FILTRATION news

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VIII.93

Salutation

We are pleased to introduce to you the first issue of our informative, collectable journal "FILTRATION NEWS" which deals with the filtration of liquids used in the production processes of the metallurgical industry.
With four-monthly issues we shall inform you about new installations and projects carried out by our company.
We will also inform you about specific applications of our equipment and central filtration plants, as well as the advantages which can be obtained by suitable filtration for each production process.
With our news, your Plant Engineering Production and Maintenance Departments will have available a series of data sheets and expertise which can be of great help with a view to optimizing the design of manufacturing lines, production costs or the quality level of the product you manufacture.
This publication is one more action to be included in the industrial policy of NOVOTECNIC, to offer our customers the best service and technical assistance possible in filtration engineering.
We hope this will be the beginning of a fruitful communication between our companies.
Cordially,

NOVOTECNIC EUROPA, S.A.
Executive President

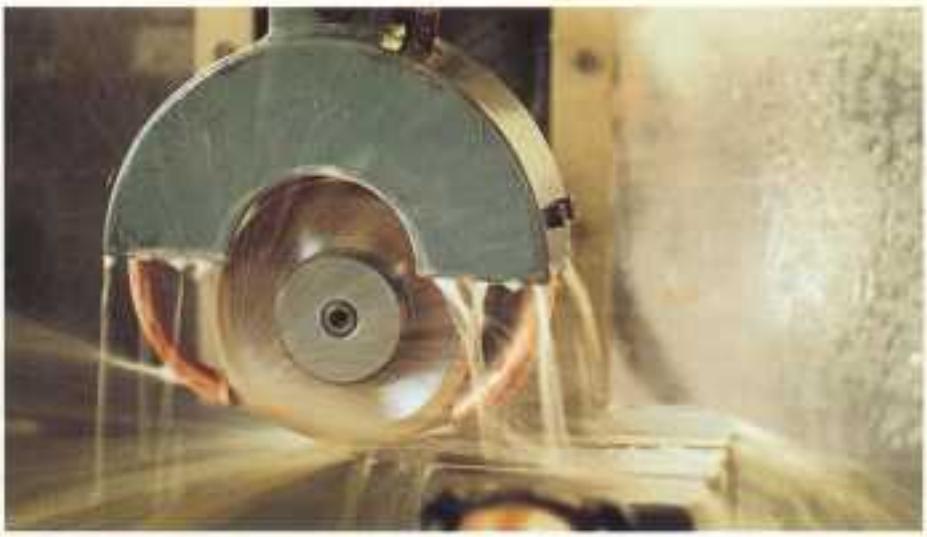
Jaume Lleal

Filtration in grinding processes with BORAZON grinding wheels

The enormous technological development which the manufacture of grinding machines has undergone in the last decade has allowed optimization of the use of BORAZON grinding wheels.
In order to obtain the high output which is achieved, it is necessary to fullfil a series of basic conditions:

CONSTRUCTION OF THE MACHINE

It is necessary that the base and the slides are extremely rigid to install the high power grinding wheel spindles.



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GRINDING WHEEL SPINDLES

The grinding wheel spindles have to be specially manufactured to operate at high cutting speeds and to resist the necessary forces to obtain the high output which is possible to obtain with BORAZON grinding wheels.

CUTTING SPEED

Thanks to the special manufacture of the machines and grinding wheel spindles, grinders with high cutting speeds between 120 and 150 m/sec. are being constructed. Now the research aims at achieving 200 m/sec. This is possible thanks to the development of new grinding wheel manufacture methods, optimizing the type of binders used, as well as the distribution and dimension of the abrasive BORAZON grains.

