Presentation On Knitting Machine

Definition

- The knitting machine incorporate and coordinates the action of a number of a mechanisms and devices each performing specific functions which contribute towards the efficiency of the knitting action.

The main features of knitting machine:

- The frame according to the needle bed shape.
- The machine control, and drive system coordinates the power for the drive of the devices and mechanisms.
- The fabric take away mechanism includes fabric tensioning, wind-up and accommodation devices.
- The quality control system includes stop motions, fault detectors, automatic oilers and lint removal systems.

Parts Of Knitting Machine

- **Machine Frame** :- it is the frame which holds various parts. It provides support for majority of machines.

- **Knitting elements**
- Needles
- Gauge
- Sinker
- Cam

NEEDLES

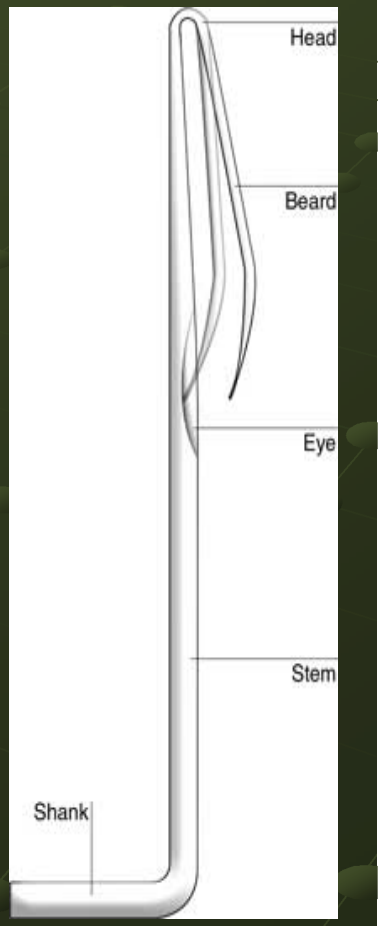
- There are three types of needles in common use today in knitting industries:-
- **BEARDED NEEDLE**
- **LATCH NEEDLE**
- **COMPOUND NEEDLE**

BEARDED NEEDLE

- Bearded needle is the cheapest and simplest type to manufacture.
- It is made from a single piece of metal.

There are five main parts:-

- The ***stem*** around which the needle loop is formed.
- The ***head*** where the stem is turned into a hook to draw the new loop through the old loop.
- The ***beard*** which is the curved downwards continuation of the hook that is used to separate the trapped new loop inside from the old loop as it slides off the needle beard.
- The ***eye*** or groove cut in the stem to receive the pointed tip the beard when it is passed, thus enclosing the new loop.
- The ***shank*** which may be bent for individual location in the machine or cast with others in a metal lead.



Knitting Cycle of Beard Needle

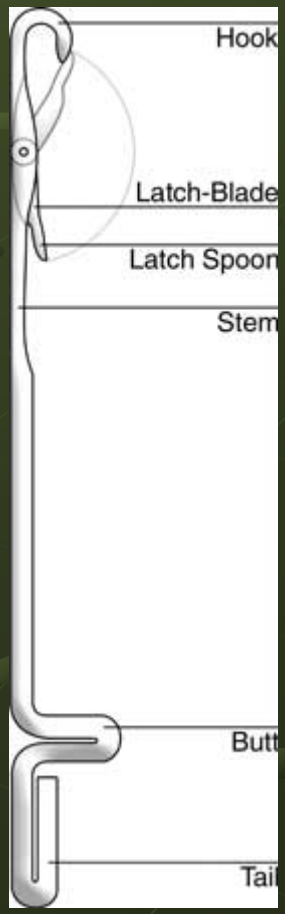
- Running Position
- Feeding Position
- Clearing Position
- Needle Closing
- Knocking Position

LATCH NEEDLE

- The latch needle was developed in the mid 19th century (1849) and compared with the bearded needle.

The needle consists of six main parts:

- **Stem** – Used to hold the course of old loops
- **Hook** – The hook is used to catch a thread and form loops.
- **Rivet** – Holds the latch in place and allows it to pivot.
- **Latch** – The latch combines the task performed by the presser bar and the beard of the bearded needle.
- **Butt** – The butt enables the movement of the needle to be controlled by a cam mechanism. A track raises and lowers the needle.
- **Tail** – Used to provide support to the needle

