



Andhra Pradesh State Skill Development Corporation



The image is a composite of two parts. On the left, there is a teal-colored graphic illustrating a Learning Management System (LMS). It features a central computer monitor displaying the 'LMS' logo, surrounded by various icons and text labels: 'courses', 'documentation', 'tracking', 'e-learning management', 'education', 'system', 'software', and 'courses'. On the right, there is a photograph of three individuals (two men and one woman) wearing headsets and working on desktop computers in what appears to be a call center or customer service environment.

Basics of PLC

Introduction to Automation



Automation Overview:

The word ‘Automation’ is derived from Greek words “Auto” (self) and “Matos” (moving). Automation therefore is the mechanism for systems that “move by itself”.

However, apart from this original sense of the word, automated systems also achieve significantly superior performance than what is possible with manual systems, in terms of power, precision and speed of operation.

Definition: Automation is a set of technologies that results in operation of machines and systems without significant human intervention and achieves performance superior to manual operation

A Definition from Encyclopedia Britannica: The application of machines to tasks once performed by human beings or, increasingly, to tasks that would otherwise be impossible.

Although the term mechanization is often used to refer to the simple replacement of human labor by machines, automation generally implies the integration of machines into a self-governing system.

Types of automation

Automation systems can be categorized based on the flexibility and level of integration in manufacturing process operations. Various automation systems can be classified as follows

Fixed Automation: It is used in high volume production with dedicated equipment, which has a fixed set of operation and designed to be efficient for this set. Continuous flow and Discrete Mass Production systems use this automation. E.g. Distillation Process, Conveyors, Paint Shops, Transfer lines etc. A process using mechanized machinery to perform fixed and repetitive operations in order to produce a high volume of similar parts.

Programmable Automation: It is used for a changeable sequence of operation and configuration of the machines using electronic controls. However, non-trivial programming effort may be needed to reprogram the machine or sequence of operations. Investment on programmable equipment is less, as production process is not changed frequently. It is typically used in Batch process where job variety is low and product volume is medium to high, and sometimes in mass production also. E.g. in Steel Rolling Mills, Paper Mills etc.

Flexible Automation: It is used in Flexible Manufacturing Systems (FMS) which is invariably computer controlled. Human operators give high-level commands in the form of codes entered into computer identifying product and its location in the sequence and the lower level changes are done automatically. Each production machine receives



settings/instructions from computer. These automatically loads/unloads required tools and carries out their processing instructions. After processing, products are automatically transferred to next machine. It is typically used in job shops and batch processes where product varieties are high and job volumes are medium to low. Such systems typically use Multipurpose CNC machines, Automated Guided Vehicles (AGV) etc.

Integrated Automation: It denotes complete automation of a manufacturing plant, with all processes functioning under computer control and under coordination through digital information processing. It includes technologies such as computer-aided design and manufacturing, computer-aided process planning, computer numerical control machine tools, flexible machining systems, automated storage and retrieval systems, automated material handling systems such as robots and automated cranes and conveyors, computerized scheduling and production control. It may also integrate a business system through a common database. In other words, it symbolizes full integration of process and management operations using information and communication technologies. Typical examples of such technologies are seen in Advanced Process Automation Systems and Computer Integrated Manufacturing (CIM).