

Marking systems for cables

Optical Fiber Coding

A brief overview of marking systems used in cable manufacturing

The outer coatings of cables are generally marked by applying text to them giving details such as manufacturer's name, type of cable, dimensions, voltage or temperature limits, lengths in the form of meter marks, etc. On the other hand, marking of the wires usually serves the purpose of uniquely identifying the individual core of multicore cables, and generally takes the form of printed numbers (wire numbering) or coding with colored rings.

In the case of very thin products such as optical fibers, marking of the individual fibers is usually restricted to coloring of the surface, sometimes with additional coding in the form of colored rings.

Marking using printed text

Cable marking with printed text is carried out by embossing or ink printing. In the majority of cases rotary methods with marking wheels are used, as their simplicity and longevity are virtually unbeatable.

In the case of stamping, we differentiate between colorless stamping, where embossed or indenting engraved wheels roll along the cable, and color embossing, where embossed engraved stamping dies or wheels apply a layer of color to the cable from a colored tape, melting it to the outer coating in the form of characters. Colorless stamping is either applied directly to the cable insulation at the extruder outlet whilst it is still soft, or to the cold cable using heated embossing wheels. In this case it is not possible to achieve such high speeds.

Ink gravure printing

Etched printing wheels are employed for ink printing using the gravure method. The rollers are supplied with printing ink either by immersion or by an ink pump system.

After removal of any surplus, the ink remains in the etching in the shape of the lettering, which is then either rolled onto the cable directly or transferred to it by a soft intermediate rubber roller that makes it possible to achieve good printing quality on an uneven surface.

The term "offset" is usually used to describe this indirect gravure printing process, although it is technically incorrect.



High-speed gravure printing equipment is increasingly used for printing wires, and especially for numbering the wires of control cables. Tandem or sometimes revolving head machines are normally used in this application, enabling the appropriate printing wheels to be prepared on the inactive printing station. At the appropriate moment, an automatically controlled flying changeover takes place between one print run and the next.

The KS Series of Medek & Schoener comprises several precision-engineered gravure printing machines for marking hot or cold cable or wire insulation at line speeds of up to 1500 m/minute.

All gravure printers from Medek & Schörner can be extended with a range of Options for maximum flexibility.

High-speed tandem gravure printing machine from Medek & Schörner

Length marking

In many applications it is necessary to mark the length on cable insulations.



Apart from a support for exchangeable text dies, the embossing machines generally used for this purpose also have a length counting head in the marking wheel which is advanced after every revolution.

The circumference of the embossing wheel is one meter (or two feet for American customers), so that the length stamping head gives a continuous length measurement at appropriate intervals as the marking wheel runs along the cable.



Medek & Schörner FMS series high performance hot foil meter/footage markers print length marks in meter or feet sequence along with text, company logo, and/or any other user definable codes in user selectable colors on the cable jacket. Advanced AC servo drive systems are provided for extremely accurate length marking at speeds up to and above 150 mpm (492 fpm).

Medek & Schörner KMS series - Indenting or Embossing without Color: KMS meter markers for sequential length, easy-to-change text and code marking. KMS 1 meter marker installed immediately after the extruder to emboss onto the hot and soft cable jacket. Speed up to 300 m/min. KMS 2 with heated marking wheel for indenting on the cold cable sheath after the cooling trough. Speed up to 150 m/min.

NEW High performance Hot Foil Meter Marker FMS 5

Two modern marking methods have achieved particular importance: these are the ink jet machine and laser marking equipment. These processes allow the marking of text to be freely programmed, and therefore offer exceptional flexibility. However, there are certain limits to their use due to their comparatively low printing speeds (approx. 350 m/min as compared to up to 1,500 m/min for color gravure printing) and their restricted use with some cable surfaces. Laser marking equipment is hardly used at all in the cable industry at the present time due to its extremely high cost.

Ring marking

Ring marking of thin wires – especially control cables or telephone wires – involves spraying the marking ink onto the wire as it runs past through rotating jet wheels.

Since there are no limits to the frequency of oscillation of special ring marking machines with rotating jet wheels, they can keep up with the highest wire extrusion speeds normally encountered today.



The firm of Medek & Schörner has advanced the development of high-speed ring marking equipment thanks to innovative technology and the high-performance components developed by this market leader. Marking speeds of up to 2,500 m/min can be achieved. Fully automatic equipment makes it possible to change both colors and markings at the touch of a button.



The RS Series comprises precision-engineered, rugged ring markers for marking hot telephone or hookup wire at medium and high speeds. The RS 70 ring marker uses interchangeable dual marking drums and has been designed for extrusion speeds of up to 1200 m/minute. Four different versions provide a wide range of ring patterns in one or two colors.

The three versions of the RS 707 use rugged, interchangeable single marking drums for production speeds of up to 2500 m/minute. Both the RS 70 and the RS 707 allow single or two color marking of all standard ring patterns as well as custom patterns.