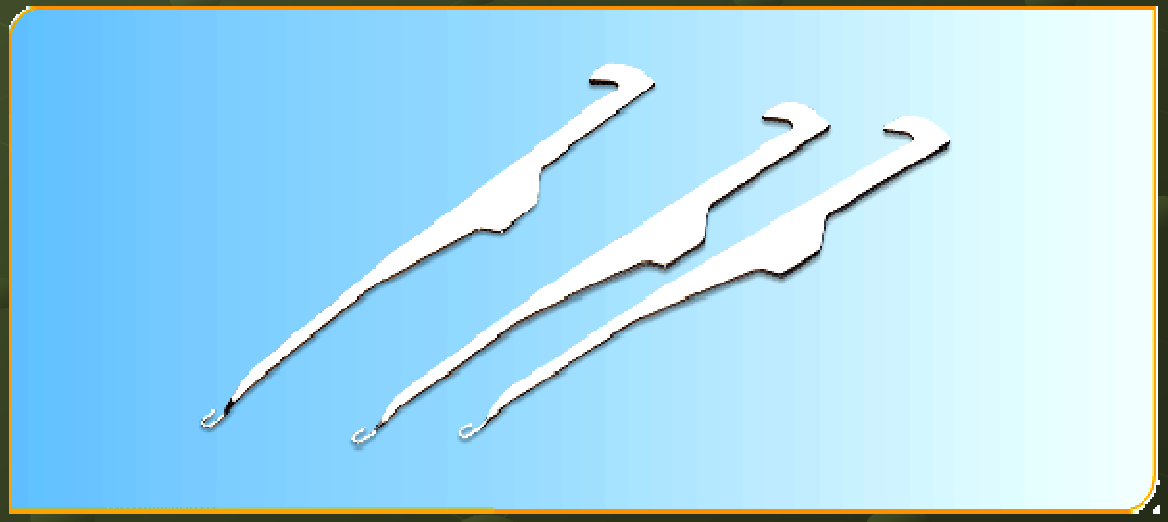


Knitting Cycle of Latch Needle

- Running position
- Latch opening
- Clearing height
- Yarn feeding and latch closing
- Knocking over

COMPOUND NEEDLE

- Compound needle consists of two separately control parts i.e, the hook and closing element.
- This needle is more complicated than other needles.
- The two parts rise and full as a single unit but at the top of the rise the hook moves faster to open and at the start of the fall hook decants.

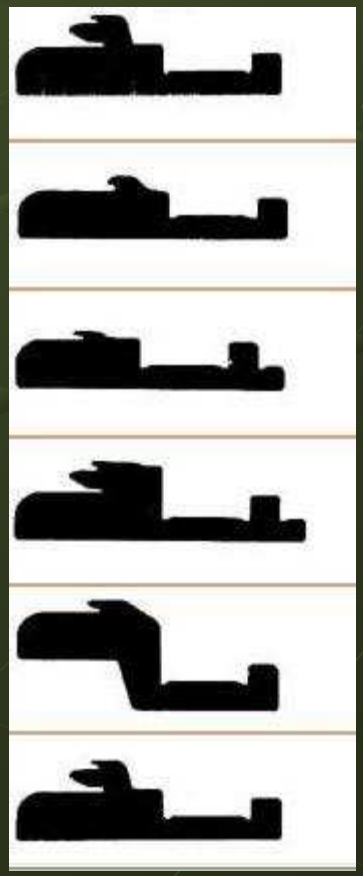


Machine gauge

- Gauge is the term used to describe the needle spacing, which can be defined as the number of needles per unit length.
- If two sets of needles are used (double jersey machines) the second set is not taken into consideration in determining the gauge of the machine.
- There are three chief systems for representing the machine gauge: Needles/inch, Needles/1.5 inch and Needles/2 inch.
- The gauge is the major factor in determining the fabric density and appearance. Finer gauge machine, knits wider fabrics as more wales are available. There is a direct relationship between the gauge and yarn count to be used on that machine.

