TO:
ERASTEEL COMMENTRY
BP 1 - 1, Place Martenot
03600 COMMENTRY
FRANCE

Poirino, 22-03-11

TO THE KIND ATTN. MR. BARET AND MR. BUGE
SUBJECT: OUR OFFER offe5860-10.doc

Dear Sirs,

Further to Your request, to the meeting by your company and to the further agreement with Mr Baret we send You herewith our offer for an inductive heating system with "going through transport" of HSS and TAV6 bars.
As from your request there will be two plants each 200KW respectively for bars 16-30mm and for bars 30-55mm.
We have studied the problem in order to answer with a proper margin to the required production of 1 bar D30mm heated in 1 min at max 500°C±10°C (loading and unloading times excluded).
As from your specific request we have not quoted any loading table as the bars should be manually loaded on a rollway at your care.
The heating is forecast out of straightening line and in order to have a constant temperature along the length it will be realized with two passages.
The bars are very bended 50mm/5mt never the less they can be continuously moved on a rollways with a rack pushing system CNC CONTROLLED that have been forecast in order to ensure constant speed movement inside the inductor.
The inductor has been forecast unmatched in order to warrant no collision with the bars and has been forecast with protection inox cooled rails coated with hard material (satellite).
It is possible to work on the whole range with one inductor of course accepting reduced production and higher consumption on unmatched bars.

OPERATIVE METHOD

- The generator realises the power delivering automatically, with the signal managed by the PLC.
- In order to avoid temperature variation on extremities the rack pushing systems are equipped with flux concentrators.

GENERAL WORKING CHARACTERISTICS.

The installation will be provided with safety devices that will grant its integrity during the working time; in particular will be prepared safeties to prevent the cycle prosecution in case of reduction of the foreseen flow of the cooling liquid for the electric components and for heating inductors; this protection is obtained through the use of high sensitivity thermostats or flow-meters and with the possibility of a visual and electric control together with the indication of the flow volume per hour, and/or litre per minute, set in the return circuits in the containment tanks.

If one of the above-mentioned problem should happen, the cycle will be automatically stopped and the anomaly will be pointed out and monitored.

In case of installation stopping, emergency stopping excluded, the cycle will continue till the end of the cycle operation of the bars on which one started the heating operation.

For the restoring after the emergency we will foresee a drive, appropriately key-closed, to allow manoeuvre only to maintenance-men.

We will observe the specification, on condition that the elements appear constantly in the foreseen dimensional and structural conditions.

The mechanical and structural parts of installations will be rugged in construction, protected from wear and eventual oxidation; the drive handling parts will be set in zones easy to reach for the maintenance.

The heating inductors will be specified in construction, granting an elevated degree of efficiency, dependability and change easiness for cleaning and maintenance.

PLANT MAIN PROPERTIES

- HEATING TEMPERATURE:

Increase 500°C ± 10°C (adjustable).

- INPUT TEMPERATURE:

20°C.

- STRAIGHTNESS OF A BAR:

50mm/5mt distributed the bars can move on a V shaped rollway

- BARS SIZES - cylindrical:

diameter: 16-55 mm

lengths: 2000÷6000 mm.

- **AVERAGE CONSUPTOON WITH ONE INDUCTOR AT 500°C:**

140Wh/kg with TAV6

117Wh/kg with HSS

- **REFERENCE PRODUCTION WITH ONE INDUCTOR AT 500°C:**

LINE 1 16-30 mm

MATERIAL	D (mm)	mt/min
TA6V	30	7,59
HSS	30	5,01
TA6V	16	14,18
HSS	16	9,39

LINE 2 30-55 mm

MATERIAL	D (mm)	mt/min
TA6V	55	2,25
HSS	55	1,49
TA6V	30	4,14
HSS	30	2,73

- **TOTAL LINE LENGHT:15mt**

COMPOSITION OF EACH SYSTEM

A) NO.1 FREQUENCY STATIC CONVERTER, OUR MODEL IHFT 200 KW, WITH HEAT EXCHANGER.

