Assembly Line Monitoring System

Generally a product made of several Components and Processes is manufactured by adding various Components at different Assembly stations and by running it through several Processes again at different stages. Manufacturing such products necessiates movement of semi finished product from one stage to the next stage which is handled by a conveyor belt kind of a system. At every stage there could be several Components that are added or several Processes that the product is subjected to. In this method of manufacturing at every stage there is a dependency on the previous stages to get a semi finished product, to add some more Components, and to pass it on to the next stage. This method also runs the risk of Assembly line hold up due to any problem in any one of the stages. Thus it is very crucial, to identify stages that are causing hold ups and communicate immediately the exact reason for such hold ups, to the concerned personnel. Speed at which these signals are picked up and communicated actually determines the hold up time of Assembly lines.

The **Assembly Line Monitoring System** designed by **Process Care Systems** helps in immediately sensing any hold up in any one of the stages automatically and communicates reason for hold up either automatically or with some more inputs from the operator at a particular stage instantaneously.

Advantages of our ALMS:

Assembly Line Monitoring System interconnects all the stations in an assembly line to a supervisor. Every assembly station is provided with a Station Monitoring Unit (SMU) which allows the operator at particular station to convey any problem at the station causing the assembly line hold up. Commonly encountered causes are allocated hot key to immediately convey the cause for holdup by pressing a relevant key.

Product Features:

➢ Smart Monitoring Unit can send if a station is down automatically by continuously monitoring activity at the Station.

➢ Programmable threshold time after which a station is declared to be down in the absence of activity.

➢ Both audio visual alarms are activated when a station is down attracting the operator to communicate the reason for down by pressing a relevant key.

➢ Provision for extra I/O lines are made through an extender port to which an IO extender module can be connected.

➢ LED / LCD TV can be integrated to publicize problems at different stations.

➢ Usage of Smart Monitoring unit makes the system work in a stand alone mode without any help of a PC.

➢ Provision is made to segregate the reasons for down at several stations and route them to the respective departments to be showed on an LCD Monitor / TV of desirable size.

