

Course PLC Project # 2: Pipe Bending System

The pipe bending system may be set to operate either automatically or in single-step mode (manual mode)

- *Initial state*

The system is in initial state when

1. the trolley is at its home position (S5 actuated)
2. the bending tool is open (S10 actuated) and
3. the safety guard has been raised (S8 actuated).

- *Function description*

The bending process can take place as follows when the system is in its initial states and the trolley is loaded (S13 actuated):

Winch W2 pulls the trolley in into the bending machine. Heater E is switched on when initiator S6 is actuated. When the trolley is in the bending machine (S7 actuated), winch W2 is switched off and motor M lowers the safety guard. The bending tool is lowered (valve Y on) when the temperature reaches the specified value (S12 actuated) and the safety guard is closed. When the bending tool has been lowered (S11 actuated), heater E is shut off and a 10-second timer started. The bending tool is raised (S10 and S8 actuated), winch W1 pulls the trolley out of the bending machine. A new cycle can begin as soon as the trolley has reached its home position (S5 actuated).

- *Auto mode (S1 not actuated)*

When the control system is in its initial state and the trolley has been loaded, automatic execution of bending process can be initiated by pressing the Start button. Lamp H4 indicates that the system has been set to Auto mode. When a bending cycle has been completed, the next cycle begins automatically with reloading of the trolley. If momentary-contact pushbutton S4 is actuated at an arbitrary point in time, automatic operation is disabled as soon as the system has assumed its initial state.

- *Manual Mode / Single-Step Mode (S1 actuated)*

Stepping is not automatic. Each step in the sequence must be initiated separately by pressing Start/Single-step pushbutton S2.

Prerequisite is that the step enabling conditions for the relevant steps are fulfilled. The commands to the outputs allocated to the relevant step are executed only as long as momentary contact pushbutton S3 is actuated.