B) NO.1 INDUCTOR (200 KW) FOR MEDIUM FREQUENCY HEATING AND MEDIUM FREQUENCY POWER CAPACITORS.

C) NO.2 ROLLWAYS AND PUSHER RACKS SYSTEMS CNC CONTROLLED.

D) MEDIUM FREQUENCY POWER WIRING (INDUCTORS/ FURNACE/ GENERATOR INCLUDED IN THE PRICE UP 3 m LINEAR).

E) CONTROL CONSOLE (PLC SIEMENS).

F) NO.1 OPTICAL PYROMETER.

DESCRIPTION OF THE PARTS OF THE SUPPLY

A) - FREQUENCY STATIC IGBT GENERATORS MOD. IHFT 200 KW

a.1. Composition of the converter (showed by stages)

a.1.1.- Main supply is switched by a high reliable sectionalising switch.

Electrical devices, like electrical motor pump or cooling fan, are protected by automatic magneto-thermic switches.

Electronic devices are protected by fast fuses.

Power semiconductors are protected by ultrafast fuses with very high rupturing capability.

a.1.2.- The first stage of the power medium frequency generator is the Dc power supply.
Conversion from AC source is made by means of a three phase Graetz bridge.
This is rectifier bridge is a completely controlled one and active devices are silicon controlled rectifiers. In order to keep safe working conditions and long time between failure the bridge is water cooled.
Working temperature is monitored.
Input and output power is controlled by electronics. Output current is filtered by a power reactance with a low loss core.
Reactance conductor is water cooled and water temperature is monitored.

a.1.3.- The second stage of the power generator are high reliable IGBT transistors. These devices have very low turn-on and turn-off times.
Critical working parameters for these devices are current, voltage and turn-off time, therefore each one is continuously monitored by digital control electronics.
Inverter bridge components are water cooled and working temperature is controlled.

a.1.4. – Fully digital command and control electronic.
Electronic control circuit has been designed by Induction S.r.l.
Electronic cards are produced with selected components and individually tested. These electronics keep the control of the machine against failure, pressure drop of cooling water, thermal runway. Any alarm condition is displayed on the control panel with a selective indicator. Power output is set by means of the control of the AC to DC converter.
Medium frequency generation is achieved through exact synchronisation to the resollant heating circuit. Operating power, frequency, and medium frequency voltage are displayed on the control panel, and they are displayed on the operating console too (predisposed for the junction-box only).

a. 1.5. - net connection card IMFP110

The electronic card IMFP020 can be considered as a base platform for the development of new or advanced functions for the control of power converters.
The core of the board is a 8bit fast and reliable DSP (digital signal processing) with several built-in interfaces: UART, SPI end serial ports.
The interface of the DSP to the power devices is completed through a programmable logic. Some very important functional blocks, which require a very fast execution, not attainable by programming, are hard-coded in the programmable logic: examples are the Phase Detector, the DCO (digital controlled oscillator) and the phase control unit.
The DSP gets from the programmable logic the digitalized load parameters (like voltage level, phase and frequency), it elaborates this information, calculates the optimal working condition and generates the proper control signals.
Around this core it is possible to add several auxiliary functions, easily interfaced via the built-in ports of the DSP.
The standard operator interface is implemented by the MODBUS protocol via the UART port.
Any MODBUS capable device can easily communicate to the electronic board.
The future development include the adoption of a wired Ethernet network interface.
Due to its robustness and wide diffusion, Ethernet and web based application are becoming more and more popular in the industrial application.
The integration of a "Digi Connect ME" module in the main board will add the benefit of a embedded web server.
The added features include HTTP/HTTPS and FTP protocols, to access, with a simple but secure interface, the data stored in the core processor memory.
With low level strong and secure protocols, like Rlogin or SSL, it could be also possible to change/modify relevant converter parameters.
Last but not least, the web interface may include POP and SMTP protocols for sending by e-mail periodic reports and/or warnings.

