## Knitting V/S Weaving

### Defined

<table>
<thead>
<tr>
<th>Knitting may be defined as</th>
<th>Weaving may be defined as:</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Inter-looping / Inter-meshing / hook-up / Inter-lock of single or set of yarn moving only in one direction either lengthwise (warp knitting) or cross-wise (weft knitting).”</td>
<td>Interlacement of two sets of yarn at right angle (90°).</td>
</tr>
</tbody>
</table>

### Principle

| The inter-lopping is carried out by needles (may be Latch or beard or compound needle etc), the needles are equipped on a cylinder and Needle butt moves between the grooves of cams to accomplish knitting cycle and producing the fabric. The shape of the needle cam grooves depends on the required knitting pattern. For more detail see Circular / Flat knitting machine or Working principle of Circular knitting machine (video) | Weaving is carried out by *inter-lacing* a series of vertical, parallel threads (the warp) with a series of horizontal, parallel threads (the filling). The warp yarns from a beam pass through the heddles and reed, and the filling is shot through the “shed” of warp threads by means of a shuttle or other device and is settled in place by the reed and lay. The woven fabric is then wound on a cloth beam. The primary distinction between different types of looms is the manner of filling insertion (see WEFT INSERTION Dictionary on home page). The principal elements of any type of loom are the shedding, picking, and beating-up devices. In *shedding*, a path is formed for the filling by raising some warp threads while others are left down. *Picking* consists essentially of projecting the filling yarn from one side of the loom to the other. *Beating-up* forces the pick that has just been left in the shed, up to the fell of the fabric. This is accomplished by the reed, which is brought forward with some force by the lay. Hence, *Interlacement* of two sets of yarn is carried out by means of primary motion (shedding, picking, and beating-up). Fig below illustrates the passage of warp through the loom. |
A typical cross-section through the loom (weaving machine.)

**Construction**
Both knit and weaved fabric comes in huge variety of construction and design, but the basic and simplest is illustrated in the figure given below:

<table>
<thead>
<tr>
<th>Schematic of Knit fabric</th>
<th>Schematic of weave fabric</th>
</tr>
</thead>
</table>

**Application and End uses**

<table>
<thead>
<tr>
<th>Applications</th>
<th>End uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home textile</td>
<td>*Bed sheets (medical /house) comforters, throws, sheets, towels *curtains, draperies table cloths, table mats, napkins *cushions, rugs etc.</td>
</tr>
</tbody>
</table>

D.knitting nucleus
<table>
<thead>
<tr>
<th>Initials with comparisons</th>
<th>Knitting technology</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Apparels</strong></td>
<td></td>
</tr>
<tr>
<td><em>T-shirts, children’s wear</em></td>
<td><em>Trousers / pants, shirts, suitings, linings, blouses, party dresses.</em></td>
</tr>
<tr>
<td><em>Sports wear, swimwear</em></td>
<td><em>Rainwear</em></td>
</tr>
<tr>
<td><em>Sweaters, neckwear</em></td>
<td><em>Jackets etc</em></td>
</tr>
<tr>
<td><em>Socks, gloves, lingers, under garments / hosiery</em></td>
<td>Note: Seam-less garments is almost impossible to obtain.</td>
</tr>
<tr>
<td><strong>Automotive textile</strong></td>
<td></td>
</tr>
<tr>
<td><em>Seat covers, floor rugs etc</em></td>
<td><em>Safety air bags.</em></td>
</tr>
<tr>
<td><strong>Technical textile</strong></td>
<td></td>
</tr>
<tr>
<td><em>Fashion is not a factor in this segment.</em></td>
<td><em>Almost same</em></td>
</tr>
<tr>
<td>Strength, chemical resistance, weight, modulus, burning, electrostatic behavior are likely to be important.*</td>
<td></td>
</tr>
<tr>
<td>Uses:</td>
<td></td>
</tr>
<tr>
<td><em>Military</em></td>
<td></td>
</tr>
<tr>
<td><em>Aero-space / satellite</em></td>
<td></td>
</tr>
<tr>
<td><em>Sanitation</em></td>
<td></td>
</tr>
<tr>
<td><em>Recreation products</em></td>
<td></td>
</tr>
<tr>
<td><em>Mining, refineries</em></td>
<td></td>
</tr>
<tr>
<td><strong>Geological textile</strong></td>
<td></td>
</tr>
<tr>
<td><em>Erosion control products (protection of soil structures from water, environmental changes).</em></td>
<td></td>
</tr>
<tr>
<td>-dams, roads, ditches etc. (see details at Dictionary on home page)</td>
<td><em>Not research</em></td>
</tr>
<tr>
<td><strong>Medical textile</strong></td>
<td></td>
</tr>
<tr>
<td><em>Compression stockings for Phlebological Use</em></td>
<td><em>Not research</em></td>
</tr>
<tr>
<td><em>The treatment of symptoms for varicose veins</em></td>
<td></td>
</tr>
<tr>
<td><em>The prevention of venous ulcers</em></td>
<td></td>
</tr>
<tr>
<td><em>The treatment of (lymphatic) oedema</em></td>
<td></td>
</tr>
<tr>
<td><strong>Initials with comparisons</strong></td>
<td><strong>Knitting technology</strong></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------------------</td>
</tr>
</tbody>
</table>
| *Support the curing and development of scars by:*  
  - Alleviating the itchiness  
  - Avoiding the build-up of serious contractures  
  *Knee braces*  
  *Elbow braces*  
  *Ankle braces*  
  *Wrist braces*  
  *Shoulder braces*  
  and  
  Back support belts. |
Knitting classification