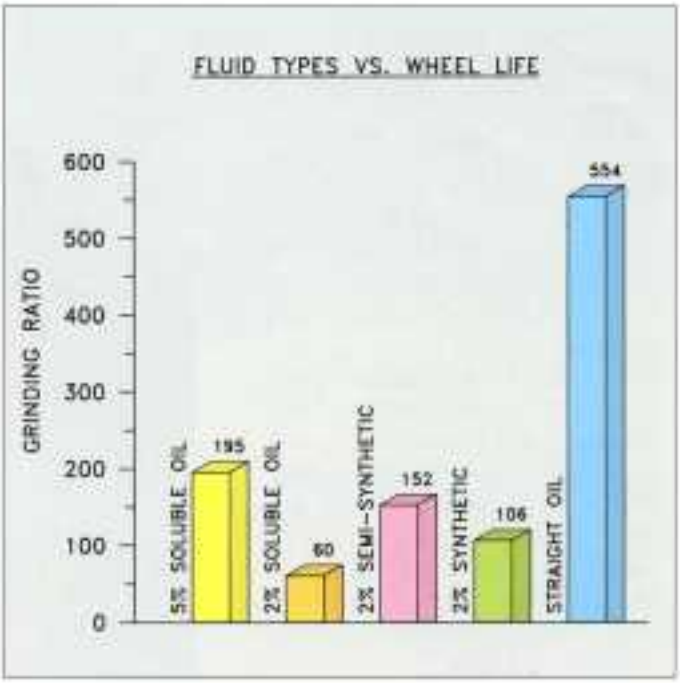
COOLANT LIQUID

To obtain outputs as high as possible with BORAZON grinding wheels, it is necessary to pay special attention to the coolant liquid which should be preferably NEAT OIL. This is due to several reasons.
The coolants with a water base give rise to the formation of vapour at high temperature at the point of contact between the grinding wheel and the part being ground. This water vapour attacks the BORAZON by decomposing it.
It has to be taken into account that the formation of B_2O_3 on the BORAZON surface provides a protecting coat which prevents the further oxidation and subsequent damage.
N.B.!! in view of the fact that this B_2O_3 is soluble in water, oxidation continues and the BORAZON particles are damaged, specially at the cutting edges, this speeds up the degrading of the grinding wheel and consequently reduces its working life.
CUTTING OILS avoid the decomposition of BORAZON, linked to the formation of high temperature vapour and oxidation, and besides they diminish the heat generated by the friction of the grinding wheel on the working piece.

Chemical reactions of Boron -Nitrite in water based fluids

a) $2\,BN + 3\,H_2O \rightarrow B_2O_3 + 2\,NH_3$
b) $4\,BN + 3\,O_2 \rightarrow 2\,B_2O_3 + 2N_2$
c) $B_2O_3 + 3\,H_2O \rightarrow 2\,H_3BO_3$

N.B.!! Water-based synthetical solutions or emulsions attack BORAZON



Working life of grinding wheels according to the coolant type

As a confirmation of the chemical studies a series of grinding tests have been carried out under the same working conditions, but using different coolants.
These comparative tests by grinding parts of hardened steel show that the «life» of the BORAZON grinding wheel is low when water-based coolants are used.
However, when NEAT OIL as coolant is used, the increase in working life of BORAZON wheels is rather spectacular. Although the graphs show an increase of working life 4 times higher, in some cases up to 9 times can be achieved.

Comparative table of coolant liquids

Taking as a basis the different coolant liquids as well as the parameters affecting the output and the tooling costs, the following table has been worked out.

	SYNTHETIC SOLUTIONS IN WATER	SEMI-SYNTHETIC SOLUTIONS IN WATER	EMULSIONS IN WATER	NEAT OIL
Heat collection	4	3	2	1
Lubrication	1	2	3	4
Mainetenance	3	2	1	4
Filterability	4	3	2	4
Environmental effects	4	3	2	3
Costs	4	3	2	2
"Life" of grinding wheel	1	2	3	4

1. Bad, 2. Regular, 3. Good, 4. Excellent

IMPORTANT

On the above table it can be clearly appreciated that taking into account all these parameters the ideal solution is the use of **NEAT CUTTING OIL** although oil has a lower cooling capacity, the improvement is substantial **due to the high degree of lubrication of the grinding wheel, as well as a high supply pressure in the coolant nozzles.**