The integration of the above technologies in our custom control board is made easy by the availability of tested platform including such web server functionality, **and the open interfaces we provided in our core structure.**

a.1.6. - Heat exchanger unit for converter cooling circuit.

It's made by a stainless steel tank. It's built into a rugged structure installed properly next to the plant and it is controlled for pressure as well as temperature. The heat exchanger is a plates type with countercurrent exchange; demineralized water is used. The water characteristics will be always the same thanks to a resin filter, while a conductivimeter with a threshold for intervention of adjustable alarm, will signal in microsiemens the water conductivity.

(Generator 200 KW) **Capacity: 8.700 Kcal/h**

ALL THE ABOVE DESCRIBED COMPONENTS ARE ASSEMBLED INSIDE A RUGGED ELECTRICAL CABINET WITH IP54.

IN OPTION.

a.1.7 - The extended heat exchanger cools the whole plant included the heating inductor with demineralised water. In case of electricity black out is provided the automatic connection of emergency water through electro-valves. The heating exchanger is mounted on a open structure to be installed next to the plant.

Capacity: 51.700 Kcal/h

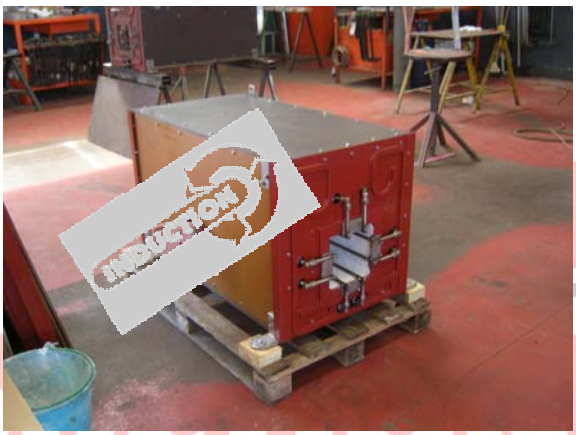
TECHNICAL FEATURES OF THE CONVERTER

(IHFT 200KW)

M.F. power output:	200 KW
Nominal medium frequency voltage:	700 V
Main power:	224 KVA
Main voltage:	3 PH 400V 50 Hz
Input water temperature:	20÷30°C
50 Hz Power factor (cos-phi) :	0,94
Pressure:	3÷5 bars
Internal circuit fall:	0,7 bars
Medium water fall input/output:	10°C
Required water flow	87 lt/min

B) - HEATING INDUCTORS

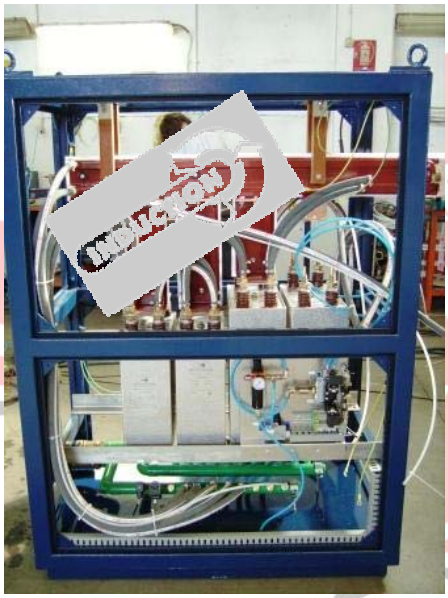
b.1.- Made by electrolytic copper tube which is insulated and covered with refractory lining at a high percentage of alumina. It will be installed inside a box, about 300 mm. longh, it will be protected by cooling control thermostats and connected to the medium frequency generator through cooled plates connections. The above mentioned inductors will be protected with cooled inox rails hard material coated .



b.2. - Medium frequency capacitors.

