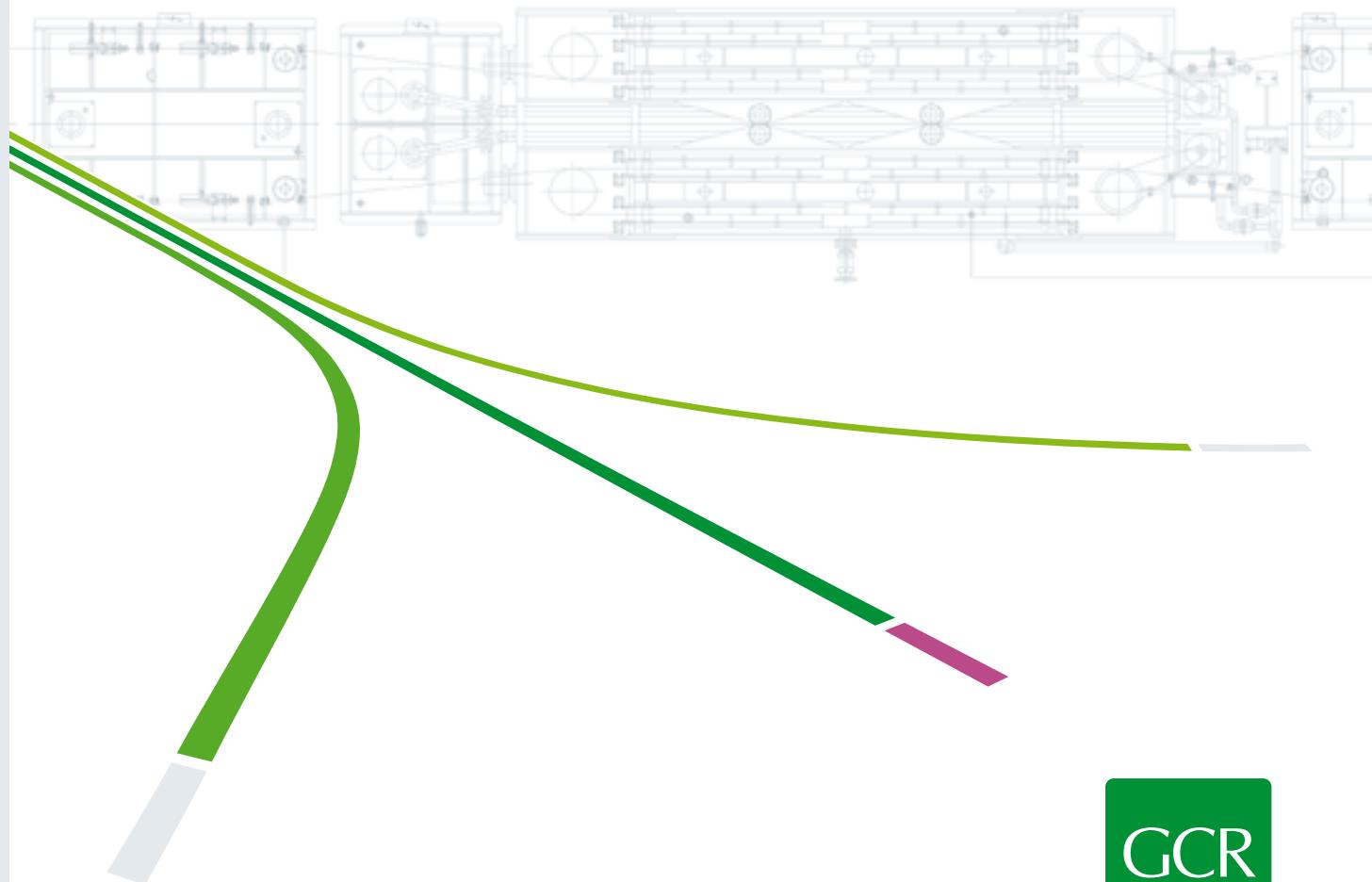


04

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BATCH PICKLING PLANTS

THE MOST ECONOMICAL SOLUTION FOR QUALITY PRODUCTION

Every modern wire factory starts with a fully automated state-of-the-art wire rod batch pickling plant.

GCR Eurodraw SPA, in cooperation with VJL Technologies, builds the most modern, environmental friendly and efficient plants for pickling wire rod with hazardous emissions that are virtually zero.