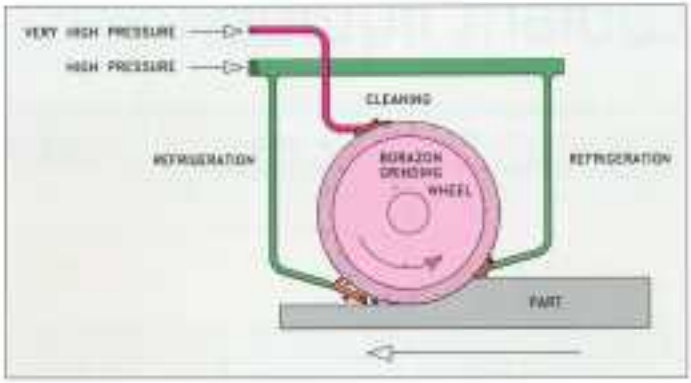
The high initial purchase costs of neat oil will be more than compensated, since changes of coolant liquids will be fully eliminated because if the oil is being filtered correctly, it can be used for an unlimited period of time. We have customers who have not changed the cutting oil of their grinding machines for the last 20 years. They just add oil to maintain the level in the coolant equipment.



NOVOTECNIC Precoat Filtration Equipment, Type FTD 3 AD TA special for coupling to a STUDER High Precision grinding machine for grinding Diesel equipment components using BORAZON wheels.

Pressure of the coolant liquid

After plenty of experiences it has been proved that the output of the BORAZON grinding wheels can be improved considerably delivering the coolant to the cutting point at high pressure (12-20 bar)
It is also necessary to clean the cutting pores of the wheels with oil at high pressure (20-50 bar) to increase their efficiency.
On the graph you can see the differences of output according to the pressure and disposition of coolant nozzles on the working point of the wheel.
The coolant oil feed at high pressure allows, in addition, to increase the speed of the wheel and consequently the capacity of material extraction, as shown on the graph.



Why is a correct filtration imperative?

In the present production precesses filtration is a determining factor which has always to be taken into account, but far more when using BORAZON wheels.

LONGER LIFE OF THE CONVENTIONAL BORAZON WHEELS IN COMPARISON WITH THE Al_2O_3

If the oil is dirty the particles in suspension blunt the wheel losing its cutting capacity which makes necessary a more frequent dressing of BORAZON wheels with ceramic and resin binders, consequently the essential advantages of this type of wheels are being lost.

LONGER LIFE AND HIGHER OUTPUT OF BORAZON WHEELS WITH METALLIC BINDERS

Using this binder high cleanliness of the oil will still be necessary, as on this type of wheel there is no possibility of dressing the wheel, and when same is blunted, due to particles in suspension in the oil, its cutting capacity will be reduced considerably and consequently the machine output. In addition, work piece burning will take place, which will necessitate a wheel change.

