



Aluminium Foil in Pharmaceutical Application

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P.Anil Kumar

Aluminum is a lightweight, silvery white metal of the main group IIIa, which is the Boron Group

Atomic Symbol is Al

Atomic Number is 13

Molecular Weight = 26.98

Al is formed at 900 degrees C

After formation, Al has a melting point of 660 degrees C

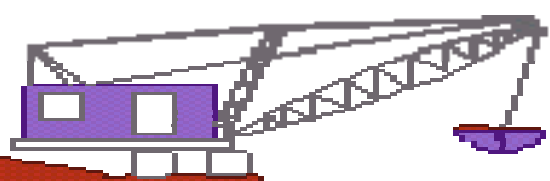
Aluminum is the most abundant metallic element in the Earth's crust

Most widely used Nonferrous metal

Aluminum does not occur naturally in nature

Aluminum ore is most commonly Bauxite

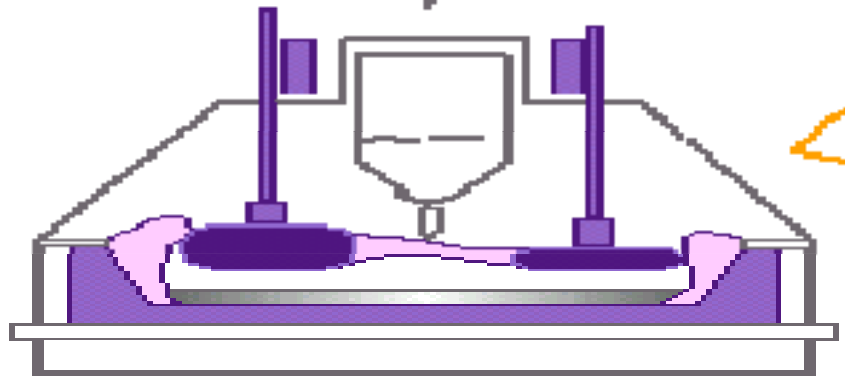
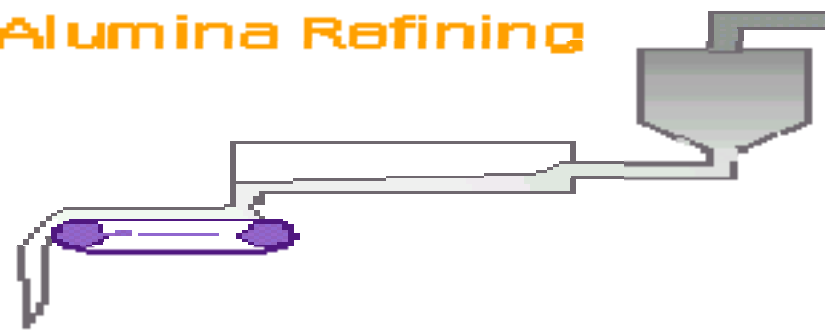
Aluminum is found in the outer 10 miles of the earth's crust



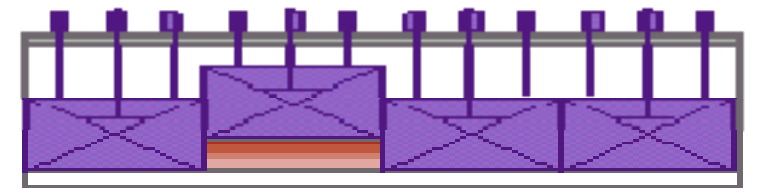
Bauxite Mining



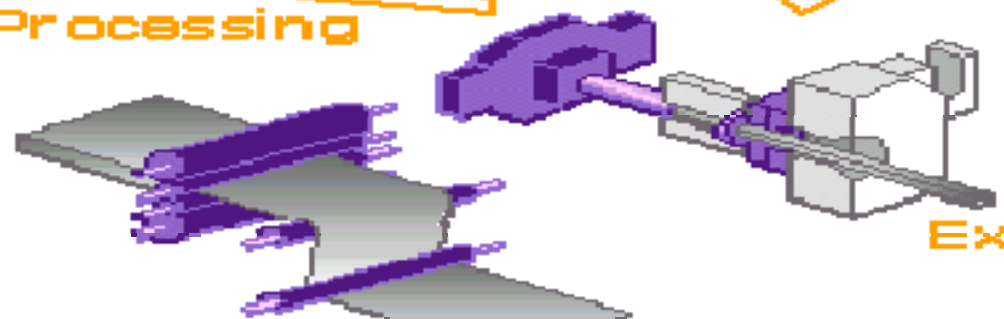
Alumina Refining



Aluminum Smelting



Processing



Extrusion

Recycling

Aluminum is used extensively for the protection, storage, and preparation of foods and beverages