INITIALS

The knit fabric is divided into two major types according to its structures
1. WEFT KNIT FABRIC
2. WARP KNIT FABRIC

And so there are two major types of knitting machine
1. WEFT KNITTING MACHINE
2. WARP KNITTING MACHINE

These machines are further divided into other classifications due to the difference in their mechanism (which is discussed in knitting machine classification, next section).

You can find

TYPES OF KNITTING

Weft Knitting
A common type of knitting, in which one continuous thread runs crosswise in the fabric making all of the loops in one course. In weft knits the inter-loop links two consecutive loops placed horizontally; when one loop breaks, the entire fabric can be undone simply by pulling the free end of the yarn.

Weft knitting types are circular and flat knitting.

Circular Knitting
The fabric is produced on the knitting machine in the form of a tube, the threads running continuously around the fabric.

Flat Knitting
The fabric is produced on the knitting machine in flat form, the threads alternating back and forth across the fabric. The fabric can be given shape in the knitting process by increasing or decreasing loops. Full-fashioned garments are made on a flat-knitting machine.

Warp Knitting
A type of knitting in which the yarns generally run lengthwise in the fabric. The yarns are prepared as warps on beams with one or more yarns for each needle. In warp knits the yarn is knitted vertically or diagonally and loops are formed accordingly; to knit the fabric, it is necessary to use many threads simultaneously, allowing the loops formed by the different threads to bind together. In this case, the knit fabric is run-proof. Therefore, the warp knit fabrics are also called “non-run“or “ladder-proof“.
Examples of this type of knitting are Tricot, Milanese, and Rachel knitting.

**Milanese Knitting**
A type of run-resistant warp knitting with a diagonal rib effect using several sets of yarns.

**Rachel Knitting**
A versatile type of warp knitting made in plain and Jacquard patterns; the latter can be made with intricate eyelet and lacy patterns and is often used for underwear fabrics. Rachel fabrics are coarser than other warp-knit fabrics, but a wide range of fabrics can be made. Rachel knitting machines have one or two sets of latch needles and up to thirty sets of guides.

**Tricot Knitting**
A run-resistant type of warp knitting in which either single or double sets of yarn are used.
Knitting M/c’s classification

- WEFT KNITTING
  - CIRCULAR M/Cs
    - SINGLE KNIT MACHINE
    - DOUBLE KNIT MACHINE (RIB/INTERLOCK)
    - V-BED MACHINE (ANGLE 90°-100°)
  - FLAT BED M/Cs
    - FLAT BED (ANGLE 180°)
  - LINK-LINK M/Cs
    - TRICOT
      - CROCHET
      - RASCHEL

- WARP KNITTING
  - D.knitting nucleus
Circular Knitting Machines

Introduction

All over the world, the majority of knit fabrics are manufactured on circular knitting machines. The high performance level of these machines, the different materials and the range of yarn counts that they are able to process, the wide variety of designs and stitches are some of the reasons which have granted circular machines the market leadership in the knitting sector. The variety of knit fabrics that can be manufactured with these machines can meet the needs of a very large end user market; from the traditional outwear and underwear sectors to hosiery, household and car interiors, without forgetting technical textile applications.

