DUPLEX®

HIGH TECH & TOP PERFORMANCE CALENDERING PLANT SUITABLE FOR FABRIC AND STEEL CORD RUBBERIZING PROCESS

DUAL PURPOSE 4 ROLL CALENDERING UNIT

HIGH TECH

SINCE 1885 Quality & Technology

INDUSTRY 4.0 AND IoT READY

COMERIO ERCOLE

MECHANICAL CONSTRUCTIONS SINCE 1885 - ITALY

QUALITY PROOF®
MADE IN ITALY

The necessity to produce high quality materials, the increase of productivity as well as the need of flexibility of the plant have led to a very significant technical evolution in the manufacturing process of rubber calenders.

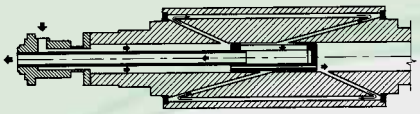
COMERIO ERCOLE is in a position to develop and manufacture equipment to obtain an increase of:
- flexibility to produce different materials on the same plant
- constant precision and repeatability of thickness and dimensional parameters of the calendered product
- product stability up to the wind-up as well product tolerances guarantee
- process cost saving and scrap reduction
- calender management as far as the production optimization and productivity increase are concerned

The **DUPLEX®** calender suitable for rubberizing of fabrics, fabric cord and steel cord in one passage is equipped with 4 rolls "S" arrangement, alternatively 45° or 30° configuration. The top (1-2) and bottom (3-4) rolls produce two rubber sheets which are immediately laminated , between rolls (2-3), on both sides of the product to be rubberized. Such a calender allows to produce simple or combined rubber sheets for big thickness and without problems of air bubbles. It is also possible to splice two different types of rubber batch. According to the production requirements the calender can be equipped with several adjustment devices such as: preloading, roll bending, cross-axis.

MAIN CALENDER FEATURES:

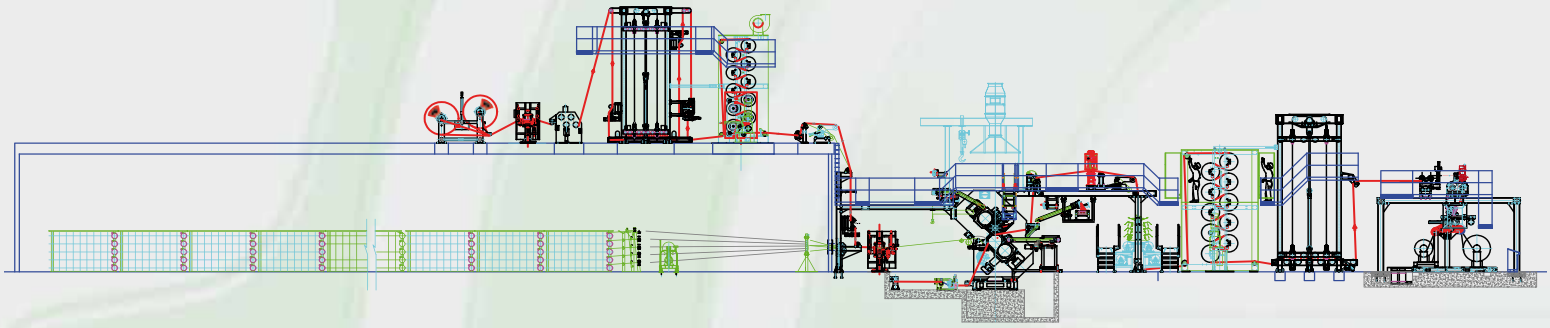
ROLLBLOCK®
STIFFNESS & CONTROL

Rolls: rolls made of compound cast iron with nodular core are normally used because they grant an higher rigidity than the traditional rolls made of chilled cast iron. High chromium cast steel rolls or forged steel rolls are also available for special application.



The working surface, which must be hard and free from porosity, is obtained by using a different alloy: this is possible with a "compound "casting. Cast rolls are worldwide 99% utilized in all running rubber calendering process due to better performances (grip) and longer life due to deeper hard surface. Even if strength of compound cast iron is just a little less than forged steel it is preferable and widely used because of cast iron molds and high content of carbon in spherical form which prevent sticking of rubber on the surface. All rolls are peripherally drilled.

Calender frames: the calender frames must support big stresses caused by the material under process between the rolls and they are subject to deformation when under load. **COMERIO ERCOLE** utilize FEM (finite element method) analysis for calender side frame engineering. The frames are manufactured using a material having a high elasticity modulus. The steel sheet fabricated construction system with proper stiffening ribs adopted, together with the distension treatment foreseen, grant the maximum rigidity together with the absence of distortions and vibrations.



The involved constructive solution allows the side frames to act only as supporting elements without interfering with the adjustment devices: as a matter of fact, all mechanical components are simply fixed to the frames. Beside the possibility of easy adjustment and optimization of all mechanical components in the effective process conditions, a very easy maintenance handling is also achieved.

Roller bearings: the standard of roller bearings engineered by **COMERIO ERCOLE,** to support the calender rolls, is based on special double row ultra precision tapered roller bearings "TRB" to grant maximum operating accuracy, easy maintenance accessibility and longer bearing life: particularly the possibility to adjust the radial clearance of the bearing in relation with the operating temperature of the calender without roll dismantling. Eliminating the roller bearing clearance, any possible roll oscillation is avoided. TRB bearings grant a radial run out less than 3 µm that in combination with the possibility to set the roller bearing clearance to zero grants a perfect longitudinal stability of the final product. Spherical roller bearing "SRB" or self aligning cylindrical roller bearing "SACR" are also available for different application and needs.