Aluminum foil can be used to cook and preserve food

Aluminum cans provide strong, lightweight, easy to open containers for many different beverages

Major application of aluminium foil is in the pharma industry for packing tablets / medicines

te disposal

> Recycling

> Aluminium: 100% recyclable



> Endlessly and without loss of quality

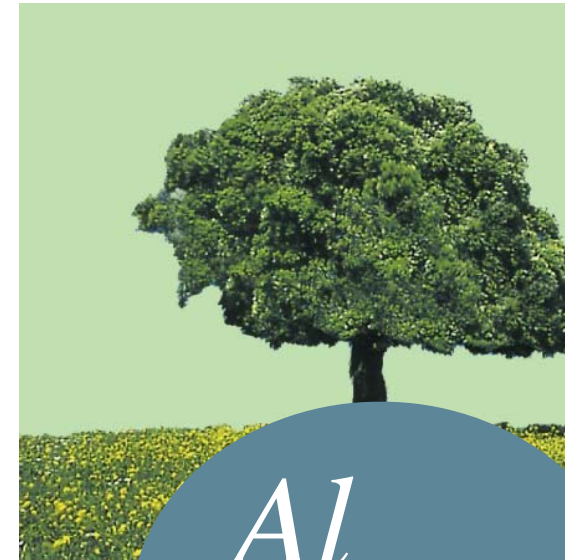
> Energy recovery

> Typical calorific gain: 25MJ/kg

> (for thickness $<50\mu\text{m}$)

preventive action through reduction at source

minimisation of the quantity of material, energy and waste at the
different stages of the product/packaging life



Al

3rd element
of the Earth's
crust

I Rolling :

➤ **Cold Rolling** : A typical reduction of around 50% is employed in each stage

- Foilstock is reduced to a light-gauge foil(7 micron) in 4 to 6 passes
- **Pack rolling – “Double foil rolling”**

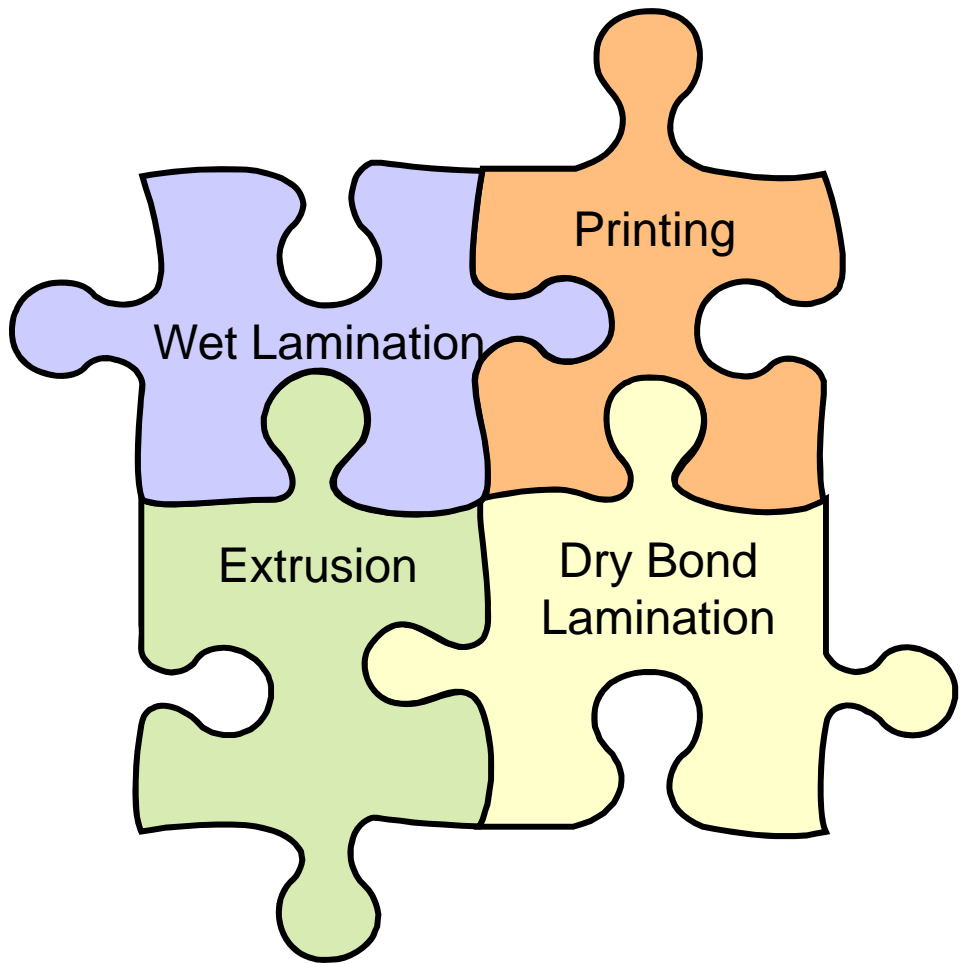
For finishing a thickness of 40 microns and below ,