Plants can be designed for hydrochloric or sulphuric acid pickling, with capacity of 60,000 to 240,000 t/year.

Plant configuration can be either "tunnel" or "open design" and are equipped with acid recovery and regeneration systems, waste water treatment systems, clarifiers, scrubbers and filter presses for phosphate sludge.

The pickling sequences are managed by sophisticated SCADA systems that operate two rigid automatic cranes and optimize coil movements in order to reduce process time to a minimum. Different pickling sequence programs can be selected in order to process wire rod coils of different grades that require different process times.

A state-of-the-art batch pickling plant is the key to successful wire production and is the most economical solution to assure consistent wire quality.



WIRE ROD PREPARATION LINES

IN-LINE DESCALING, PICKLING AND COATING

Before any wire drawing, wire rod must be descaled and/or pickled. In case of low carbon wire rod, it is generally sufficient to use a mechanical descaler and a brushing unit; however for high carbon wire descaling alone may not be sufficient to assure efficient wire drawing.

For the production of tire steel cord and hose wire GCR Eurodraw offers a rod preparation line that includes mechanical descaling, steam pickling or H_2SO_4 electrolytic pickling and hot rinsing; and finishes with borax coating and drying.

This line can be installed either in-line with a wire drawing machine or can be used as a stand-alone unit where the wire is wound on large capacity spools.

GCR Eurodraw offers four types of mechanical descalers suitable for low or high carbon rod and for small or large diameter wire rod. Descalers for high carbon, large diameter wire rod are equipped with descaling rollers that are mounted on a hydraulically operated swiveling support so that threading is very simple. Descalers can be followed by brushing units. The GCR Eurodraw brushing unit is available in single or double configuration for high speed brushing.

GCR Eurodraw has designed a unique steam pickling unit. The unit works on the simple principle that if the skin of the wire is heated very quickly, the hard scale present on the surface expands and falls off. The unit uses only overheated steam and is very effective and environmentally friendly.

For wire that is very rusty or with thick layers of scale, GCR Eurodraw can supply an electrolytic pickling line. The unit can be designed for a single wire or even up to five wires.

The line consists of four main parts: A pickling tube in which electrolytic pickling takes place, an acid recycling tank where the acid is stored and pumped to the pickling tube, a rinsing unit and an electrical cabinet that contains the rectifiers necessary to perform the electrolytic process.

Electrolytic pickling is the most effective way to clean rod; it ensures consistent quality of the product and has very low operating costs, comparable to mechanical descaling and brushing.

Prior to wire drawing the rod should be coated to neutralize the surface and facilitate subsequent drawing operations.

In-line wire rod preparation usually uses borax or lime. The coating unit consists of an insulated and heated tank where the borax or lime is circulated by a pump. The borax or lime is generally heated by electric resistances; steam coils can be used as an alternative if steam is available.

In order to limit the space necessary to dry the borax or lime before the wire proceeds to the wire drawing machine, GCR Eurodraw has developed an induction dryer that heats the wire to instantly dry the borax or lime solution coating.

Heating power is automatically adjusted with the speed of the wire and can be further controlled with an optical pyrometer that reads the wire surface temperature and adjusts the power accordingly.





Q4.03

DESCALERS AND BRUSHING UNITS

TWO-PLANE DESCALERS; SINGLE AND DOUBLE BRUSHING UNITS

GCR Eurodraw has developed various types of descalers suitable for low carbon and for high carbon wire rod.

The basic descaler for low carbon wire rod is a simple unit with manually adjustable rolls and with a scale collection bin located underneath. The same unit is also available with hydraulically adjustable rolls to facilitate threading, especially if the unit is used to descale high carbon wire rod.

For larger rod diameters a bigger descaler has been designed in two separate versions. One version, generally used in combination with cold rolling lines, foresees only one descaling section, the other version is a two-plane descaler that can handle rod up to 16 mm in diameter.

The rolls of the larger descalers are all powered by hydraulic cylinders for easy roll adjustment and threading.

To remove fine scale from the wire, GCR Eurodraw offers single or double brushing units. The brushes are made of high carbon steel wire and are easily adjustable to be more or less aggressive depending on the wire rod surface conditions. If necessary, two brushing units can be installed in sequence in order to clean the wire at high speed.

Both the descalers and the brushing units can be combined with a steam cleaning unit. This simple unit is very effective and removes any remaining fine scale from the wire rod before it enters the first diebox of the wire drawing machine.