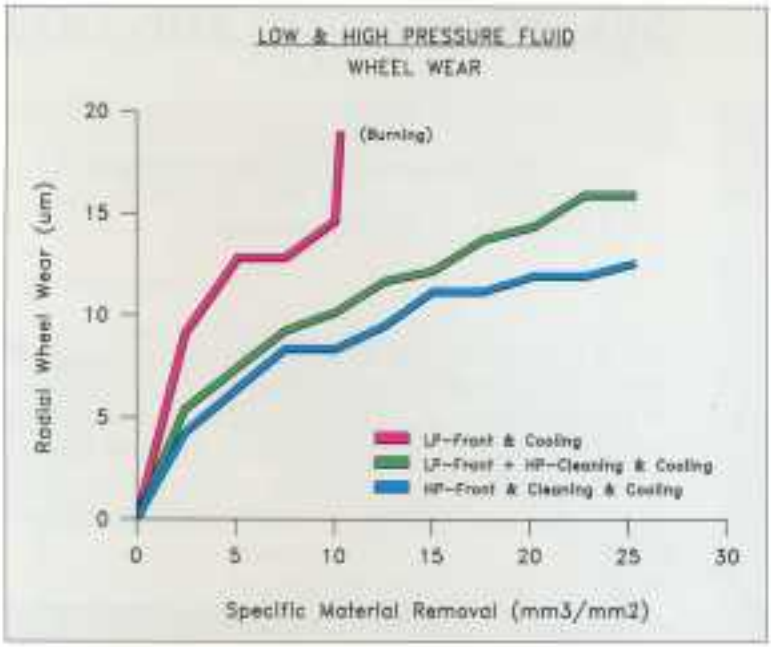
LONGER LIFE AND HIGHER OUTPUT OF HIGH PRESSURE PUMPS

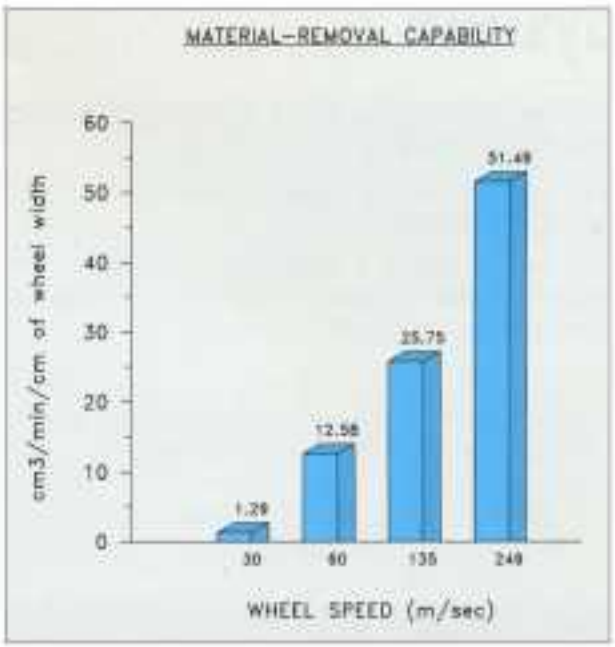
When using BORAZON grinding wheels it is necessary to use high pressure pumps (gears, blades or screw type).
This makes a very strict filtration necessary because the abrasive particles in suspension destroy, in a few months, the inisde of the pumps which involves expensive repairs and even the changing of the pumps.

THE SURFACE QUALITY OF THE GROUND PIECES can be seriously affected if the liquid is not perfectly filtered, as scratches, grooves and burning of the piece may occur. This is specially important when operating under conditions of maximum output of the BORAZON wheels.

When the oil is completely clean, the «life» of the pumps is considered "unlimited"









NOVOTECNIC Precoat Filtration Equipment, Type FTD 5 E 10 specially designed for coupling to "QUICK POINT" high output grinding machines with BORAZON wheels of Messrs. JUNKER.

Suitable filtration system

As a resumé of all the above, it has been proved that it is absolutely necessary:

•To use neat oil in order to prolong the life of the BORAZON wheels.