- o Typically two layers of foil are rolled together , with a very thin film of ro sprayed in between .
- o The characteristic of such rolling will be "one side bright – one side matt" finish
- **The foil can be produced either in "as-rolled" or in the "soft" temper**

Annealing: To obtain "soft" foil, it is annealed at a temperature of a °C for a prolonged time to

- o Allow the grain structure to recrystallise and ,
- o To remove the rolling lubricant from the surface by evaporation.

71 Major Raw Materials



Slitting

100 Major Types of RGF

33 Product Categories with 103

Major Raw Material – Foil Stock

Alloys in AA 1235 (Light Gauge between 7 mic. to 20 mic.)

Alloy AA 8011 for Medium gauge rolling above 20 mic

Alloy AA 8079 for specific customer requirements (lower pin hole count, UTS etc.)

AA 8006 & 3003 for SRC Rolling

**Poly Granules and Poly Film for lamination with Foil for
Pharma products.**

Resins for Heat Seal Lacquer (Blister Foil)

**Paper for lamination with Foil for Non Pharma Products
(Cig. / Confec etc.)**

Solvents – Acetone / Ethyl Acetate / MEK etc.

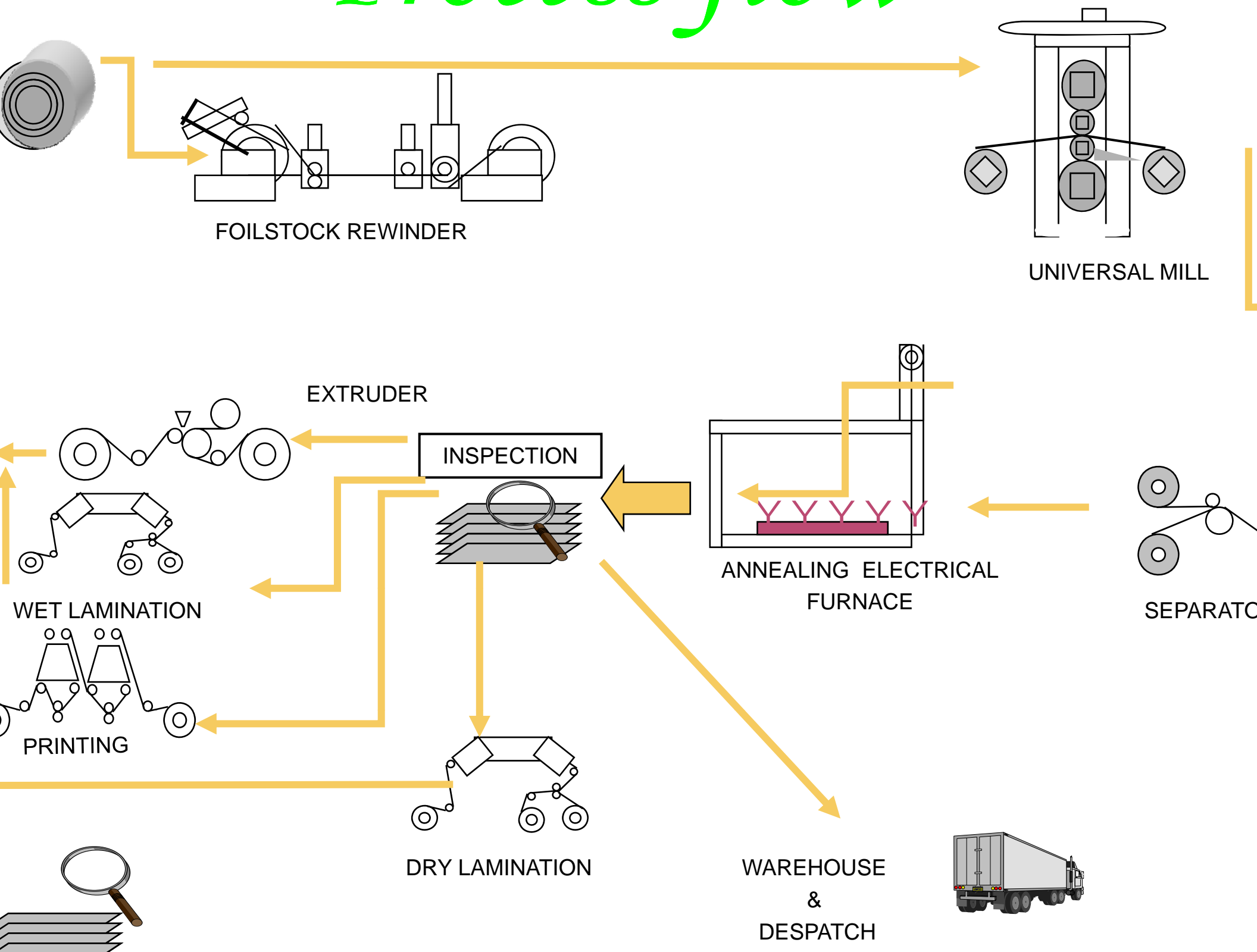
Inks for Printing applications



Manufacturing Process

Aluminium Foil

Process flow





This Operation has two features:

1. To rewind the foil stock from steel core/card board to the mill spools.
2. To observe the top and bottom surface of foilstock for visual defects.

Foil Stock Sourcing from Sheet P

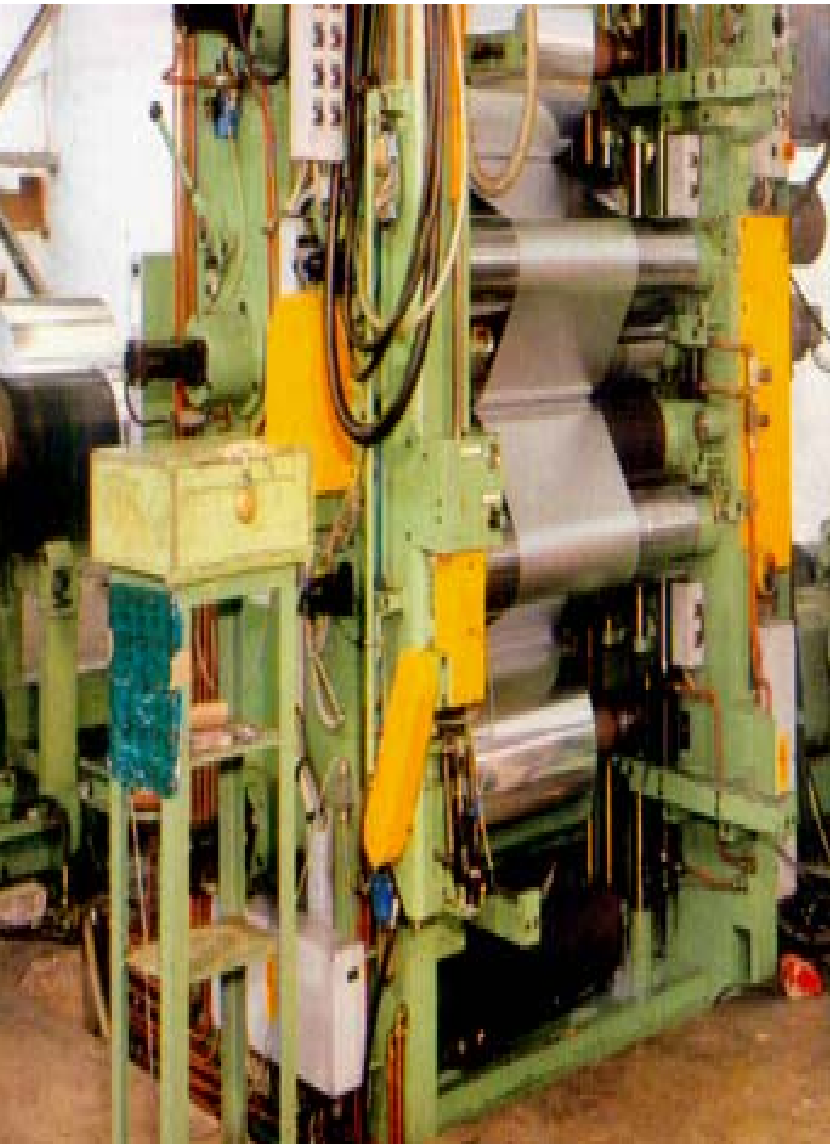


The main function of the mill is to reduce the thickness. This can be done either in single sheet or by pack-rolling.