HYDROGAP®
SPEED & PRECISION

HYDRONIP®
SPEED&PRECISION FLEXIBLE CONTROL

Calender roll positioning device: the traditional roll positioning is the mechanical type. This mechanical system is not very accurate, it is slow to operate and it is subject to severe wear, jeopardizing the precision: this problem is evident when the system has to work in connection with automatic thickness gauge. The correcting feed back signals are short and very frequent so that the parts involved wear rapidly, severely jeopardizing the adjustment accuracy and causing hunting phenomena.

COMERIO ERCOLE in order to overcome all these inconveniences, based on long and deep experience, conforms its standard on a fully hydraulic device for calender roll position gap adjustment. Position repeatability +/- 2µm and a bearing block position accuracy +/- 5µm is granted. All this achieved with an emergency opening speed of 10 mm/sec and an operative adjustment speed of 1 mm/sec. In addition **COMERIO ERCOLE** introduced a further revolutionary development granting the possibility to switch on roll nr.2 from "position" control to "pressure/force" control and vice-versa during calendering process in order to achieve better and constant rubber sheet coupling by applied force control constantly controlling the contrast force according to the necessary coupling force.

RUBBER FEEDING – ROLLING BANK CONTROL:

The requirements for a good calender feeding process involve the following necessities:

BANCO® PLUS
AUTOMATIC ROLLING BANK CONTROL

- temperature constancy of fed rubber
- quantity constancy of fed rubber
- uniform spreading of fed rubber along the roll gap

In order to grant a proper automatic rolling bank control **COMERIO ERCOLE** introduced a basic configuration based of sonar sensors with a proper software package or, alternatively, a "plus" configuration based on digital camera and dedicated PC configuration elaborating virtual images representing each bank: the system provide a normal and a predictive software elaboration.

PRE AND POST CALENDER EQUIPMENTS:

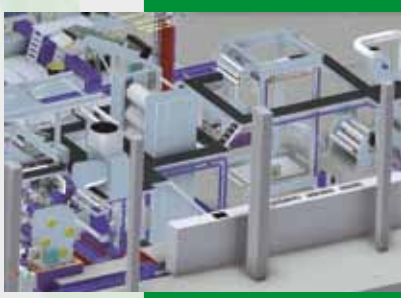
The pre and post calender equipment change according to the article to be produced. Nowadays an interesting plant combination normally named "dual purpose line" allows the rubberizing of either fabric or steel cord on both sides in only one passage optimizing the utilization factor of the plant. Here below common units usually considered in order to bring the material in a suitable condition for winding- up and for the following storage.

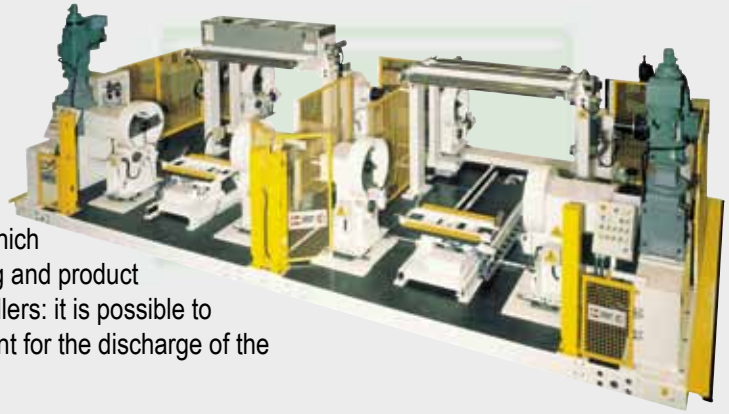
Edge trimming unit: different tailored configuration available for fabric and/or steel cord calendering process.

Preheating and Cooling drums tower: different tailored configuration available depending specific end user needs and environment conditions

Accumulator: different tailored configuration available depending specific end user needs

Transversal cutting and sample drawing unit: different tailored configuration available depending specific end user needs. **COMERIO ERCOLE** developed automatic devices for 90° cutting angles as well as, for special project, innovative adjustable cutting units 60°- 90°. Several special accessories and tools are available to cover all possible calendering process request.





Wind-up with liner let-off: different tailored configuration available depending on specific end user needs. Usually shuttle type is considered as standard which allows easy and safe liner loading and product un-loading. Storage of product rollers: it is possible to foresee an automatic management for the discharge of the finished product and liner rollers.

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PROCESS AND THICKNESS GAUGE CONTROL SYSTEMS

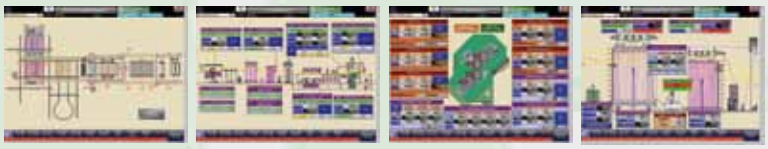
Since the functionality of the calendering line depends on the level and quality of the electric/electronic equipment, **COMERIO ERCOLE,** together with the major producers of electrical and automatic equipment, produce hardware and software systems for the management of a rubber calendering line where it is possible to reach the highest sophistication level and integration as far as the control and supervision level is concerned. The control and supervision system is also integrated with a thickness gauge system manufactured by reliable suppliers. Data collection with MES integration with dedicated packages are also available upon specific customer requirements.

DATI® DATA COLLECTION PLAN

ENGINEERING AND KNOW-HOW

SERVICING®

COMERIO ERCOLE is in a position to manage complete "turnkey" projects supplying engineering and technological know-how services suitable for the required production process.



Choose the Original Choose Success!

SYSTEM CERTIFICATION ISO 14001 SGS

SYSTEM CERTIFICATION ISO 9001 SGS

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MECHANICAL CONSTRUCTIONS

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