High-speed ring marker from Medek & Schörner

The RC 707 T Slim-Format ring marker has been specifically designed for use in high speed extrusion plants that provide little room between the extruder and cooling bath (foam skin plants).

Coding of optical fibers

The coding of optical fibers (optical fiber color coding) has also developed into an important area of cable marking technology. Similar to the production of enameled wire, the fibers are drawn through ink applicator heads with coloring dies and then dried. Today we use only UV-curable inks, which are dried by exposure to intensive ultraviolet light. Extremely high throughput speeds (up to 3,000 m/min) can be achieved with UV curable inks, and they also meet the latest environmental standards. The previously used paints were harmful to the environment due to the solvents they contained, and more importantly could also be detrimental to workers' health.

Equipment from Medek & Schörner for color coding optical fibers is noted for its high output, flexible modular design and ease of operation. The company's long experience in the marking and coating of optical fibers is reflected in an outstanding technological system that ensures gentle treatment of the sensitive optical fibers at all stages of processing. All components of the equipment are of modular design, and can easily be configured to form complete systems.



Offline Optical Fiber Color Coding System

Engineered to the highest standards, the GFP series is specifically designed to coat optical fibers with UV curable inks at speeds up to 3000 mpm (almost 10.000 fpm).

The GFP-UV coloring system comprises a fiber pay-off, coloring and curing units, and a capstan plus take-up unit. Single-line and parallel arrangements with up to six independent fiber lines can be offered.

Each model is equipped with Medek & Schoerner M550 high performance UV irradiators with permanent irradiation control and automatic adjustment for the actual curing demand. This allows optimum curing rates, compensates bulb aging and quartz tube deterioration and does additionally prevent thermal overload conditions for the fiber.



MS Austria designed UV irradiator unit M550

Fiber tension sensors ensure optimal fiber travelling conditions with minimum mechanical stress and minimum fiber oscillations. An automated reel flange detecting system and a winding supervision system offer a smooth and flawless fiber take-up with minimum operator attendance.

An optional RSJ add-on ring marking system allows the fiber to be marked with ink bands at speeds up to 800 mpm (2625 fpm).

Further processes for optical fibers

A process known as “tight buffering” is similar to the coloring of optical fibers, and involves applying a coating of crosslinked resin. Like the ink in color coating of the fibers, the resin is also applied by an resin applicator head and hardened by ultraviolet radiation. Thus a simple tool change makes it easy to adapt coloring units to this process. The tight buffering extension can easily be installed and allows process speeds up to 400 mpm (1312 fpm).

During the color coating of optical fibers, it is often necessary to carry out tensile testing at the same time (“screen proof test”), thereby eliminating a separate winding process. In this test the fiber is subjected to a specific tensile force that results in breakage of the fiber in the event of a manufacturing defect. The machine used to carry out this “screen proof test” can easily be incorporated as a separate component in existing coloring equipment.

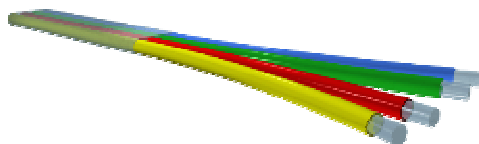
Fiber Ribbon Processing

Medek & Schörner also offers equipment for high speed fibre ribbon processing of up to 24 primary coated and colored optical fibers at maximum operational speeds of up to 1000 mpm (3281 fpm) and with excellent ribbon planarity. The horizontal design offers a simple and comfortable equipment handling.



Fiber Ribbon Processing Line FRP 05

In this application an appropriate number of fiber pay-offs are combined with a tape gluing head, a UV curing station, and a take-up – usually suitable for large spools. The tape gluing head is a tool that ensures precise positioning of the fibers as they run in and coats them with resin. The product is then hardened by exposing it to ultraviolet light before being wound up again.



„Fiber Ribbon“

Apart from the key process of coloring or coating, the common feature of all equipment for optical fibers is that the delicate fiber must be handled extremely gently during the entire procedure. It is necessary to avoid tight curves on the deflection rollers as well as fluctuations in tension, so the highly dynamic drive control equipment must be correspondingly sensitive. Perfect winding geometry and accurate tension control are essential when the fibers are wound up, as bad winding can produce defects in the fiber product that do not actually exist. Particularly with respect to these requirements, the firm of Medek & Schörner offers technological standards that have been raised to the highest level as a result of years of experience in this field.



The firm of Medek & Schörner was founded in the year 1929 by Josef Medek and Gustav Schörner to offer precision engineering services. For over 50 years now, the company has specialized in the manufacture of printing and marking equipment for extruded products such as wires, cables, pipes and sections. The product range extends from simple marking machines to equipment using the latest technology with fully automatic control systems for use in high-performance production plant.

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