

The Form Fill Seal(FFS)

The Form Fill Seal(FFS) machines are a genre of filling equipment that can fill in a flexible packing material. The product should be free flowing type, either liquid or even granular. The equipment may be controlled electro-pneumatically or mechanically.

The process involves certain steps, which will take place cyclically in auto operation.

There is option for variation in size and quantity of the product packed. To a large extent, the market milk is now being sold by packing in these machines.

The following are the operations that go cyclically.

1. Forming of tube of packing material from film in rolled state
2. Simultaneous operation of filling and sealing
3. Movement of film to form next package
4. Simultaneous separation of filled and sealed packet while filling of next packet.

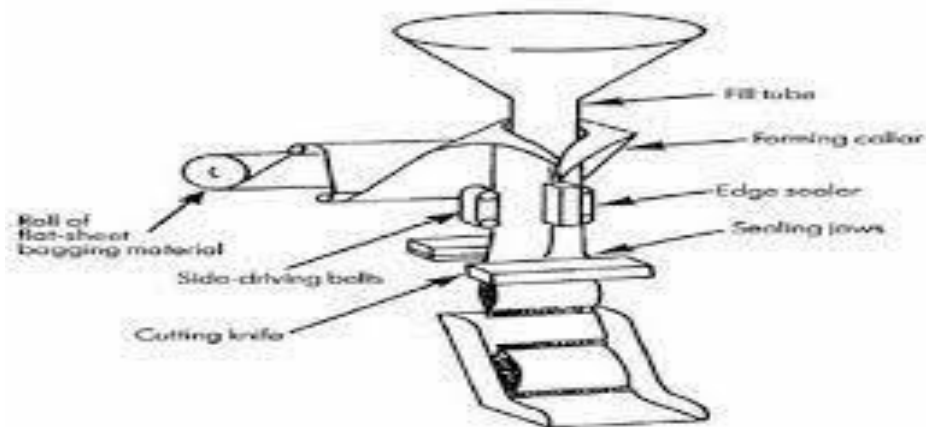


Fig: Vertical FFS.

source: Google

Sequence of Operation

With reference to the fig. the film roll is loaded at the backside of the filling machine on a sliding platform. The film edge is passed over end of role contact lever, dancer roller, UV tube and brought to the front side over to forming plates. The forming plates rolled the flat film in to tube a certain band of overlap. Within the tube is the fluid filling pipe enveloped. The tube then passes over to vertical seal jaws that are engaged and disengaged with the help of an air operated piston, or in machines by mechanical means. In between the jaws, the overlapped part of the film tube passes. The set of jaws have one stationary and one moving jaw. The moving jaw has a nichrome rod, supplied with variable voltage such that the heat is generated when the current passes intermittently. During the period when the current does not pass, when the jaws are disengaged, the cooling water being circulated in the moving jaw, cools it and prevents continuous over heating of the sealing rod. The film is supported by Teflon cloth and

rubber cushion, as well as protected by Teflon cloth from sealing rod. This arrangement prevents electricity passing on to the film and other parts, while allowing only the heat to pass on to the film and partly melting and fusing the vertical joint.

Lower down the film tube, there are a pair of nip rollers giving a holding and pulling down action, when the jaws are disengaged, making the film to move to seal the next portion of vertical overlap.

Further lower down the film tube is engaged by horizontal jaws, at a sufficiently below the lower edge of fluid filling pipe. This arrangement allows the formation of lower seal of the packet, while the fluid is being filled to a known quantity. The quantity of flow is controlled by a valve operated by a rod which is lifted by a solenoid coil position at the top of machine, just at the feeding line from the over head tank carrying the fluid to be filled. While filling is taking place, a pair of flat blades operated by spring keeps the film perfectly flat at horizontal edge so that there is no folds and horizontal seal is perfect.

When the filling of fluid and the horizontal sealing is complete, the horizontal jaws (as well as vertical jaws) get disengaged, and the nip rollers start rolling to bring the next length of film tube to be filled for next packet. While the second packet is being filled, the first packet already filled will be getting the horizontal seal of top portion of the filled packet. When the next time the jaws open, the first packet drops

down by its own weight and weakened connection to the rest of the tube.

The above cycle of operation is repeated when the controls are in automatic operation, while single action takes place when in manual operation during initial adjustment of time and temperature combination for obtaining proper seal.

Controls

The Form Fill Seal Machine has various controls for the following operations.

1. Adjusting the temperature of sealing rod by controlling the electric supply, to match to the thickness of the film to be sealed.
2. Adjusting the timing for the jaws to be engaged and simultaneously filling operations to take place, with a known quantity of fluid.
3. Adjusting the quantity of fluid to be filled when jaws are engaged
4. Adjusting the timing for the jaws to be engaged and allow time for movement of film to the required length of package.

The other useful instrumentation are the end of film indicator (gives audio signal), so that the new film roll can be changed easily, fine adjustments for the quantity of fluid filled in few grams range, fine adjustment of timings, etc.

The equipment will require water for cooling the jaws at a fixed flow rate and of low temperature. Also, compressed air is required which is at required pressure and free of condensed moisture.