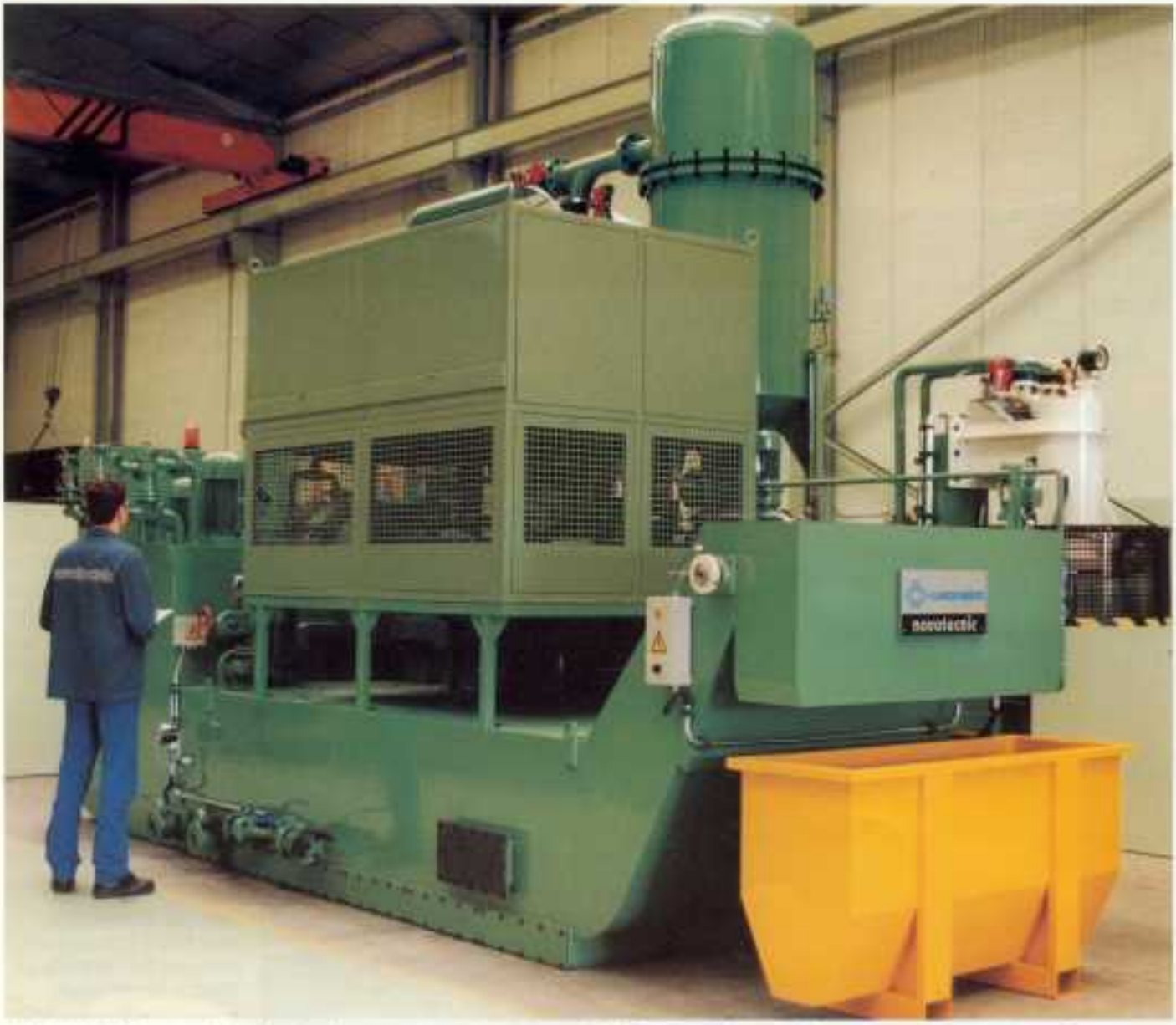
•To have available a filtration system which keeps the liquid completely clean to obtain the maximum output of the machine and the BORAZON wheels.

Use NOVOTECNIC precoat filters which assure a nominal filtration quality in the order of 1÷3 microns, as well as the content of particles in the filtered liquid, between 2 and 10 miligrams per litre.

Unsuitable filtration systems

Filtration systems by paper band or centrifugues are also included the range of NOVOTECNIC products **but they must be rejected completely.**

The small particles which remain in suspension under the nominal degree of this type of filter are of 5÷15 microns. These accumulate, bit by bit in the oil until an oil change becomes absolutely necessary because the great amount of these small particles clog the cutting pores of the wheels and in addition they damage the high pressure pumps.



NOVOTECNIC Precoat Filtration Equipment, type FTD 15 DA specially designed for coupling to a KLINGELNBERG endless gear and thread grinding machine with BORAZON wheels, type HNC 35 SL.