Functional block diagram

Assembly Line Monitoring System – Lean
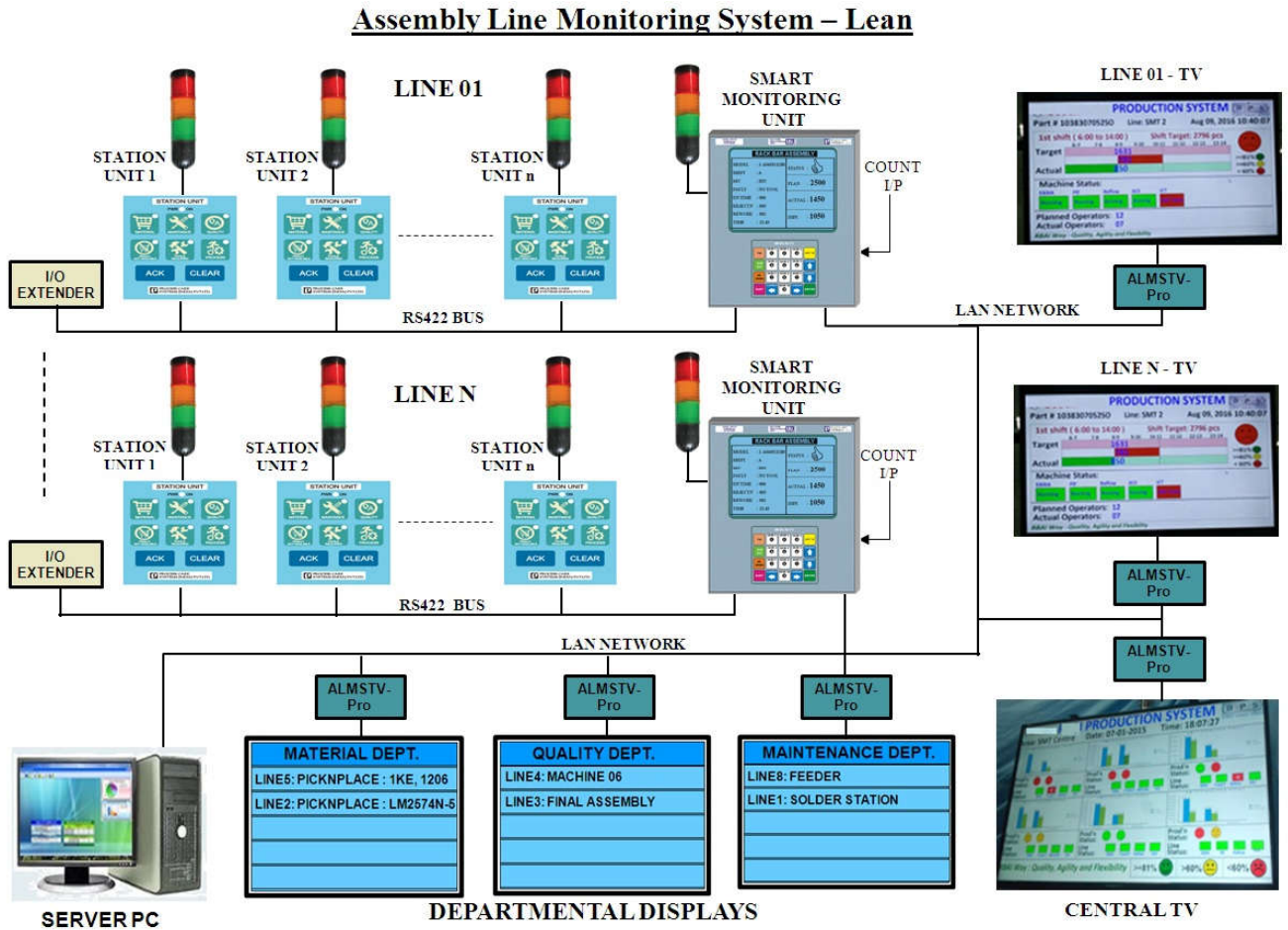
In Assembly Line Monitoring System each machine/station will have an electronic device called Station Unit (SU) installed with a Tower Lamp (optional) connected to it. Three lamps with colors Red, Amber, Green in the Tower lamp are used to indicate different status of that particular machine /station. Machine running normally is indicated by lighting up of 'green lamp' and down is indicated by continuous flashing of 'red lamp'. When operator acknowledges this down by pressing one of the keys: Material, Maintenance, or Alarm, amber lamp will light up with all remaining lamps turned off.
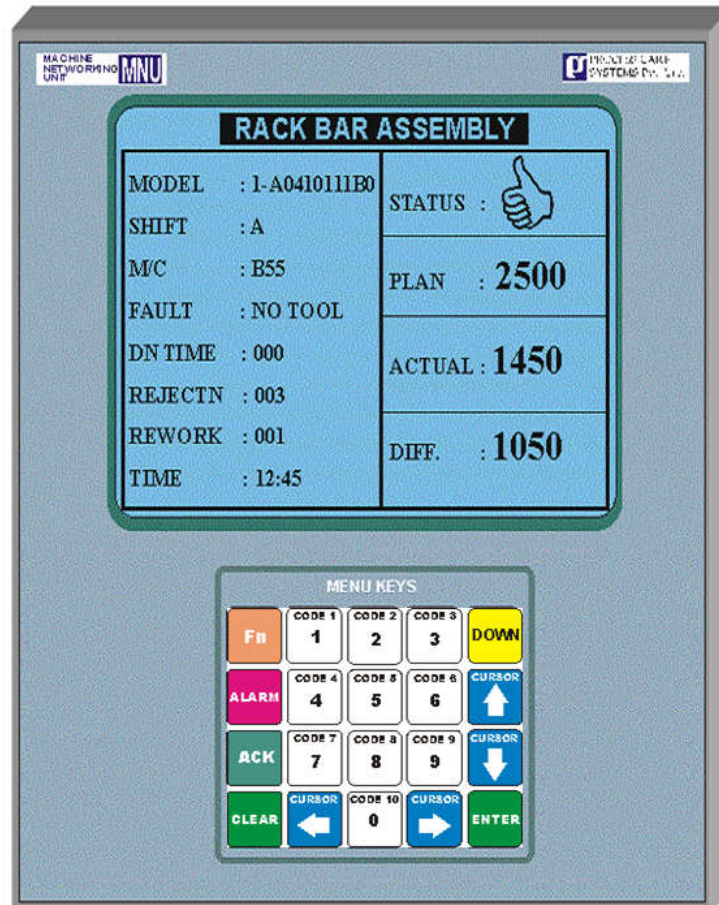
Station Unit (SU)
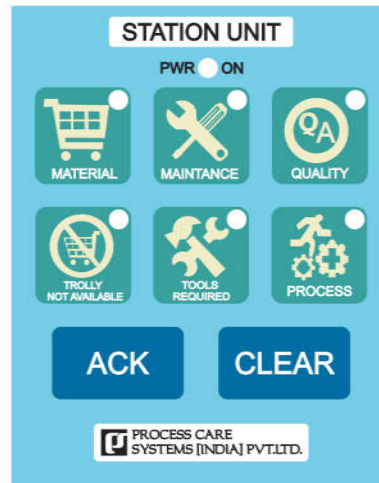
Station Unit (SU) is simple in construction with a keypad having eight keys. External IO interface used only for expansion of digital IO. Eight keys on the 'SMU' are meant for different functions. They are as follows:

1. **'MATERIAL'** key: This key is used by the operator at the station to inform the shortage of material to the supervisor. This key operation will flash up status LED.

2. **'MAINTANCE'** key: This key is used by the operator at the station to request for repair and maintenance.

3. **'QUALITY'** key: This key is used by the operator at the station to inform damaged or fault material received.

4. **'TROLLY NOT AVAILABLE'** key: This key is used by the operator at the station to inform trolley not available.

5. **'TOOLS REQUIRED'** key: This key is used by the operator at the station to request for tools.

6. **'CLEAR'** key: This key is used to clear the acknowledged requests.

7. **'ACK'** key: This key is used to acknowledge the request made by operator.

Smart Monitoring Unit (SMU)

✓ Designed to get the operator requests (like Maintenance, Material etc.,) from the Assembly stations units and to flash corresponding symbols on display module.

✓ This module consists of

    o   800x480 pixel LCD Display module

    o   20 keys Membrane Key pad.

    o   Inbuilt Speaker.

1. **'Fn' key:** Pressing this key will perform a list of functions.

   a) Set Date and Time

   b) Preventive maintenance timing setting.

   c) To change pass code

2. **'CODE 0 - 9'** key: 10 Keys used for digit entry.

3. **'DOWN'** key: On pressing this key, LCD will show a list of all the station names. Supervisor can move the cursor to the appropriate station and press 'ENTER'. Then inform operator's request to respective department.

4. **'ALARM'** key: This key is used to raise an alarm in case of emergency.

5. **'ACK'** key: This key is used to acknowledge the operator request from station unit.

6. **'CLEAR'** Key: After serving the station for its request, flashing image with station name on LCD can be cleared by pressing this key. This will load list of stations who are waiting for material or maintenance. From this list desired station can be removed.

7. **'←' and '→'** keys: These keys are used to move the cursor position in horizontal direction.

8. **'↑' and '↓'** keys: These keys are used to scroll through list of entries like Station names

9. **'ENTER'** key: This key is used to select the chosen entry in the list, to clear acknowledged request from the operator etc. As shown in the block diagram of ALMS, all relevant departments will have a display where station names of those raising requests will be displayed one after the other at a relevant department.

A LCD TV display can be placed at the prominent place in the assembly line to display station names of the machines which are down. If the machines are more than 5, all machines are covered by flipping the machine names. Several such SMUs can be connected to the centralized PC using LAN. PC will record all these information from different stations and stores it with date time stamp which is used to generate various MIS reports.