CLEXTRAL
Group

BIVIS PULPING PROCESSES AND TECHNOLOGY

Technology for a Changing World

An important step into the future of paper manufacture

BIVIS CO-ROTATING TWIN SCREW PROCESS

A truly remarkable development for the paper industry, Clextral BIVIS machines for pulp processing offer many advantages when compared to conventional pulp processing techniques. Improved product quality. Lower manufacturing cost. Higher process efficiency. Less waste. Paper manufacturers around the world have discovered that the Clextral BIVIS process is an essential tool to help them stay competitive.

Clextral developed the BIVIS paper process jointly with The French Paper Technical Center (C.T.P.) and leading French paper companies, applying proven twin screw extrusion technology used in the plastics, chemical, food and feed industries since the mid 1950's.

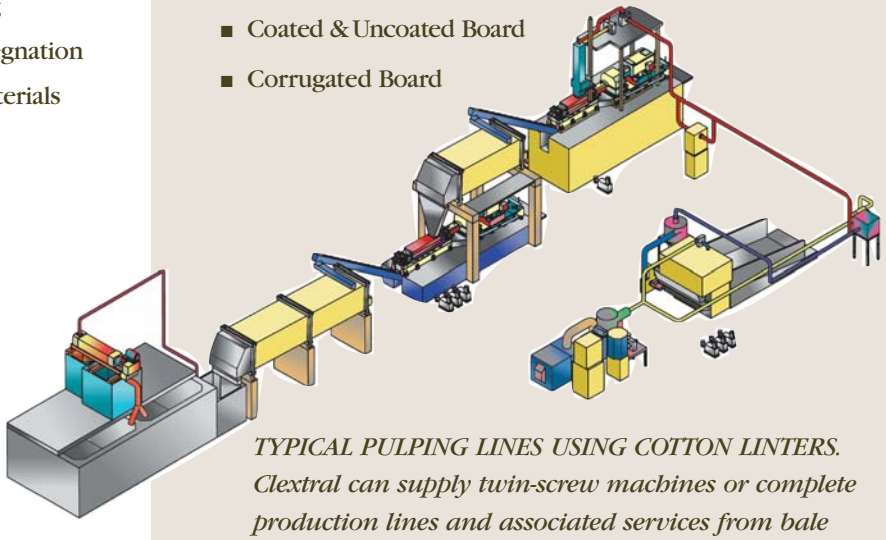
Simply defined, a BIVIS machine is: *a processing machine consisting of two identical co-rotating intermeshing self-wiping screw profiles operating within a closed barrel.* Yet, Clextral BIVIS systems offer much more. Since 1975, we have worked to achieve the highest levels of technology, expertise and practical know-how in BIVIS technology to help our customers reach their product goals.

Clextral BIVIS machines provide continuous, automated processing for:

- Wood Chip Defibering or Fiber Cutting
- Chemical Impregnation of Cellulose Materials
- Pulp Bleaching
- Pulp Washing

Clextral BIVIS machines process paper pulp, cellulose, wood and non-wood fibers for:

- Security Paper
- Special Grades
- Writing & Printing Paper
- Tissue
- Coated & Uncoated Board
- Corrugated Board
- Recycled Paper
- Chemical Applications
- Fiber Board
- Horticulture



TYPICAL PULPING LINES USING COTTON LINTERS. Clextral can supply twin-screw machines or complete production lines and associated services from bale opening through pulp refining.

PULP and PAPER BIVIS PROCESSES

The Clextral process offers important advantages:

- **Optimum pulp quality**

  The continuous mixing and kneading actions of the dual screw machine ensure fiber separation, chemical treatment and washing for top quality pulp.

- **Low processing cost**

  Compared to conventional pulping processes, the BIVIS process requires:

  - 20 - 50% less energy for wood defibering or fiber cutting
  - 10 - 33% fewer chemicals for bleaching and chemical treatment
  - Less people to operate the line

  Most importantly, the process produces **30% to 90% less effluent**, minimizing treatment costs and offering a green alternative for paper manufacturers.

- **Reduced processing time**

  The BIVIS continuous process replaces many individual steps in conventional pulping lines, reducing processing time.

- **Compact turnkey installation**

  A typical BIVIS line includes:

  - A Wood or Fiber Preparation
  - A Pulping Section
  - A Refining Section

- **Less civil engineering costs**

  BIVIS machine as well as complete pulping line require reduced civil engineering.

Staff training is one of the many services offered by Clextral to ensure the optimization of the pulping equipment.