Overall view of a circular knitting machine

MAJOR PARTS AND THEIR FUNCTIONS

1. YARN FEEDING SYSTEM

1.1) The Spool Holder

The spools of yarn to be used to manufacture the fabric are arranged on a holder which can be of two different types:
*The circular rack (fixed on the upper part the machine),

The cone / spool holder

D.knitting nucleus
Circular knitting machines  parts n functions

*Or the lateral creel (fixed on the floor beside the machine).

1.1 (a) CIRCULAR RACK
On the spool rack, the number of pegs that hold the spools corresponds to the number of the thread guides on the machine. The yarn is conveyed from the spool through some yarn tensioners provided with sensors which monitor the correct feeding tension. The sensors activate in the case of knots or yarn breaks, and in this case stop the machine automatically with an electric command.

Some machine manufacturers add to their machines a motorized rack lowering system for facilitating the spool loading or machine maintenance operations. The rack is brought back to its original position once the spool loading or maintenance procedures have been concluded.

The spool rack is the only system usable on revolving-cam machines, since on these machines also the spool rack must revolve.

The machines with fixed cams can be provided with a spool rack, or in alternative a lateral creel to facilitate spool loading.

1.1 (b) LATERAL CREEL
The lateral creel is a metal structure positioned on both sides of the machine. The yarn threads are unwound from the spools positioned on the creel pegs. After having passed through special guides and plastic or aluminum tubes, the yarns reach the thread guides on the machine. In this case, too, the yarn path is monitored by sensors which detect possible breaks and knots. The lateral creel is increasingly used as a spool holding system because it facilitates the operator when changing the spools or in the case of yarn breaks, and allows a dramatic reduction of flying dust and particles in the knitting room thanks to the guide tubes connected with an automatic suction system. Although the creel takes up a larger floor space, it can accommodate a huge number of spools. This allows the possibility of double thread feeding to each feed system, as well as of integrating tail-to-head spool splicing for ensuring the continuous feeding of yarn.
1.2) Yarn Feeders

Yarn feeders can be divided into “positive” or “negative” types depending on the possibility of controlling the yarn feeding speed and uniformity.

1.2(a) NEGATIVE YARN FEEDING SYSTEM

A yarn feeder is the negative type when the needle takes the yarn directly from the package during the stitch formation step, and the feeding tension of the yarn cannot be controlled.

This feeding technique can generate differences in the yarn length used for stitch formation. This is due to the variable tension of the yarn since a new spool has a certain diameter which gradually reduces as more yarn is unwound and fed into the machine. In addition, the spool can be too hard or too soft.

1.2(b) POSITIVE YARN FEEDING SYSTEM

It has two major parts:

A). Motorized yarn accumulator (check out Animation, “KNITTING MACHINE KEY ELEMENTS” at VIDEOS & ANIMATION section).

The motorized yarn accumulator levels off the yarn tension since when rotating, it accumulates a certain/specific quantity of yarn on a constant-diameter pulley and then stops. The yarn wound on the accumulator is then conveyed to the thread guide always maintaining the same tension. The machine takes up the yarn, gradually emptying the accumulator, which is then restarted automatically to replenish its yarn reserve.

This solution is particularly indicated when the same type of feeding technique cannot to be applied to all the feed systems due to the structure of the knit stitches. Therefore, yarn accumulators are mainly used on machines for the manufacturing of fabrics of pre-set length, or also of continuous cloths with Jacquard patterns.

For different type of yarn count, (if used in the same fabric) different size of the pulley dia will be use for accumulator.

For example,

If yarn Ne is 10/s, pulley dia will be more, therefore belt drives accumulator slower to maintain the same amount/mass of yarn feeding in the fabric.
If yarn Ne is 30/s,(same fabric), then pulley dia will be smaller than 10/s Ne pulley, therefore belt drives accumulator faster to maintain the same amount/mass of yarn feeding in the fabric.

B). POSITIVE BELT FEEDING

Positive feed systems control the tensions of the yarn fed by means of a drive wheel or a drive belt system.
The drive wheel systems consist of two conical toothed wheels. The belt passes between the two wheels which further passes over yarn feeding accumulator namely Memminger Positive Feeder (MPF or IRO) arranged in series as shown in fig. This positive system grants a smooth (constant) feeding of the yarn on all the feed systems. For different type of yarn count, (if used in the same fabric) separate belt driven with different size of the pulley dia will be use.