MULTI-WIRE PICKLING LINES

H_2SO_4 ELECTROLYTIC PICKLING AND HCl PICKLING LINES

Multi-wire pickling lines are usually supplied for installation with wire annealing or patenting and/or plating lines. GCR builds two types of multi-wire pickling units:

H_2SO_4 electro-pickling

The H_2SO_4 electro-pickling unit is extremely efficient and very compact. Sulphuric acid is used as the cleaning agent combined with the electrolytic effect, allowing fine adjustment of the pickling effect. By increasing or decreasing the current it is possible to adjust the pickling action depending on the surface conditions of the wire.

The unit is equipped with a fume suction system and can be supplied with a scrubber for acid fumes abatement. All tanks are made of high quality PP adequately reinforced where

needed and mounted on a stainless steel structure. The unit is completely wired and piped with all pumps mounted on board.

HCl multi-wire pickling

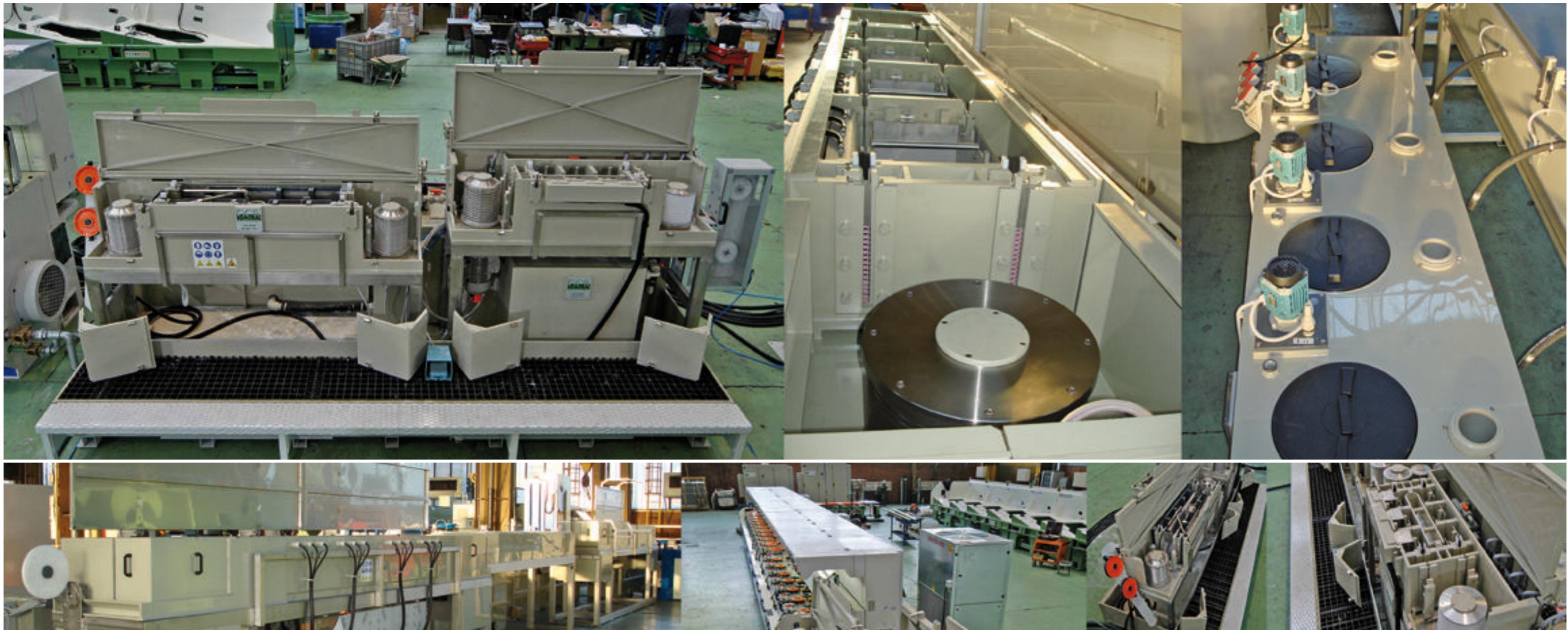
The HCl multi-wire pickling unit built by GCR has a unique design with a round bottom tank that offers many advantages. First of all, servicing of the tank is much easier than with a conventional square tank as all residues are collected in the center where the drain is located.