- **Wide selection of raw materials**

  A wide range of raw materials are successfully processed into high quality pulp using the Bivis process. Raw material sources include:

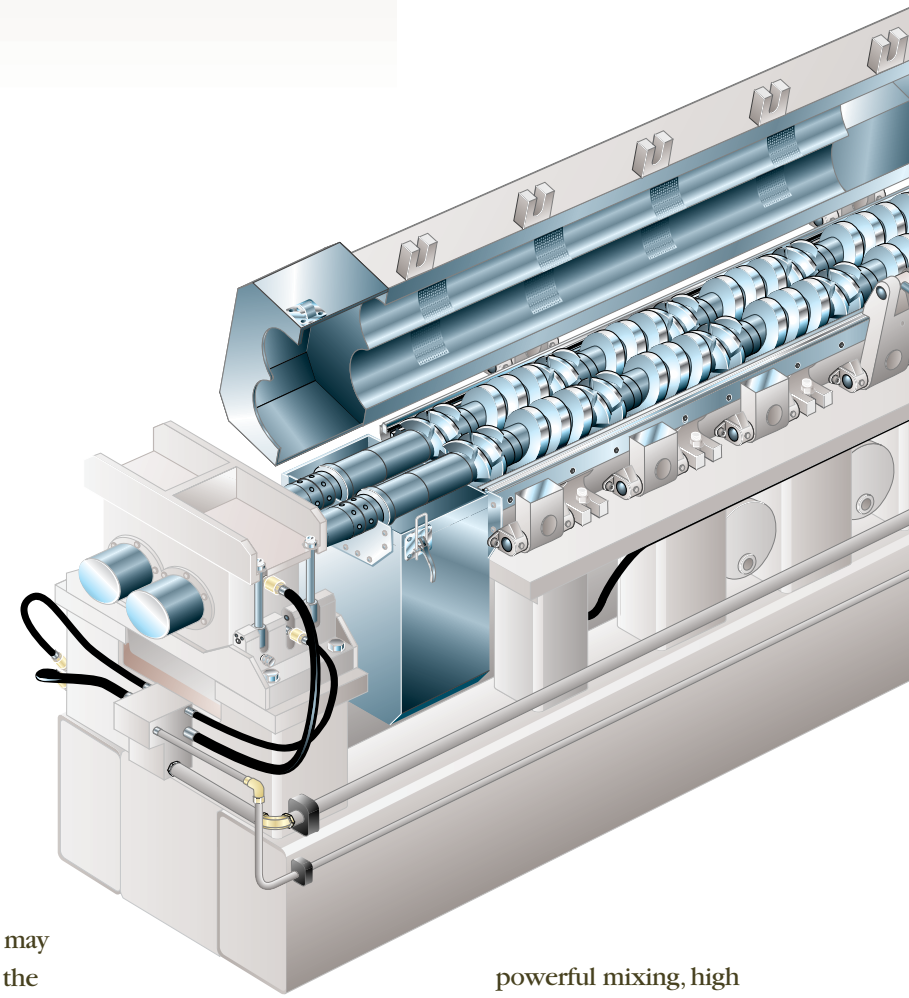
  - Softwood
  - Hardwood
  - Cotton fibres
  - Hemp
  - Flax
  - Sisal
  - Cellulosed fibres
  - Wheat or rice straw
  - Kenaf
  - Bagasse
  - Jute
  - Oil palm tree fibres
  - Sorghum
  - Other non wood materials
  - Recycled Fibers

- **Wide range of Bivis machines**

  - Capacity: 50 to 5,000 BDKg/h
  - Motor Power: 50 to 2,000 KW

Clextral offers complete pulping lines which include all equipment, installation, start-up and training to ensure that each processing machine produces the required pulp quality.

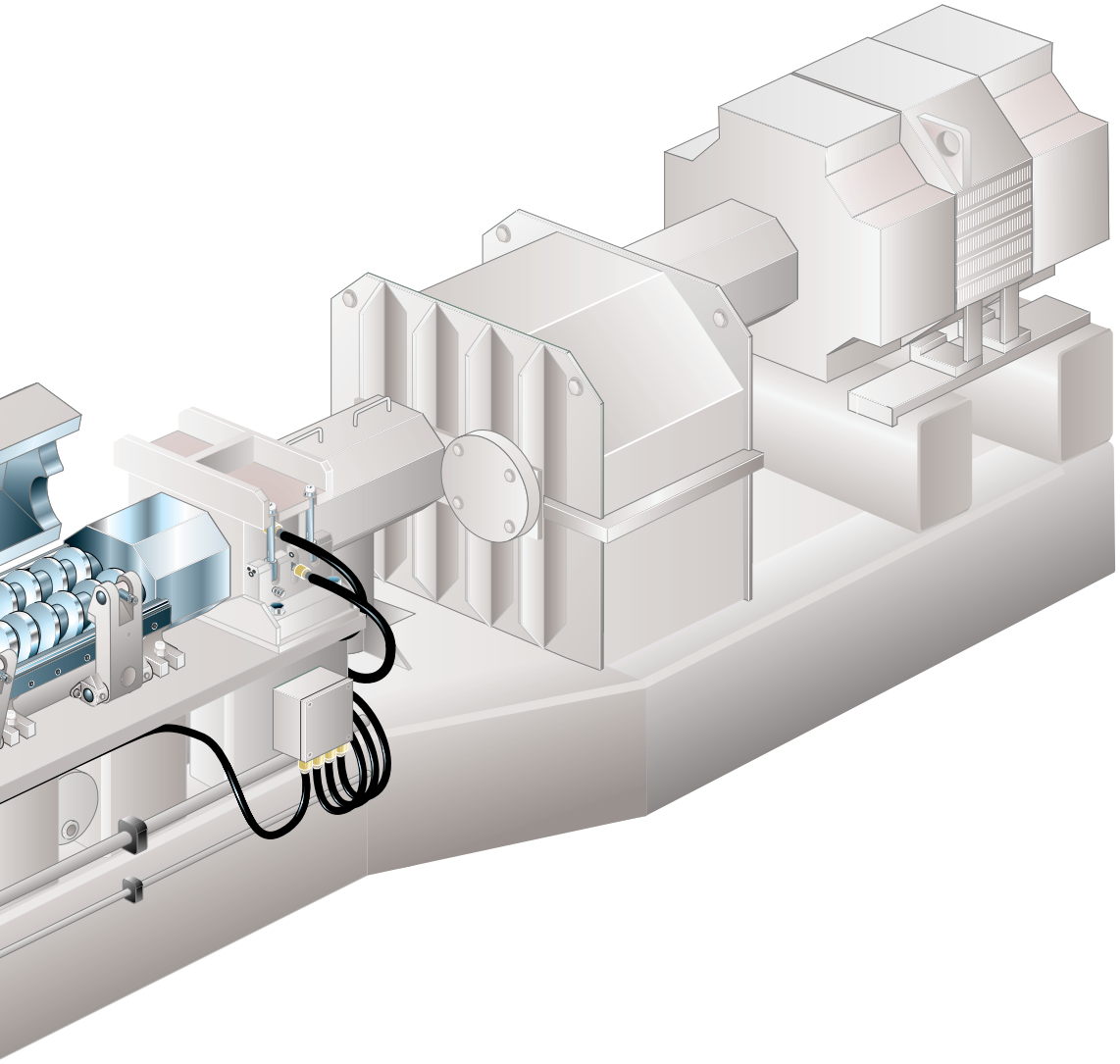
A practical application of a proven technology