Today, the belt system has by far become the most common positive feeding system. The belt makes the spool rotate, and the number of rotating spools corresponds to the number of feed systems.
By adjusting the belt RPM, the quantity of thread can be increased or reduced. This system grants an accurate control of the yarn tension

2. THE TREAD GUIDE

The tread guide is the fundamental element of a yarn feeder.
On circular knitting machines each thread guide corresponds to a feed system. The thread guide is a steel or ceramic plate with a hole for the thread. The thread guide is positioned near the hook of the needle and, besides feeding the yarn; it opens and protects the latches.
The thread guides of double-bed machines feature two holes: one is used for conveying the yarn to the needle on the cylinder while the other hole only serves for feeding the dial needles when these are working.

Some machines have more thread guides for the same feed system, e.g. the circular knitting machines for continuous fabrics or continuous striped jersey or those equipped with Jacquard selection systems. The whole set of thread guides mounted on these particular machine models is called stripe pattern motion.

Stripe pattern motions usually includes from four to six threading-in options and a yarn retaining/cutting device. A gripper is positioned between one thread guide and the next to keep the threading-in position while changing the color on the stripe pattern motion. The machine’s head controls the gripper which holds the thread while the scissors cut the thread as soon as it stops.

The yarn remains threaded-in the thread guide, held by the gripper. The thread is released from the gripper and fed to the needles only when the thread guide is activated again. Thanks to a centralized programming system, the different thread guides are only operated when necessary depending on the color or yarn change.

Special thread guides with double threading-in are used for generating special patterns, for example, plating. Together with the thread guides operating in the stitch formation position, special additional thread guides are employed for feeding the weft yarns.

3. KNTTING HEAD

It is the most important part of any knitting machine. It may have single needle bed (i.e. single knit machine) or double needle bed (i.e. double knit machine). This part is responsible for major knitting operations. The main components of this part are as follows:

3.1 Needle

The needle is the basic element of loop formation. There are three most commonly used types of needle used in knitting machines:

(a). the latch needle
(b). the spring-beard needle
(c). the compound needle

(latch needle is the most common type of needle used. These needles are arranged on a bed (Needle-bed) side by side to each other in a series and slides in the grooves of a circular needle-bed).

3.2 Needle bed

A knitting machine may have Single needle-bed or Double needle-bed,

In a Single needle-bed which are known as Single knit machine, the needles are equipped on a
Circular knitting machines

3. Cylinder mounted vertically (90°) on a machine.

While in Double-bed the needles are equipped on two needle-beds positioned at 90° to each other (Rib / Interlock) or 180° to each other (double-cylinder or link-link machine), the vertical needle-bed is called cylinder while the horizontal one is called dial.

3.3 Sinker

Sinkers incorporate knitting cycle. The sinkers hold the already formed fabric formed while the needles rise for the next stitch formation cycle. The sinkers also support the fabric when the previous course is knocked-over. The sinker, which has a particular shape, has two main parts: the nose (upper section) and the breast (lower section) which can move forward and backward horizontally driven by special cams.

3.4 Cams

There are two types of cams in a knitting head.

(a) needle cam / tracks

(b) sinker cam

3. 4 (a) Needle cam / tracks

The Needle cams are the one which commands the various needles movement. Needle butt moves between the grooves of cams. The shape of the needle cam grooves depends on the required knitting pattern. The basic shapes of needle cam are shown in the figure below. The cams are placed outside the needle-bed; each feed system is provided with its own cam group.

D. Knitting nucleus
In Double-bed, two cam frames, one around the cylinder and the other above the dial are.

**Open Needle cams of a typical knitting machine**

*Revealing 3 cam tracks on dial*

**Dial & Cylinder Needle tracks**

**Different types of cam tracks**

All the cams are fixed to a bearing structure called “cam frame”. On single-bed machines, the cam frame is stationary, while the needle-bed revolves i.e. cylinder.

Outside the cams, on each feed system, there are special micrometric screws, which adjust the stroke of the lowering cams and determine accurately the length of the yarn fed.

In their simplest structure, the cams are screwed to the cam frame and command a single movement of the needle: for example, when for a certain feed system we only have one group of lowering and rising cams, the selection possibilities will be very restricted. In fact, in this feed system, the needles must knit or remain idle (this is the typical situation of jersey knitting machines). In this case, to modify the pattern it is necessary to change the cam. These technical limits have been overcome by increasing the number of needle butts and the corresponding cam tracks necessary to drive the needle.