Furthermore, the unit is constructed so that it is completely rigid and self-supporting, thus avoiding the need of additional metal frames that are not compatible with HCl acid spillages. The unit is of course fumeless, with triple water curtains and demisters that totally

prevent the escape of dangerous fumes into the factory. Depending on the line speed, the pickling unit can be configured in two or three separate sections, all with independent pumps and with separate pickling trays in each tank.

Pressurized counterflow rinses combined with water curtains ensure the removal of all acid residues from the wire before it proceeds to the next processing phase. Threading of the unit is made easy with a built-in threading trolley that moves all along the unit and pulls the wires through. If wire must be threaded manually, special side openings that are flooded with water allow passage of the wire, while preventing escape of the pickling fumes.





04.05

DEGREASING UNITS

WITH ANNEALING FURNACES, WIRE DRAWING MACHINES, PLATING SECTIONS

GCR Eurodraw has developed various types of degreasing units for different applications:

Multi-wire degreasing units for installation with annealing furnaces. These units have been designed specifically to clean stainless steel wire prior to annealing. Cleaning before annealing prevents the formation of black spots on the wire that are impossible to remove with subsequent pickling. The degreasing unit for stainless steel wire is generally composed of two separate sections.

The first is an ultrasonic cleaning section that "mechanically" cracks the residues on the wire; the second section is electrolytic with a degreasing agent that dissolves the residues and removes them completely.

Thereafter, powerful counterflow hot rinse unit removes the degreasing agents.

Mono-wire degreasing units for installation with wire drawing machines. These units have been designed to work inline with wire drawing machines and therefore operating speeds can reach 25 m/sec. The degreasing system can be either ultrasonic or electrolytic with a degreasing agent such as caustic soda. In case of very dirty wire, a combination of ultrasonic and electrolytic degreasing in sequence gives exceptional results.

surface prior to plating. It is very important that the wire be perfectly clean before plating, in order to assure good bonding between the wire and the deposit. The cleaning agent in this case can be either electrolytic using a degreasing chemical or sulphuric acid or only chemical using phosphoric acid.

Multi-wire degreasing units for installation with plating equipment. These units are used to remove all wire drawing residues or burnt residues from the wire

MULTI-WIRE ELECTRO-PLATING LINES

FOR PRODUCTION OF COPPER, NICKEL, TIN, ZINC-PLATED WIRE AND OTHERS

GCR Eurodraw's long experience in building brass-plating lines for the steel tire cord industry has evolved into the design of multi-wire electro-plating lines for many other applications, including multi-wire electro-galvanizing lines for the production of staple wire, nickel-plating lines, copper wire electro-galvanizing lines and many more.

GCR Eurodraw has mastered a unique electro-galvanizing technique using insoluble anodes. This is achieved with a dissolution tank in which zinc pellets are dissolved into the zinching solution. Powerful pumps then bring the zinc-charged solution to the working trays where the zinc is deposited on the wire.

The system has many advantages compared to a traditional line using soluble anodes,

among which better wire coating concentricity and consistency as the solution is equally charged with zinc all around the wire and the zinc concentration is easily controllable.

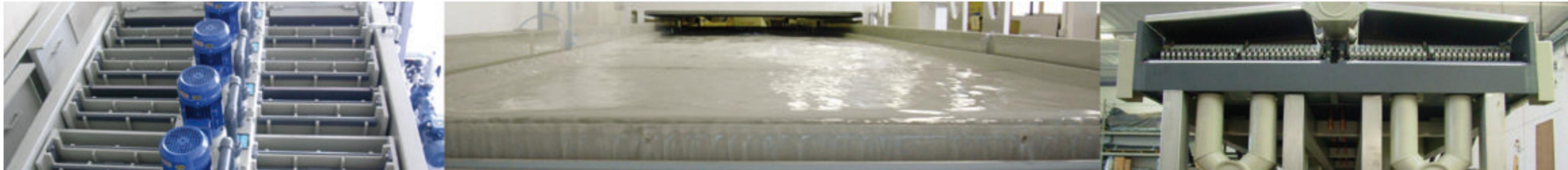
It is also possible to use a higher current density in order to increase coating weights at higher speeds. And maintenance is reduced to a minimum because there is no need to replace zinc anodes as they wear out, but simply to add zinc pellets to the dissolution tank as necessary.

The electronic controls are equally important on such type of lines. GCR Eurodraw can now offer new generation state-of-the-art rectifiers that ensure clean delivery of current with no fluctuations.