Wood Defibering / Fiber Cutting
Using a combination of reverse screw sections with varying geometries, the BIVIS machine efficiently processes wood chips, non wood fibres, textile fibres, recycled fibres, virtually any cellulose raw material, to achieve optimum fibre separation or fibre cutting depending on the raw materials. The highly efficient BIVIS system uses a fraction of the energy required by traditional processing equipment.

Cooking, Chemical Treatment and Chlorine Free Bleaching
Treatment of material with chemicals and bleaching agents is easily and efficiently accomplished by the BIVIS machine. The high consistency of the material, plus the combined actions of temperature and pressure, accelerate the chemical reactions. Liquids or gases may be injected into the barrel at specific areas. The highly efficient BIVIS process greatly reduces the volume of chemicals required and dramatically lowers the volume of effluent to be treated. Bleaching to attain maximum brightness is accomplished without the use of chloric agents; sodium hydrosulfite and hydrogen peroxide achieve optimum results.

Efficient and Thorough Washing
After chemical treatment, it is necessary to eliminate the dissolved organic and mineral matters from the pulp. The BIVIS machine performs pulp washing in several stages. Washing water is injected through the BIVIS barrel. Direct washing or counter flow washing may be performed. Due to high pressure treatment and powerful mixing, high efficiency washing is obtained. Effluent is forced through filtered openings in the barrel. For certain products, such as chemico-mechanical and semi-chemical pulps, both washing and defibering may be performed simultaneously. The high consistency process requires less water and produces significantly less effluent.



A Superior Processing Machine

The main functions of the BIVIS machine are:

- Transport
- Mixing
- Compression
- Kneading or Shearing
- Expension
- Fluid Injection or Extraction

In order to perform these continuous functions most efficiently, the BIVIS machine's processing parameters must be precisely set and regulated. Screw configuration, rotation speed, filling ratio, feed rate, mechanical energy, chemical agents are accurately measured and controlled to assure constant product quality throughout production.

Built for performance

Clextral BIVIS machines' powerful screw action is provided by the direct drive power transfer from the variable speed motor through a gear box reducer. The barrel which houses the screws is a split design, with horizontal mating device which provides a secure seal. Barrel and screw metallurgy options provide solutions for virtually all industrial applications, from standard hardened steel to special industrial alloys that are proven to withstand the most abrasive and corrosive processing conditions. Easy to remove barrel liners provide an economical solution to barrel wear.

Flexible Design

The modular design of the BIVIS machine makes it very flexible for specific requests or for changing requirements. Multiple cellulose materials may be processed on one machine by adapting the screw profile, the barrel equipment and process parameters. Throughput volume is adjusted by setting new production parameters on the control panel.

FROM ONE MACHINE TO TURN KEY PROJECTS

Clextral is your reliable source for BIVIS processing systems. Our offer includes:

- Process engineering and design
- Total project management
- CAD equipment configuration
- Process and technical assistance
- Staff training
- Automation control including hardware and software
- After Sales Services

Scope of supply:

- BIVIS machine
- Stock pumps
- Dilution tanks with agitators
- Wood chip or fiber preparation units
- Feeding systems
- Densifier
- Metering pumps
- Screw press
- Pulp chests
- Retention tanks
- Compactor unit
- Screens
- Refiners
- Other equipment as required

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