According to the customer's specifications the thickness is reduced in many passes.

The rolling mill capability is a maximum of 200 mic to a minimum of 1 mic.

Rolling Oil is used for lubrication and cooling.



Through this machine Aluminium pack roll is separated to 2 rolls of individual

According to customer requirement, it is being slitted and rewound into the foil of specified sizes.



After the Separator, the foil comes to an annealing furnace which gives softness and removes the oil present if any.

Approx. 10 tons of foil could be kept in a single furnace.

After annealing the foil is cooled .

There upon foil is used for a customer's requirement.



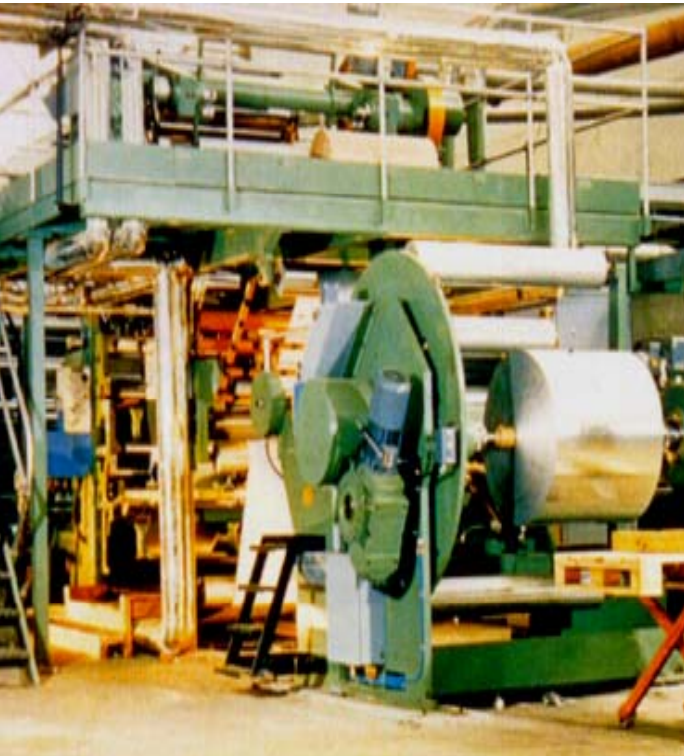
To laminate any two substitutes through
Dry/Wet lamination and
Lacquering/Coating.

To laminate any two substrates through
lamination process and Lacquering/
Coating.

Blister Foil is coated with Heat Seal Lacquer

per lamination on foil done for Non Ph. applications

Extruder



To laminate two substances. LDPE granules are used as an adhesive.

This forms a sandwich lamination in 1 wash of both sandwich laminate and plain laminate. Its also a kind of lamination with poly

Online trimming and automatic splicing are done.

Ex: 30 micron foil /LDPE film/poly fi

45 Gsm kraft paper/15gsm poly/0091



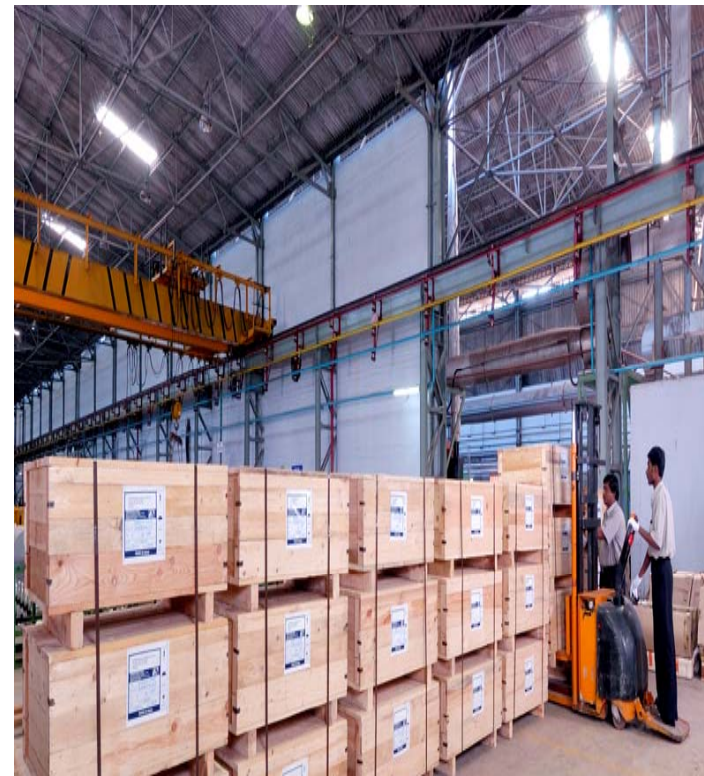
- **Done on Printing machine**
- **Primarily for direct Pharma House**
- **Machine's generally have auto registration facility.**



