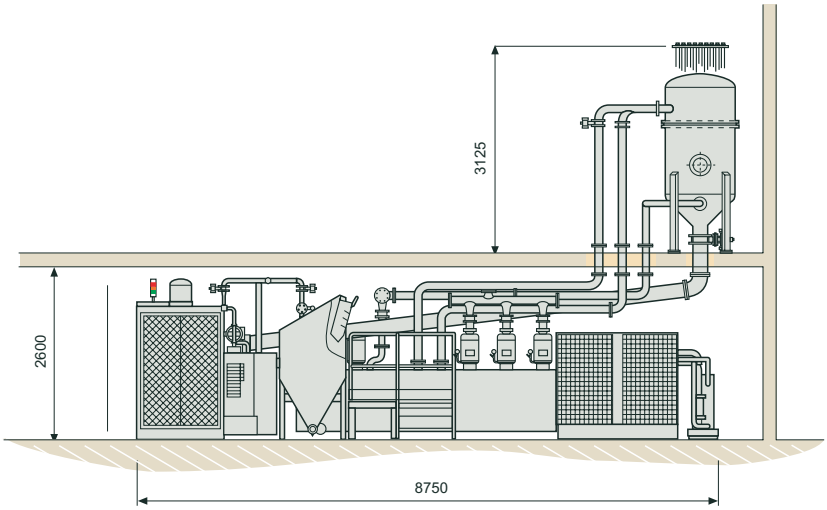
1. Water cooling equipment
2. Heat exchanger

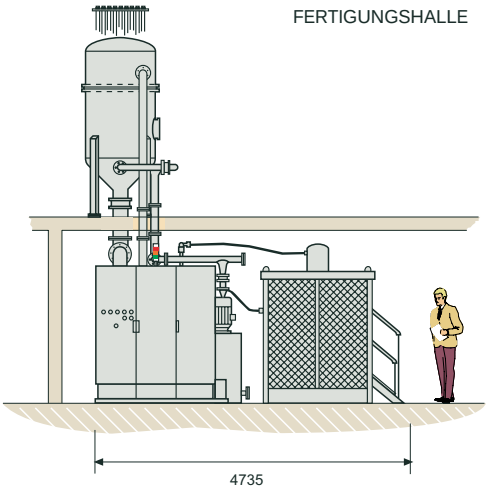
TI. Liquid temperature sensor

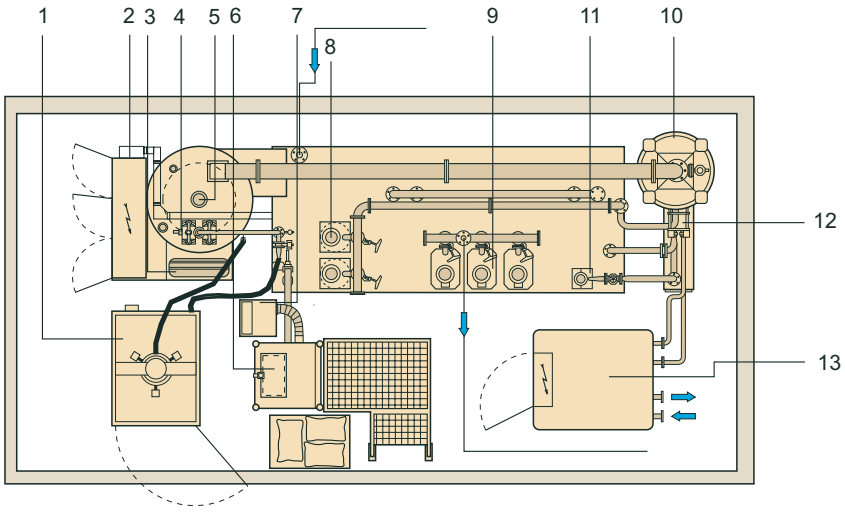
DIRECT LIQUID REFRIGERANT TEMPERATURE REGULATION	
Advantages	**Disadvantages**
• No requirement for the intermediate 3-way valve regulation system. • Simplification of the overall cooling system. • Optimisation of the cooling capability of the water cooler. • More regular cooler compressor operation.	• Impossible to install other heat exchangers in parallel using the same cold water. • Impossible to install the cooler within a centralised cold water system..