Now machine manufacturers are able to offer modern single-bed machines with up to 5 selection tracks.

**3.3 (b) Sinker cams**

The Sinker cams are the one which commands the various sinkers movement. Sinkers are driven by these cams whose shape depends on the type of the sinker itself.

In Double-bed knitting machines, no sinkers are desired during the stitch formation cycle, the fabric formed by the rising needles of one needle-bed is held by the needles of the opposite needle-bed.
4. Take-down and Winding Motions

The fabric take-down and winding motions have been designed to facilitate stitch knock-over and fabric take-down procedures. The take-down and winding functions are kept separated in order to allow a smooth running of the machine and avoid possible fabric distortions.

4.1 Spreader

Circular knitting machines pose some problems as regards the winding of the fabric, as the fabric itself is delivered in tubular form and must be spread flat prior to winding. The spreading of the tubular fabric generates some distortions because of the different distances between the various zones of the tubular fabric emerging from the take-down system and the same zones wound on the fabric roll. These differences reflect into uneven winding tensions (the tension is lower in the fabric centre and higher at its edges).

To avoid these problems, a metal frame called “Spreader” has been incorporated before the fabric winding system. The spreader increases the width of the tubular fabric by giving it an almost circular shape, equalizing the distances between the various zones of the fabric and the nip line of the winding system.

![Fabric spreaders for Circular knitting machines](image)

4.2 Take-down Motion

The take-down motion consists of 2 or 3 rollers placed beneath the cylinder. In the simplest system configuration (i.e. the two-roller) the fabric passes between two rollers that stretch it by rotating in opposite directions.

Anyway, the best system is the three-roller take-down motion which pulls the fabric without slipping and without exerting too much pressure that could damage the fabric.

From a mechanical point of view, a take-down system can be either equipped with a swivel arm or with a lever and spring mechanism. Modern take-down systems are motorized and the latest models also incorporate an electronic control.

![2-roller take-down motion](image)

A special take-down system has been designed for variable needle-bed machines since these
Circular knitting machines do not use the whole needle-bed. This special take-down motion features independent rollers to adjust the tension during the knitting process and differentiate the tension between the central part of the cloth and the edges. On the most recent machines, it is possible to set up to 99 different tension values.

4.3 Winding Motion

The fabric winding motion is provided with a clutch. In this way, to grant a steady peripheral speed, the angular speed of the winding roller can be gradually reduced as the diameter of the fabric roll increases.

An Italian manufacturer of circular knitting machines exhibited an innovative winding system mounted on a 30-inch circular knitting machine. In practice, this machine features an “open” base that allows the fabric cutting and opening on only one side prior to winding. Obviously, in order to allow the take-up of the open fabric, the width of the winding roller must be twice the width of a standard one.

The take-up step is carried out on the already opened fabric, and the edges of the fabric are kept tensioned by means of two rollers with worm-screw profiles.

Thanks to this innovative solution, no further rollers squeeze the knit fabric. With the help of this noble feature knit fabric can now be prohibited from central marks, which is particularly serious problem occurs when using elastomeric (spandex) fibers. An Open-width winding motion is illustrated in the figure given below:
5. DRIVES, CONTROL AND MONITORING SYSTEM

5.1 Drives

All the modern circular knitting machines are equipped with inverter drives, ensuring electronic speed variation, to set the optimum working speed & allow the best possible control of machine accelerations and slow-downs. The drives command the operating speed, the slow speed and, as an alternative to the hand-drive lever, allow a very low speed running with push-button control. The most recent drive models are equipped with visual diagnostic devices for solving problems such as machine stops.

The motion is transmitted to the needle-beds by means of shafts and gears. On single bed machines, the motion transmission is quite simple since there are no alignment problems; on the contrary, double bed machines must incorporate an adjusting device for aligning the needles of one needle-bed to the needles of the opposite one.

5.2 Control and Monitoring System

Modern circular knitting machines feature on-board computers (CPU) complete with a display and a keyboard to monitor and control the most important functions:

- Speed
- Number of machine revolutions (R.P.M)
- Working hours
- Causes of machine stops
- Detector of the yarn length fed into the machine

On modern microprocessor-controlled machines, the LCD display (TOUCH SCREEN) is equipped with an alphanumeric keyboard for entering the operator’s settings. The whole system
Circular knitting machines

is controlled by an electronic circuit which signals the status of the machine and the possible causes of machine stops by means of flashing lights.