The Purpose of slitting machine is to slit the material as per Customer requirement like width of the reel, weight of the reel and outer diameter etc.

The purpose of Doctor winding machine is to eliminate any defective portions noticed during the slitting operation.

- Wooden
- Pallet
- Loose
- Corrugated folding cases cartons





Pharmaceutical Application

Aluminium Foil

Barrier Property : Aluminium Foil has a total barrier to light, oxygen, moisture, gases, vapour and liquids

Mechanical properties:

Aluminium Foil is strong and can be laminated with other materials.

Through usage of varied alloys, aluminium foil can be given a range of characteristics which make it suitable for lidding or, sealing of containers or, trays for tablets.

Due to its 'deadfold' property, collapsible tubes made from aluminium foil laminates do not, when squeezed, draw air and moisture into contact with the product.

Hygiene and safety: Aluminium Foil does not harbour bacteria. It can be supplied in a fully sterile condition. The foil is generally produced in hygienic 'clean-room' facilities. Aluminium foil can also be supplied with tamper evident features such as counterfeit security, holograms etc.

Sustainability: Aluminium foil is light weight and minimises the amount of packaging material needed. This helps to preserve valuable pharmaceutical products. Aluminium can be repeatedly recycled at a fraction of its original energy cost.

er Pack : This is essentially a foil, which is given a coating of Seal Lacquer medium on one side and the same is laminated to a PVC tray which will contain the tablet or capsule. It essentially has a trough technique. Modern developments in this foil include Child Resistant Blister packs to provide more secure access.



Pack : This foil is essentially laminated with plastics or, paper. A key requirement is that it should be easy to tear open. The foil properties of flexibility and deadfold characteristic are important in these applications, allowing the metal to closely conform to the shape of the tablet. Strip packs provide very high chemical barrier performance.



Sachets and Pouches :
Aluminum foil is laminated in sachets form and it provides an effective packaging solution for various products whether in powder, granules or liquid form. Large foil pouches are also used to store, transport and dispense sterile products used in the hospital environments. The sachets keep the product in good condition for long periods. They withstand rigorous tests and are convenient



ures : The foil is laminated paper or plastic and is used heat sealed membrane automatically closing the container, usually under a screw cap. Localised heat needed to start the sealing process is generated by an electrical induction process after the screw caps are applied on the filling and sealing line. The resulting sealed membrane provides



Flexible Tubes : Aluminium is used as a key component in foil laminates. Apart from providing excellent barrier performance to protect sensitive creams, the foil offers the advantage of 'deadfold'. This means that a tube made from a foil laminate can be designed not to 'spring back' when squeezed and so draw in ambient air and contamination into the tube.



Confectionary :

Aluminium foil is laminated with waxed paper and waxing is done for the safe storage of chocolates.

Alternatively, the paper is of moisture proof in nature, which does not allow the content to come in contact with the paper and this results in the safe storage of confectionary product.



Visible Ink :

It is printed with UV
visible ink on certain
-determined positions.

Printing not visible to
naked eye .

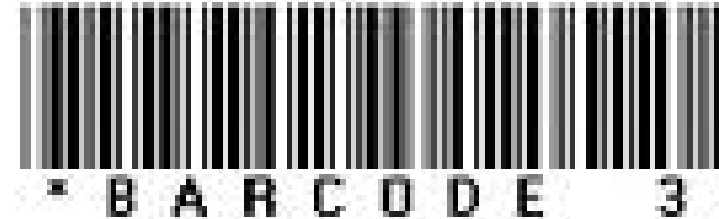
This printing will be visible
only under UV light and
with this, it is possible to
detect any counterfeit
product in the market.



Codes / Holograms:

Each surface has unique
codes – Each strip will
have a different code,
which can be detected
by the manufacturer.

Other measures include
-Hologram, usage of
special inks while printing
show varied colours at
different angles.



Thank you