This translates into lower power consumption and better control of the coating weights and consistency.

GCR Eurodraw's unique supervision system gives an overview of all the line functions and allows operation in manual or automatic mode.

All pumps, pH meters, flowmeters, rectifiers, valves, temperature probes and fans are carefully monitored so that the operator is in full control of the line and of all the working parameters.





O.07

MONO-WIRE ELECTRO-PLATING LINES

HIGH SPEED LINES FOR APPLICATIONS WITH MAXIMUM PLATING FLEXIBILITY

GCR Eurodraw's expertise in multi-wire plating lines has been transferred to mono-wire lines as well. Mono-wire lines are generally not coupled with heat treatment systems and therefore can be operated at very high speeds, up to 12 m/sec.

Mono-wire electro-plating lines can be designed for production of galvanized wire, nickel-plated wire, tin-plated wire and also brass-plated wire for hose wire or tire steel cord. Specifically for the production of brass-plated wire, GCR Eurodraw has developed a quite unique high-speed diffusion system. The wire is pickled, copper-plated, zinc-plated and then heat treated so the zinc and copper melt together and form brass. The diffusion can be either by Joule effect or by induction heating.

Mono-wire lines offer maximum flexibility because they can be laid out in many different configurations, such as U-shape, S-shape or L-shape, making it possible to maximize factory space usage. An equivalent 12-wire line would require about three times the space of a mono-wire line with the same production capabilities.

The electronic controls are very important on mono-wire lines as well. Here too, GCR Eurodraw offers new generation state-of-the-art rectifiers that ensure clean delivery of current with no fluctuations; which translates into lower power consumption and better control of the coating weights and consistency. The GCR Eurodraw unique supervision system is also applied to mono-wire lines, to give an overview of all the line

functions and allow operation in manual or automatic mode. All pumps, pH meters, flowmeters, rectifiers, valves, temperature probes and fans are carefully monitored so that the operator is in full control of the line and of all the working parameters.

CHEMICAL PLATING LINES

FOR PRODUCTION OF BEAD WIRE AND CO₂ WELDING WIRE

Chemical plating lines are generally used to produce products such as bead wire or CO₂ welding wire.

GCR Eurodraw can supply both mono-wire and multi-wire chemical plating lines.

Essential to these lines are proper cleaning and activation of the wire surface prior to plating; and agitation of the plating solution.

To this end, GCR Eurodraw has designed unique wire cleaning systems (described in the cleaning section) and a recycling and distribution system so that the plating solution is properly distributed around the wire to assure consistent coating.

Mono-wire lines can be installed in-line with wire drawing machines because the operating speed is the same as that for wire drawing.



NOT ONLY A
MACHINERY MANUFACTURER.



KNOW-HOW, ACCESSORIES AND SERVICES

KNOW-HOW AND TECHNOLOGY FOR ELECTRO-PLATED WIRE

KNOW-HOW

GCR Eurodraw's long experience in the production of steel cord and other bare and plated wire products allows us not only to deliver equipment, but also to deliver know-how and guide our customers in the achievement of their production targets.

The GCR Eurodraw technical personnel has been trained at modern production facilities and are in full control of the latest plating techniques and wire surface treatments; as well as other processes for the manufacture of wire, strand, cable and rope products.

GCR Eurodraw expertise excels in tire cord, hose wire, bead wire and staple wire production where equipment, technology and know-how can be delivered by a single company without the need to share responsibilities among many vendors. GCR Eurodraw has also been manufacturing PC wire and strand lines for many years and, in addition, has built and jointly operated with its customers many complete turnkey PC strand plants.

The GCR Eurodraw team is composed of experienced mechanical engineers, chemists, process engineers and production management experts, all of whom are available to assist GCR customers whenever and wherever necessary.

ACCESSORIES

All GCR Eurodraw lines and machines can be supplied with a number of specific accessories either designed and produced by GCR Eurodraw or made by selected affiliated companies.

Pointers

Comapac produces a complete range of wire pointers suitable for the machines described in this catalogue.

Welders

GCR Eurodraw can provide wire butt welders suitable for every application, from high performance pressure welders with programmable annealers for high carbon rod for PC strand, to welders for low and high carbon fine diameter wire and strands; as well as welders equipped with grinders and shears.

Spool tilters

GCR Eurodraw can provide hydraulic spool tilters for every spool size.