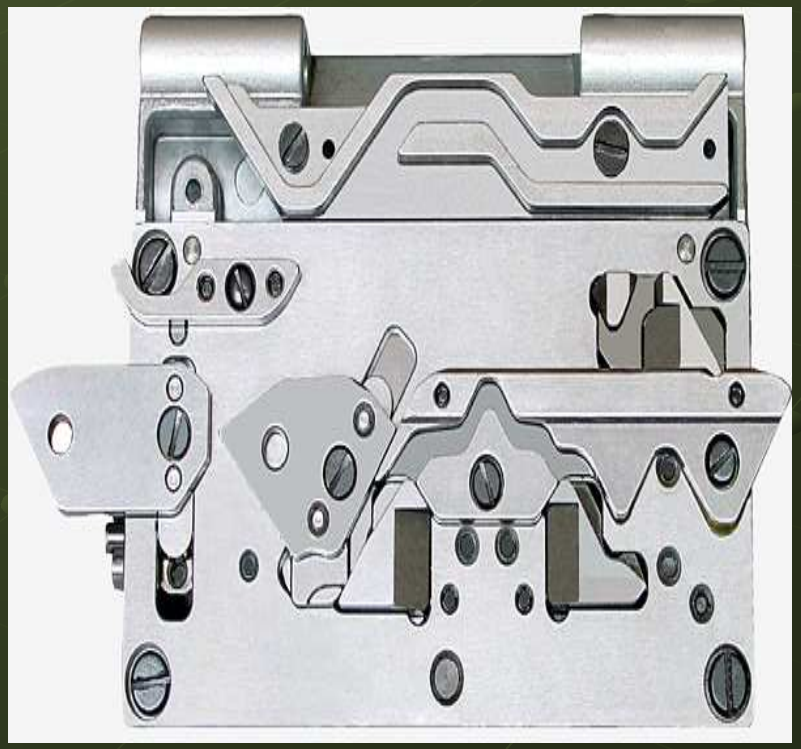
SINKER

- The sinker is the second primary knitting element. It is a thin metal plate placed between the two adjoining needles and has a collective edge.
- The sinker is placed at 90 to the needle.
- The main function of sinker is loop formation. It may perform one or more function.



CAM

- The upward movement of the needle is obtained by the rising cams.
- Cams controlling the downward movement of the needles are called stitch cams.
- Guard cams keep the needle butts in their race way.
- Running cam up throw cam keep the needle butts at a low level until they meet the next rising cam.



Two Types of Knitting Machine

- Weft Knitting Machine
- Warp Knitting Machine

Weft knitting machine

- Fully Fashioned Machine
- Flat Knitting Machine
- Circular Knitting Machine
    1. Single Jersey
    2. Double Jersey

Fully Fashioned Machines

- Bearded needles are used which are set into a straight-bar in a long row and the entire bar is reciprocated by rotary cams which causes the knitting action.
- Fully Fashioned machines only have one set of needles and therefore can only produce plain knit fabric, making it necessary to produce the welts/cuffs on special ribbing knitting machines.
- The ribs are held on “running-on” bars and are either transferred on to the Fully Fashioned machine by hand or automatically depending on the age of the machine.
- The patterning capability of Fully Fashioned machines is limited to plain knit fully fashioned panels. Machines with stitch transfer and intarsia capabilities can create the well known “argyle” styles.
- The gentle knitting action of these machines allows the use of delicate fine count woollen spun yarns and also enables the machines to run faster where possible giving good knitting efficiency.

Special Features

- Machine gauge : normally 21-30 needles per 1.5 inch

- Machine width : from 2 to 16 section machines, each section up to 36 inch wide
- Needle type : bearded and latch
- Needle bed type : single and rib
- End – products : jumpers, pullovers, cardigans, dresses, suits, trouser suits, fully fashioned hose, under wear, sports shirts, thermal wear.

Flat Knitting Machines

- Sometimes referred to as “Flatbeds” or “V-beds” due to the nature and arrangements of the knitting beds where two opposing needle beds are positioned so that the upper ends form an inverted “V”.
- Needles slide up and down the beds in slots known as “tricks” and in this case the gauge refers to the number of needles per 1 inch.
- The carriage or “cam box” traverses across the needle beds and selects needles to be knitted as it reciprocates side to side.
- stitches can be passed from one bed to the other and the beds can be moved linearly in relation to each other. This not only allows panels to be shaped, but it also opens up extensive patterning possibilities using stitch transfer,.

Special Features

- Machine gauge : normally 5-15 needles per 1.5 inch
- Machine width : up to 78.7 inches
- Needle type : Latch
- Needle bed type : single, rib and interlock
- End- products : jumpers, pullovers, cardigans, dressed, suits, hats,

Circular Knitting Machines

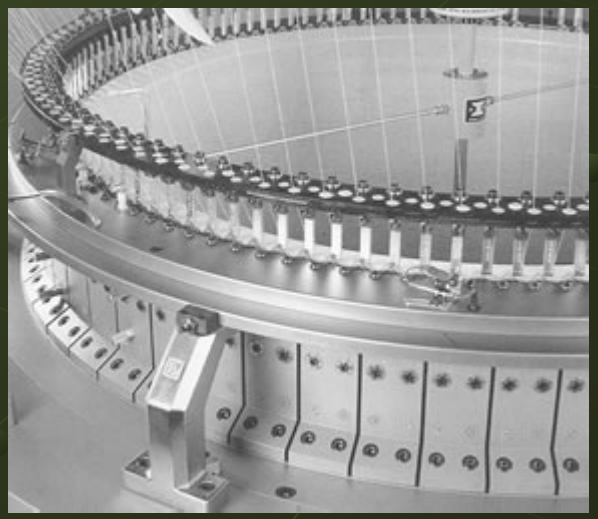
There are many types of circular knitting machines which produce long lengths of tubular fabric and quite often they are manufactured with very specific end uses in mind.