They are assembled inside the converter and realise the medium frequency inductor's reactive power compensation. They are connected to each other in parallel and are calculated to obtain the transfer of the maximum active power on the heating material.

Through opportune taps can be manually regulated the load calibration and the equalisation in frequency and power.



C) NO.2 ROLLWAYS AND PUSHER RACKS SYSTEMS

d.1. - The furnace that makes the support of the inductors set and that contains the capacitors is provided of two steel rolls way

d.2. – Two pusher rack system CNC CONTROLLED equipped with flux concentrators will move the bars inside the inductor with constant and precise adjustable speed.

E) - OPERATING CONSOLE

It will have all the electrical actuators to control the engines of the pumps and of the various tools.

It will allow the management of the line through a PLC Siemens Simatic S7, with an operating panel which will allow trouble shooting and signalling.

Monitoring of the running parameters as:

- work rate
- sizes of the worked piece
- heating temperature
- instantaneous and average total consumption of the system
- energy account.
- alarm messages level 2 (alarms' detail).

SOFTWARE

The system can command and control automatically the cycles of:

- Pre-loading furnace starting and converter regulation.
- Energy account for heating, uniformity of furnace temperature during the different working cycles, power converter management.
- Bars moving on rolls with automatic control of the positioning (and of the speed during the heating phase) loading and unloading.
- Control of the pyrometer in output with program of the min. and max. limits and automatic selection of the pieces not at the adequate temperature.
- The system can accept, in the base version, to memorise up to 200 pieces formula, of 10 parameters each.

F) - PYROMETER UNIT

- No. 1 optical pyrometer units, regulation field to agree.
- No. 1 Maximum and minimum positioning temperature set-point.
- No. 1 Temperature displays (on the monitor of console).

The first described pyrometers allows the security control in order to avoid the overheating and the feed-back regulation by software and P.I.D.

The second pyrometer provides the temperature indication at the end of the heating line.

COOLING WATER CHARACTERISTICS

(very important in case you do not buy the option a.1.7)

Water used in the cooling system must have the following physical-chemical characteristics:

- Mechanically clean: optically clear, not turbid, without deposits;
- Chemically neutral.

- Electric conductivity:

max. 600 µS/cm for inductors and furnace;

max. 60 µS/cm for medium frequency generator.

- Carbonate Hardness max. 8 DH (German degrees)

PH value >= with hardness of 8 DH

PH value >= 8.1 with hardness of 6 DH

PH value >= 8,3 with hardness of DH

- Free carbon dioxide (CO_2)

max. 8 mg/l with hardness of 8 DH

max. 4 mg/l with hardness of 6 DH

max. 3 mg/l with hardness of 4 DH

- Carbon acid (H_2CO_3):	must not be present
- Ammonia (NH_3):	must not be present
- Nitrites (N_2O_3):	max. 0,04 mg/l
- Iron:	max. 0,3 mg/l
- Manganese:	max. 0,05 mg/l
- Sulphates (SO_3):	max. 150 mg/l
- $KMnO_4$:	max. 15 mg/l

DELIVERY TECHNICAL CONDITIONS

1) TRAINING

A course for learning the basic concepts concerning the plant.

PLACE: our factory in Poirino (TO).

PERIOD: N. working days per 8 hours/day to be agree.

PARTICIPANTS: there should be the following people (3 people max.): the technician for the planning; the technician for the first mechanics, oleo-pneumatic and electronic maintenance; the machine operator.

NOTE: Travel and accommodation expenses will be invoiced apart, based on standard UCIMU rates.

Personnel who will attend to the course should have a proper background.

2) TEST FOR ACCEPTANCE

It will be carried out by our technicians in our factory in calorimetric test possibly at the presence of your technicians.

3) SET UP

Our specialised technicians will come to Your factory to assist in assembling, machinery testing, and they will set and start up electrical, electronic and pneumatic components and any other appliance included in the supply.

