

Timer Applications

Lecture 12

Engineering 475 Automated Production Systems



Operator Safety Example

One way to protect an operator of a manually activated machine is to have two start push buttons (momentary action) that must be pressed within a small time window to activate the machine window.

This prevents an operator from placing a brick or other heavy object on one push button and operating the machine using only one hand.

In addition, both push buttons must be released before a new cycle can be started to prevent the machine from double cycling if the operator continues to depress the push buttons.

Geller, pg. 115

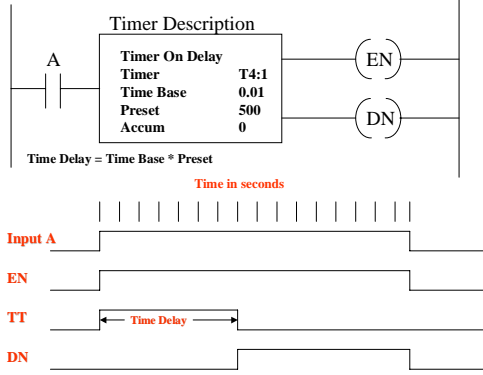
Previous Drill Machine Example



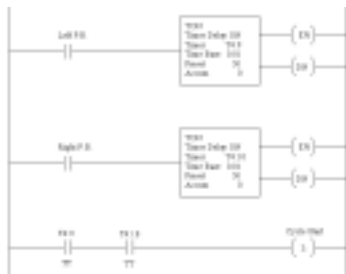
In the example developed in previous classes, there is nothing to prevent the operator from putting a weight on both switches and letting the machine run itself.

This violates the method described on the previous slide for ensuring operator safety.

Timer Delay On (TON)

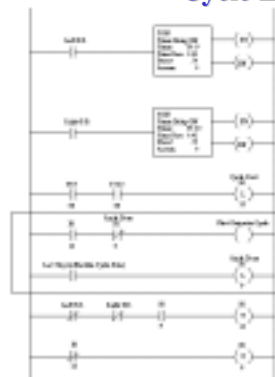


Cycle Start Ladder Logic



This logic ladder will set the Cycle Start Latch if both of the push buttons are depressed within the time delay for the first button pushed.

Cycle End Logic

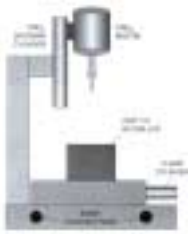


The previous slide showed only how to get the cycle started.

This slide shows the additional logic required to make sure that the machine does not cycle automatically.

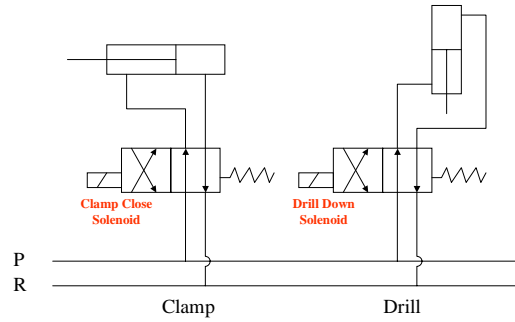
Note that simply starting and stopping a machine cycle safely can get complicated.

Oil Pump Example

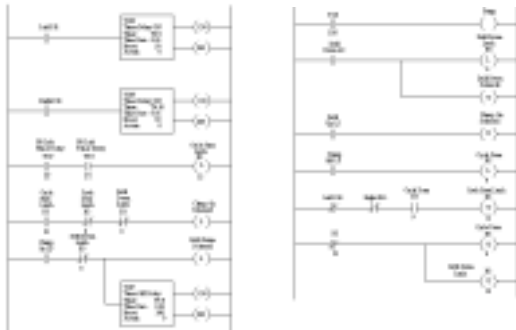


In this example, we want to add an oil pump that will lubricate the piece during the drilling operation. The pump must stay on for two seconds after the drill hits the down position to keep it lubricated as the drill is removed from the piece. The oil pump is turned on when the drill down operation begins.

Pneumatic Schematic



Ladder Logic Diagram



Assignment

Add logic to the ladder logic diagram developed in this class to check for a damaged or worn drill bit. If the drill bit is damaged or worn, it will take more than 10 seconds to complete the drill operation.

Time the drill down cycle and cause an alarm if the drill has not finished during the down cycle in 10 seconds. If this is the case, abort the drill down cycle and return everything to the start position. Light the alarm lamp and do not allow another cycle to start unless an alarm PB is pressed.

An AutoCAD file containing the logic diagram is on the student drive.