NOVOTECNIC central filtration plants and equipment for working with BORAZON

Novotecnic has developed a series of special equipment ready for achieving all the output offered by the new tecnologies in the manufacture of grinding machines for operating with BORAZON wheels.
Novotecnic's Filtration Engineering Office remains at the disposal of the Metallurgic Industry for the study and design of filtration equipment which alter to suit the specific needs of each customer.

Bibliography:

"EFFECTS OF GRINDING FLUID TYPE AND DELIVERY ON CBN WHEEL PERFORMANCE" by Alan C. Carius. G.E. SUPERABRASIVES. TECHNICAL REPORT.

"HIGH SPEED GRINDING PROVED IN PRODUCTION" by James Woodside. G.E. SUPERABRASIVES. TECHNICAL REPORT.

Central filtration system for emulsion used in the machining of pearlitic cast iron

NOVOTECNIC has installed a central filtration plant type FIDE 4 DA 32 in a French factory for automobile brakes, consisting of:
- A line of 45 m velocity channels for the collection of chips and coolant liquids coming from a machining line.
- Settling tank with a capacity of 32 m³ with automatic chip extraction, mounted in a pit inside the workshop.
- Filter FIDE 4 having a filtration flow of 3.500 l/min with pneumatic vacuum and non-woven band as the filtering element.
- Clean liquid distribution pipework and pump system.
- Surface deoling equipment.

The central filtration system is fully automated and thanks to the excellent filtration level obtained, as well as to the deoining system, it allows a better quality of machining, a longer tool life as well as a long-lastintg emulsion as has been proved previously in the central plants installed in the same company in Spain where the emulsion has not been changed after more than three years'working.



Central filtration plant FIDE 4 DA 32

Central filtration system TADE 4 DA 7 for a subcontract grinding company

This small central filtration plant has been installed in a subcontract grinding company at HAUTE SAVOIE, France.
This central plant filters a flow of 1.000 l/min of emulsion by means of a paper band system and hydraulic vacuum. It is then distributed to 20 Centerless grinding machines.
The central has a total capacity of 7m³, it is situated at the floor level. The dirty liquid return is by means of small transfer tanks located at the side of the machines, as well as an overhead pipe network.
This system facilitates factory layout changes allowing machines to be positioned according to the manufacture's needs since they can be installed anywhere in the works.



Participation in a research project for the European Community

NOVOTECNIC has supplied to the UNIVERSITY of KASIERSLAUTERN a precoat filter specially designed for the filtration of liquids used in high production grinding operations on non-metallic materials.
Besides the a.m. University and NOVOTECNIC, a manufacturer of coolants, as well as a private Swedish research institute will take part in this research project.
The aim of this project is the optimization of the elements employed in high output grinding operations.
The present situation is:
•Disadvantages in competition of the E.C. vis-à-vis Japan in non-metallic products to be studied.
•Machining of low profitability due to high tool costs.
•Negative incidence in the environment due to coolants which have to be changed frequently.
•High percentage of faulty parts.
The working subjects are:
•Grinding at high speeds (up to 180 m/s)
•Grinding with large ultra-sound sensor
•Analysis of oil as coolant for high output grinding of nonmetallic materials.
•Optimization of coolant filtration to increase the quality of the pieces and to prolong the «life» of the grinding wheels.
•Physical-chemical checking to verify the quality of the elements.
This project is anticipated to be carried out over the course of the next 4 years.

NOVOTECNIC EUROPA, S.A.

Blanquers, 2 E-08130 STA. PERPETUA DE M. - BARCELONA
Tel.: 34-3-729 13 62 Fax: 34-3-718 25 58 Telex: 59738 NOVT E

BENELUX:	NOVOTECNIC BENELUX TONGEREN	Fax: 32-12-264052	INDIA:	FRANCIS KLEIN & CO. BOMBAY	Fax: 91-22-2870168
BRASIL:	NOVOTECNIC DO BRASIL STO ANDRE	Fax: 5511-4121040	JAPAN:	KANEMATSU K.G.K. TOKYO	Fax: 81-3-59981748
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