The set up will be invoiced as from our technician service cost (See technical assistance costs).

4) NOT INCLUDED

The following costs are not included in the supply: qualified ancillary personnel and transport and lifting equipment; foundation work for plant set up; (this work must be performed in compliance with the related drawing); electrical, water and air connections up to the plant's inputs access platforms and eventual industrial safety barriers, which could be necessary by your factory; spare parts; courses for the general handling system; the cost for flight tickets, for board and lodging for your delegation will be at your charge; fitting for set up and connection, air compressor for pneumatic services, hydraulic oil and lubricant for plant working; any fittings not included in the prices.

5) TECHNICAL ASSISTANCE COSTS

a) Technical assistance will have the following costs:

- Normal working day (8 hours) ***EURO* 592=**
- Normal working or travel hour ***EURO* 74=**
- Overtime or extraordinary travel hour ***EURO* 100=**
- Overtime working hour on Saturday, on non- working day, or on night time ***EURO* 120=**

  N.B. Every portion of normal working hour, extraordinary hour or non working day hour will be invoiced as entire hour.
- Every day or portion of day spent out of our factory on customer request. ***EURO* 140=**
- Saturday and non working day at the customer disposal ***EURO* 347=**

b) The travel expenses refund will be:

for AEROPLANE travel: according to IATA rates, for TRAIN travel: according to FF.SS rates, for CAR travel: according to ACI rates, FOR OTHER MEANS OF TRANSPORT: invoiced apart as from cost. REMAINDERS: invoiced apart as from cost.

The means of transport will be chosen by the supplier.

c) Board and lodging costs at customer's charge.

d) Exclusions:

Material which has not been explicitly indicated.

Material which had to be replaced, during the performance of the intervention by our technicians on the spot.

Potential subsequent interventions of our technicians, which might be considered necessary for perfect functioning by Induction Service srl.

6) GUARANTEE

Starting from the plant set up, for 12 months (8 hours daily shift - free Turin) **or not more than 15 months since the material expedition date.**

Excluded from the guarantee are consumption materials as refractory cement, inductor slideways, protective sheats, fuses, pneumatic tubes, sensors and any other thing that is particularly exposed to hostile surroundings and that the operator could damage even accidentally.

During the guarantee period, INDUCTION S.r.l. will provide, in his unobjectionable judgement, to repair or to replace the examined pieces which will be free supplied as also the manual labour for the repairing.

The restoring of the replaced materials is free our factory of Poirino.

They will be at customer's charge: the transportation costs for the material, the travelling expenses, our technicians travelling hours and expenses, when the replacement should be effectuated by us.

NOTE: The Intervention for the repairing or for the replacement of pieces during the guarantee period, cannot produce any extension of the guarantee period over the limits established by the contract.

The guarantee doesn't cover any indemnities for the period of the plant inefficiency.

Therefore anyone cannot ask to the supplier for any reimbursements for direct or indirect damages caused or consequences of his supply as, for example, but not exclusively, production interruption and/or losses, missed or limited introits, financial costs, etc.

CANCELLING OF GUARANTEE CONDITIONS.

The guarantee is lost in case of anomalous using of the plant out of the declared working performances and in particular in case of mistakes or carelessness of the user and for breaking or damages owned to collision, improper setting or use and for the non- respect of the using and maintenance prescriptions that have been given together with the plant.

The guarantee is also lost in case eventual interventions or modifications by the purchaser or by non authorised persons.

The damages have to be signalled to our technical service by remarking the kind of problem and by giving as much indications about it as possible.

7) DELIVERY

To agree (5/6 months), a conformity inspection should be done by your technicians before the shipping.

The plant lay-out acceptance should be returned within 30 days from its receipt. Anyway, acceptance must be received 120 days before the agreed delivery date.