All the electronic control components are accommodated in a cubicle linked with the machine by special connectors. Sometimes, together with these functions, the machine can also carry out needle selection procedures by retrieving the information saved on floppy disks or by means of a direct connection to a dedicated CAD system.

6. MACHINE ACCESSORIES

6.1 Lubrication System

The perfect lubrication of the knitting head is essential for an efficient knitting process; lubrication is usually guaranteed and carried by electronic atomizer pumps.
6.2 Suction and Blowing Systems

These systems prevents from the dust / lint or foreign material in the working range and the yarn feeding area. Suction and blowing systems usually incorporate a blower in the knitting range and swiveling fans in several points where the yarn passes.

![Lint removal fan (Ventilation system)](image1) ![Yarn channel or Suction tube](image2)

6.3 Safety Systems

The application of international safety standards and regulations has led manufacturers to design machines featuring safety systems that stop the machine in case of hazard for the machine operator.

To protect the operators from any possible injury, all electric and moving parts are completely enclosed and the machine base is protected by special guards (metal grids or even more complex structures that immediately stop the machine when opened).

![Emergency Stop button](image3) ![Door opening sensor (Micro-switch / Limit switch)](image4) ![Fully covered metallic cage](image5)

Knitting machine with Safety standards
**Wales and Courses**
A vertical column of loops laid vertically one upon the other are known as **Wales**. Wales are always equal to No. of needles.

A horizontal row of loops are known as **Courses**, belonging or not to the same yarn.

**Feeder**
A unit which guides a yam to the needles.

**Stitch density**
It refers to the total no of loops in a measured area of fabric and not to the length of yarn in a loop (stitch length). it is the total number of needle loops in a given area (such as square meter or sq. inch)

**Loop / Stitch Length**
The average amount of yam in a loop is known is loop / stitch length.

Now a day’s production order usually comes in stitch length, because practically stitch length is more linear and remains constant even if machine manufacturers have been changed. On the other hand G.S.M can’t remain constant if we jump to different machine brand. The reason is there is slight difference arrived in machine designing; for example cylindrical, feeding, needle cams, take-down differences.

**Short method to find out the stitch length of fabric**
- Take a piece of fabric
- Pull out the counted stitches/loops from the fabric (say 21 loops= a)
- Stretch the loops and measure exactly with the help of scale(say 7 cm = b)
- The stitch length can be calculated by dividing stretch length (a) by no. of loops (b)

Mathematically:

\[
\text{Stitch length} = \frac{b}{a}
\]

**Example:**
Stitch length = 7/20 (always take one loop less from counted)
= 0.35 cm or 3.5 mm

**Course length**
The amount of yam required to knit one course.
**Gauge**
The number of needles per given distance (or per inch) in a knitting machine.
The thickness of the knitting needle in the shank and the hook.
The number of Wales per inch in a knit fabric.

\[
\text{No. of Needles (}\eta\text{)} = \text{Dia} \times \text{Gauge} \times \lambda \\
\text{Or} \\
\text{Gauge} = \frac{\eta}{\text{Dia} \times \lambda}
\]

**Gaiting**
The arrangement of two sets of needles is known as Gaiting. There are two types of gaiting Rib gaiting and Interlock gating.

**Timing**
Relative movement between two sets of needles or ~ Needles and sinkers

**Yield**
The weight per unit of fabric (G.S.M. or oz / yds\(^2\)).
Types of Knit Stitches

Knit Stitch
It is basic stitch among all the knit stitches and is also known as the Plain stitch. It is carried on the machine with the help of Knit Cam as mention in the figure below:

It could be define as:
Full or complete movement of needle is known as knit stitch.

In this type of stitch needle takes the new yarn each time by clearing the old yarn into the new yarn as illustrated in the Animation, "KNIT STITCH", at Videos & Animation section.

Tuck Stitch
It is the second basic type of knit stitch. Its cam design is different from the knit cam which is illustrated in the figure below:

It could be define as:
Half or in-complete movement of needle is known as tuck stitch.

In this type of stitch, needle grasps the new yarn but, it does not clear/release the old yarn from its hook (as needle not move completely upward). The working motion has been illustrated as “TUCK STITCH", at Videos & Animation section.

Miss Stitch
This stitch consumes the minimum length of yarn as it makes the yarn Float at the back of the surface, the needle remains sit or in other words we by-pass the needle through Miss Cam, the picture of it is shown below:

It could be define as:
No movement of needle is known as miss or welt stitch.