KENFILT-NOVOTECNIC REFERENCES

Country: **SWITZERLAND**	Equipment/Central FTD 30 AD TA Supplied 30.11.2001 NF: 2.000/4801	**FILE No. 2000**
Manufacturer of: **CUTTING TOOLS**	Technical Data Refrigerant Liquid: 10 cSt oil at 40°C Flow Rate: 1.000 litres/min Machined Material: HSS - CARBIDE Type of machining: Profile Grinding Grinding Wheels: Diamond and CBN Bonding material: Metallic and Resin	
Problem to resolve:	• Improve performance of diamond and cbn grinding wheels • Increase geometric quality and tool surface • Reduce maintenance costs • Reduce cutting oil costs	
Adopted solution:	• 1 x FTD – 30 AD TA precoat central filtration system, fitted with a 30,000 Kcal/h oil cooling group	
Obtained results:	• Reduced consumption of diamond and cbn grinding wheels • Reduced cutting oil consumption • Increase of machine production • Increased tool quality • Drastic reduction of defective tools	







POS.	BEZEICHNUNG
1	Schlammtrocknungseinrichtung
2	Elektroschaltschrank
3	Pneumatikschalttafel
4	Schlammtrocknungspumpe
5	Schlammbecken
6	Filterhilfedosierung mit Sackentleerer
7	Staubfilter für Sackentleerer
8	Beschichtungs-Filtrierungspumpen
9	Versorgungspumpen
10	Filter FTD-30 (im oberen Geschoss)
11	Umwälzpumpe
12	Plattennwärmetauscher
13	Kühlaggregat
	BECKENFASSUNGSVERMÖGEN : 8600 L

KENFILT-NOVOTECNIC Filtration Plants for GKN plc

The **GKN Automotive Group**, which began to manufacture and supply drive shaft swivel joints for the first British and German cars with front-wheel drive in 1959, has since become one of the world's leading companies in the design, engineering, manufacture and assembly of front wheel drives for all types of vehicles using these types of swivel joints.

During the last few years, they have been investing considerably in their GKN Indugasa factories in Vigo and GKN Ayra Durex in Zumaya, purchasing new production machinery, control and assembly equipment and also in filtration plants for the grinding oil for the various components which make up the swivel joints in order to improve the manufacturing processes, increase productivity and reduce final product quality assurance incidents under a policy of "zero defects".

It is important to point out that the filtration quality of the grinding oil has a direct effect on the surface, dimensional and geometric quality of the swivel joints components, because if this is not clean, the grinding quality is seriously affected, leading to a series of problems which not only affect the final product quality, but also cause abnormalities both in quality control and on the swivel joints assembly line.



View of the second precoat-filtration installation. Type FTD 75 DA 45. Distribution flow 2.500 l/min.

This is the reason behind the GKN Car Group's purchase from NOVOTECNIC EUROPA S.A. in 1995, the first small FTD 8 AD TA type cellulose precoat filtration plant for a flow rate of 300 litres/min which was installed at the GKN Ayra Durex factory in Zumaya.

After having been able to verify the advantages obtained with this first unit during several years of operation, it was decided in 1999 to invest "in filtration" and to entrust KENFILT-NOVOTECNIC with the study, design, project and construction of the following:

- One FTD 30 DA 20 plant for a flow rate of 1,000 litres/min. for the GKN Ayra Durex factory.
- Two FTD 50 DA 30 plants for a flow rate of 3,000 litres/min. for the GKN Indugasa factory.
- Two FTD 75 DA 45 plants for a flow rate of 5,000 litres/min. for the GKN Indugasa factory.

The GKN Car Group currently has six KENFILT-NOVOTECNIC precoat filtration plants, all of which are operating at full capacity and meeting all the filtration needs as required by those in charge of engineering.



General view of a unit of KENFILT-NOVOTECNIC filtration installations.



We have reached a new objective: the expansion of our installations.

As we now have:

- 1.350 m² of offices
- 4.200 m² of factory
- 880 m² of warehouse

A total area of almost 6.500 m².

In this way we are consolidating another point for our strategic growth plan with the aim of continuing to increase our market presence and the firm proposal to continue to offer the best overall service to all our customers wherever they are in the world.

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WE ARE ON THE WEB !

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