The foundation work drawing should be accepted and returned within 30 days from their receipt.

Failed the observation of the above rules, delivery date should be changed.

8) PACKING

Not included.

9) DELIVERY TERMS

Free our factory.

10) PAYMENT

30% at the time of order.

30% between order and delivery.

30% at the acceptance testing by our factory

Settlement: upon agreement.

11) VALIDITY

This offer is valid for 90 days.

12) PLANT LAY-OUT

As our plants don't generally need foundation and are assembled against execution order, the lay-out of the plant will be provided within 2 months from the order.

13) TECHNICAL DOCUMENTATION

Technical documentation as from European norms quoted in the Machines Directory 89/392 CEE and its relative adjournments.

Together with the plants it will be supplied a copy of:

- maintenance manual;
- programming manual, if required;
- technical documentation electrical pneumatic and hydraulic drawings will be supplied in Italian.

Eventual different documentation:

It could be supplied by cost.

It is nor foreseen, for normal reasons of industrial prudence, the supply of building drawings, software lists of the operating systems, electrical drawing of the single printed circuits and other analogous documents.

14) NORMS CORRESPONDENCE

The plant will correspond to the IEC norms and to the instructions for precautionary measures and sanitary-environment measures. It has the mark CE.

Safety guards following CE norms:

1. Machine-edge safety guards: they are realised in conformity to CE norms.
2. External safety guards: the plants must be provided of safety guards apt to avoid the access of people into the working and handling area. These guards must be studied depending on the allocation of the plant inside Your factory, so their description and quotation will be possible only after the definitive arrangement of the lay-out.

To release the certificate of conformity to CE norms:

- the plant must be provided of the edge guards as at o.m. point 1;
- our personnel must sign that the safety guards at point 2 have been made according to the norms and that are properly set, installed and linked.

15) PAINTING

The generator cabinet and eventual other equipment will be painted in blue RAL 5003/ grey RAL 7035.

16) RESERVE OF OWNERSHIP AGREEMENT

- Induction reserves the right of ownership on the supplied plant until the complete payment of the due amount. As a consequence the purchaser engages oneself as follows:
  a) to make good use of the plant according to the specific destination of the plant.
  b) not to move for any reason to a third party the availability and the use of the plant.
  c) not to move it from the place resulting in this contract without the previous written authorization of INDUCTION.
- The purchaser assumes in any case all the risks related to the plant from the delivery.
- The missed payment of one of the instalments for an amount superior to the eight part of the total price will cause the cancellation of the contract and the consequent right of INDUCTION to exact immediately the payment of the total amount or to exige the return of the supplied plant.
- Instalments still paid will remain to INDUCTION as indemnity for the use and the depreciation of the machinery, with the exception of a greater damage's proof.

E C O N O M I C O F F E R FOR EACH PLANT

A) NO.1 FREQUENCY STATIC CONVERTER, OUR MODEL IHFT 200 KW, WITH HEAT EXCHANGER.

B) - HEATING INDUCTOR (200 KW).

C) - NO.2 ROLLWAYS AND PUSHER RACKS SYSTEMS

D).-MEDIUM FREQUENCY POWER WIRING (INDUCTORS/ FURNACE/ GENERATOR INCLUDED IN THE PRICE UP 3 m LINEAR).

E) CONTROL CONSOLE PLC SIEMENS S7.

TOTAL NET PRICE OF EURO 225.200,00=

ACCESSORIES.

a.1.6 EXTENDED HEAT EXCHANGER.

NET PRICE: EURO 8.600,00=

B) - EXTRA HEATING INDUCTORS (200 KW).

NET PRICE EACH: EURO 10.200,00=

F) NO.1 OPTICAL PYROMETERS.

NET PRICE: EURO 40.000,00=

Being at Your disposal for any further information and looking forward to hearing from You, we remain Yours faithfully.

INDUCTION S.r.l.
Albino Picco
Giovanni Calvi