Two types of machine

- Single Jersey Machine
- Double Jersey Machines

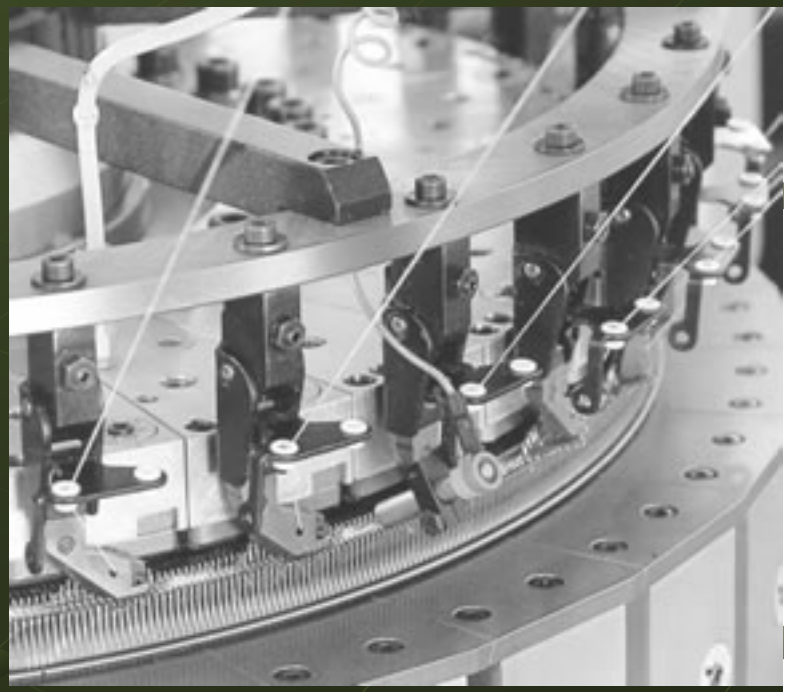
Single Jersey Machines

- Single Jersey machines are equipped with a single “cylinder”, about 30 inch diameter, of needles that produce plain fabrics (single thickness). .
- single jersey based machines include:
- Terry loop machines; the basis for fleece fabrics which are produced by knitting two yarns into the same stitch, one ground yarn and one loop yarn. These protruding loops are then brushed or raised during finishing creating a fleece fabric.
- Sliver knitting machines are single jersey machines that have been adapted to trap a sliver of staple wool fibre in to the knit structure.



Double Jersey Machines

- Double jersey machines are single jersey machines with a “dial” which houses an extra set of needles positioned horizontally adjacent to the vertical cylinder needles.
- This extra set of needles allows the production of fabrics that are twice as thick as single jersey fabrics.
- Typical examples include interlock based structures for underwear/base layer garments and 1 x 1 rib fabrics for leggings and outerwear products.



Warp Knitting Machine

- Warp knitting machines were invented in 1775, some 200 years after the first knitting machines.
- There was extraordinary growth in the warp knitting industry between 1950 and 1970 due to development in yarns
- After 1970, warp knitting declined with the reduction in sales of nylon shirts and sheets which were the major products of warp knitting at that time.

Types of machine are-

- Tricot machine
- Raschel machine

Tricot Machine

- In tricot machines the needles mainly used are beared needle with a pressure bar tricot machine.
- It has one or more than one warp beams mounted above the machine.
- the machine and is controlled by yarn guides, set in a guide bar. One guide bar is used for one set of warp yarns.
- The greater number of bars, the greater the design flexibility.
- Movements of guide bar is controlled by chains with links.
- As the guide bar is raised and moves side ways it plays the warp yarn in their respected needle hooks to form a coarse of loops. Simultaneously when the loops of proceding.

Raschel Machine

- Reschel machines are different from tricot machines as rashel fabrics are made with heavy yarns
- they usually have an implicate lace like pattern where as tricot fabrics are made with five yarns and flat or have simple geometric fabrics.
- The gauge of reschel machine is measured in term of the number of needles per two inches.
- Reschel fabrics are knitted on machine having 2-40 guide bars,