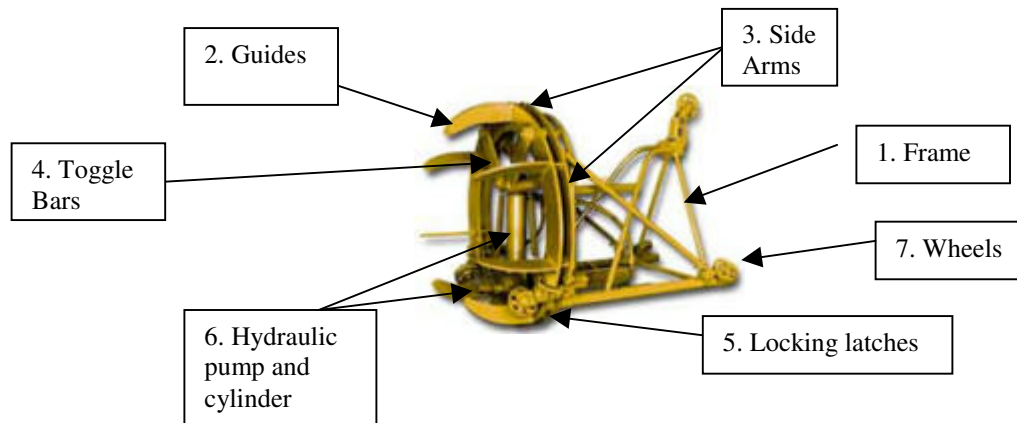


## 1. Internal Line-up Clamps Equipment Description:

### Hydraulic Internal Line-up Clamp Components



**Hydraulic Internal Line-up Clamp**

1. Frame: Supports the clamp and runs on 4 bottom wheels and one upper wheel.
2. Guides: Directs the clamp into the next pipe joint.
3. Side Arms: 3 side arm rings (two top and one bottom) align the two pipe joints.
4. Toggle Bars: The toggle bars push the 2 upper side arms against the internal wall of the pipe.
5. Locking latches: Two brass latches located at 4 and 8 o'clock lock the clamp in place providing self-alignment of the side arms.
6. Hydraulic pump & cylinder: transfers motion from reach rod to hydraulic piston and to the toggle bars.
7. Wheels: Allows the clamp to roll into the next pipe joint.

### Operation of Internal Line-up Clamps

The internal line-up clamp aligns two joints of steel pipe in preparation for the welding process.

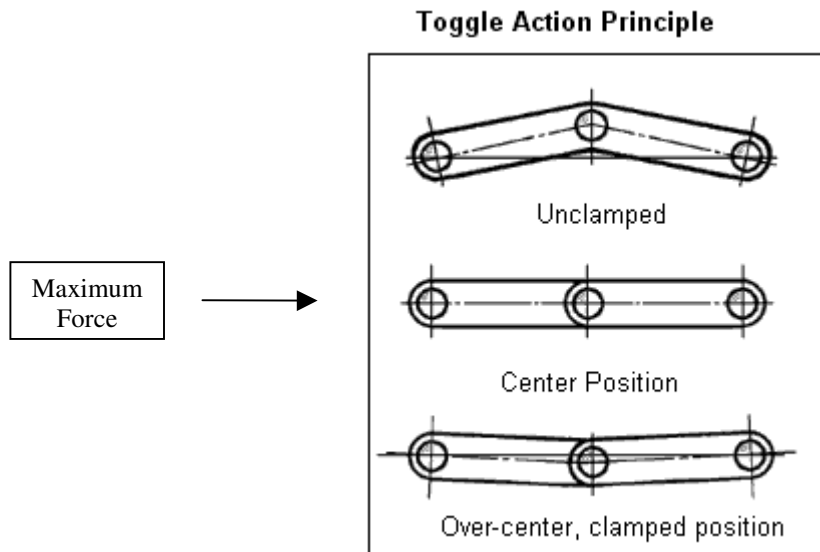
The internal line-up clamp is set into one pipe joint about 30 cms. from the end of the pipe. The reach rod is connected to the hydraulic pump pinion eye. A second pipe joint, to be welded to the first pipe, is positioned at the end of the reach rod. The reach rod is then placed inside the second pipe. The second pipe is moved slowly until one end of the pipe reach the end of the first pipe. The operator at the end of the reach rod will pull the clamp towards him. A second operator will advise the first operator when the clamp latches have passed the end of the first pipe. The clamp is then pushed back until the self-positioning latches lock the clamp in place. The 2 pipe ends are set-up as required by the pipefitter or welder. A clockwise motion applied on the end of the reach rod will rotate the hydraulic pump which will move the toggle bars until they expand the clamp. The welding process is completed and the clamp is then retracted and moved to the next pipe joint.

### Hydraulic Internal Line-up Clamp Design

The key feature of the internal line-up clamp is the accuracy that the three side arms provide when aligning the internal pipe walls of the two pipes to be welded. To achieve a close

alignment of the pipes, the circumference of the side arms is machined to match the contour and wall thickness of the pipe. A toggle bar mechanism connected to the end of the hydraulic ram will expand as the hydraulic pump is rotated. The toggle bar length is calculated based on the and distance that the side arms have to travel to make contact with the internal wall of the pipe.

Toggle bars in a centered position reach maximum force. However, toggle bars in an under or over toggle position as shown in the drawing below will not exert maximum force.



Each clamp is machined for a specific pipe internal wall thickness. The manufacturer of the equipment highly recommends to either machine or shim the clamp to compensate for changes in the pipe internal wall thickness.

Not adjusting the clamp for variations in wall thickness could:

1. Limit the surface contact area between the side arm and the internal wall of the pipe. As a result, only the highest point of the side arm will be in contact with the internal wall.
2. Limit the performance of the toggle bars.
3. A manual version is also available.

### **Clamp Flexibility**

The ideal situation to obtain maximum performance of the clamp is to shim or machine the clamp to compensate for changes in wall thickness of the pipe. However, the manufacturer suggests that the clamp can still be used without modifications when changes in the **internal wall thickness of the pipe do not exceed +/- 4 mm of the internal wall thickness that the clamp was set up.**