Rolling cassette maintenance benches

A specific accessory for maintenance of DEM rolling cassettes is available as an option. The unit assures easy and precise roll alignment and easy dis-assembly and re-assembly of the cassettes.

Wire drawing accessories

Rotating dies, soap mixers, laser wire diameter gauges, GCR Eurodraw digital drawing data acquisition and supervision system, PROFIBUS machine-to-cabinet link, disc brakes on every block, wire presser rolls on every block, dustproof machine guards, water flow indicators and many more.

Die re-cutting and laboratory equipment

Through affiliated partners, GCR Eurodraw can provide all necessary die reworking equipment, as well as laboratory equipment for tensile and torsion testing and chemical analysis of pickling solutions and waste water.

SERVICES

GCR Eurodraw is not only a plant and machinery manufacturer but also provides production know-how and technology for PC wire and strand, steel cord, hose wire, bead wire, galvanized wire for wire rope and many other products.

GCR's long and varied experience in setting up turnkey wire production operations, and jointly managing the production with our customers during the start-up and commissioning phases, gives major added value to the project and ensures success.

AFTER SALES SERVICE

GCR Eurodraw is committed to total customer satisfaction. Our after sales service department is fully staffed with mechanical engineers, electronic engineers and process engineers that are able to solve any problems that may arise. Our spare parts service department is available to answer all spare parts inquiries, even for the very first machines ever built by the companies of the GCR Group.



KEY FACTS ABOUT THE GCR GROUP

In 1974 established as GCR Engineering SPA with the scope of designing and building equipment for the production of steel cord.

In 1982 acquired the company MILL, specialized in the production of wire drawing machines.

In 1988 established the company Eurodraw Srl for the production of straight through wire drawing machines.

In 1990 acquired the company OZ Cams and merged MILL and OZ Cams into Eurodraw.

GCR Engineering and Eurodraw work as a team for the supply of several turnkey steel cord plants in Europe, Asia, USA and South Africa; as well as supplying a wide range of equipment for different applications throughout the world.

In 1999 GCR Engineering is awarded ISO 9001 quality certification, further requalified in 2002 to VISION 2000 certification and now valid until 2011.

In 2002 GCR Engineering and Eurodraw Srl move to new premises.

In 2002 GCR Engineering and Eurodraw Srl merge into GCR Eurodraw to become one of the largest wire machinery manufacturers and with the widest production program.

In 2005 GCR Eurodraw opens a branch operation in China to consolidate its market position in the People's Republic of China.

In 2006 GCR Eurodraw is awarded construction of the largest PC strand operation in the Middle East, with a capacity of 100,000 tons/year.

