

TIA University- TIA the Expressway Video Tutorial Cause & Effect Matrix Programming Language

General Information

Event Code: TBD
Length: 1 hour each

Audience

These video tutorials are for Engineers and PLC Programmers requiring an introduction to the fundamental aspects of TIA Portal advanced features and optional software tools.

Profile

Participants for these video tutorials must have a licensed copy of TIA Portal V17 or newer.

Each video tutorial comprises of two primary elements, a video tutorial and a TIA Portal project file mixtank.zap1x

Participants will watch the video and follow the instructor to complete each training exercise. This event is virtual (no live hardware) PLC Sim integrated into the Totally Integrated Automation framework is used for completing the lab exercises.

Learning Objectives

Upon completion of this event, the student shall be able to:

- Obtain a working knowledge and understanding of Cause & Effect Matrix (CEM) Programming
- Learn how to translate a process control narrative into a detailed CEM functional code element.
- Learn how to interpret existing TIA Portal alarming logic for use as causes
- Learn how to interpret existing TIA Portal interlock logic for use as effects
- Learn how to monitor the state of the Matrix online using PLCSIM

Exercise Topics

1. **Create a CEM function block**
 - a. Specifying the CEM programming language
 - b. Adding inputs to the block interface as causes
 - c. Adding outputs to the block interface as effects
2. **Programming a CEM function block**
 - a. **Cause instructions**
 - i) Overview of instructions
 - ii) Instantiating
 - iii) Commenting
 - iv) Assigning to FB inputs
 - b. **Effect instructions**
 - i) Overview of instructions
 - ii) Instantiating
 - iii) Commenting
 - iv) Assigning to FB outputs
 - c. **Actions**
 - i) Overview of instructions
 - ii) Instantiating
 - iii) Action Groups
3. **Instantiating a CEM function block**
 - a. Assigning existing alarm points to cause inputs
 - b. Assigning existing interlock points to cause outputs
4. **Simulation**
 - a. PLCSIM
 - b. WinCC Comfort simulator
 - c. Online monitoring of CEM function block