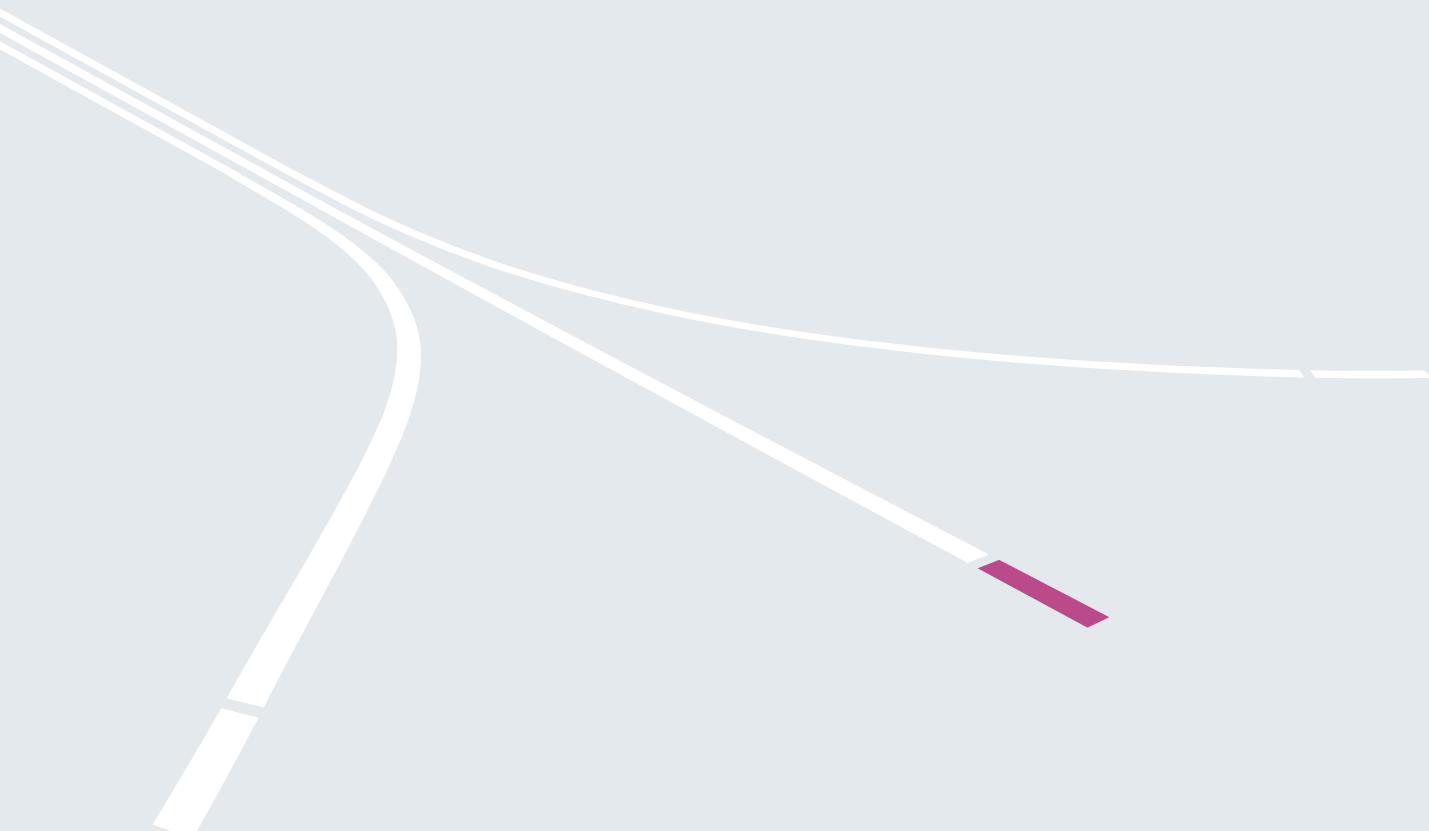
In 2007 GCR Eurodraw, in cooperation with EVG of Austria, purchases the company DEM located in Udine; with this acquisition the production program of the group also covers rolling cassettes and wire profile machinery.

In 2007 GCR Eurodraw purchases Comapac Wire Machinery Srl located near Lecco, a company specialized in the production of pay-offs and take-ups, competitive rolling machines and custom-designed wire drawing equipment for special applications.





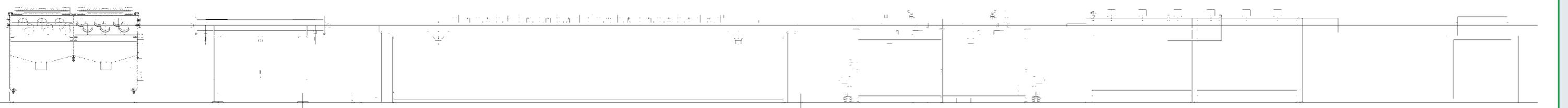
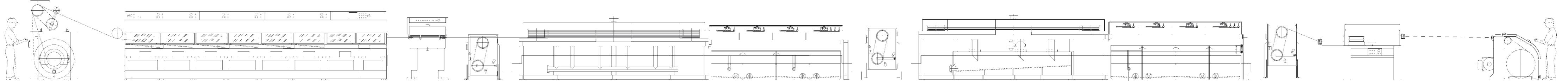
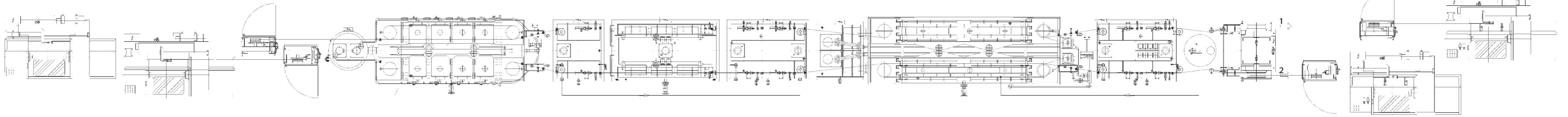
SURFACE TREATMENT LINES



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MULTI-WIRE PICKLING UNITS

