Global Common Controls Hardware Design (GCCH-1) Course

(Revision 4.0, dated 09/16/09)

Course No.	GCCH8017, (CTIS: 33543)
Duration	4 days
Pre-Requisites	No Pre-Requisites
Objectives	Upon successful completion of this course, participants will be able to: • Understand the purpose and benefits of the global standard. • Identify architecture components. • Utilize standard safeguarding measures. • Know what the GM Configuration for EPLAN is and where to locate it. • Use standard naming conventions. • Identify drawing packages at the system, controller/cell, and tool level. • Identify the lettered sections of a drawing. • Identify the robot specifications for robot interface packages. • Identify math-based tools and be able to locate them.

GCCH-1 Overview

This course is designed to familiarize participants with the content of the GCCH-1 Standard. CCRW controls architecture, safety hardware circuits, drawing package format, robot application interfaces, and math based tools are a few of the topics discussed. Participants will complete a hardware design project.

GCCH-1 Core Lecture – **1-1/2 Day**

Module	**Content**	**Delivery Method**	**Time** (Hours)
1 - Overview	• Scope. • Purpose and Benefits. • Audience. • GCCH-1 Supporting Information. • GCCH-1 Global Design Standards Document.	Lecture	1
2 - Architecture	• Design criteria for low, medium, high automation. • System, Cell, Station Architecture. • PLC family. • Block-pointing. • PLC, HMI, PDP, and E-Stop span of control. • Communication networks. • Global common panels and components.	Lecture Hands-on Activities	21/2 1/2
3 - Safety	• Scope and Purpose. • GM's Health and Safety. • Safety PLC and Safe I/O. • (SIL) Safety Integrity Levels. • Safety Categories. • Pulse Testing. • Benefits of Safety PLC and Safe I/O. • Monitored Power Systems (MPS). • Global Gate Box and Operator Settings. • Global Safeguarding, Components and Circuitry.	Lecture	2

4 - Documentation and Naming	• GCCH-5A User Manual location. • GCCH-5I Installation Manual location. • Definition of EPLAN P8. • Definition of GM Configuration for EPLAN P8. • Location of GM Configuration for EPLAN P8. • GM EPLAN Project templates. • EPLAN P8 deliverable formats. • Naming conventions.	Lecture	1
5 – Drawing Packages	• Standard, Templates, Electrical Cabinets, and Wiring Diagram. • Wiring Diagram (WD) Drawing Levels – System, Cell/Controller, Station -Tool. • Drawing Section Format.	Lecture	1
6 – Drawing Sections	• Drawing Sections – A, B, C, D, E, F, G, H, I, W, X, Y, Z.	Lecture	3
7 – Robot Packages	• Robot Supplier. • GRS1 and RS4 Specifications. • Drawing Package types. • Typical Robot Processes.	Lecture	1
8 – Math Based Tools	• Math Based Tools Definition. • Math Based Tools Location. • xRWD2eRWD definition. • Purpose and Benefits of eRWD. • eDrawing/eTool definition. • eCellDrawing definition. • eRWD flow process.	Lecture	1

GCCH-1 Project – **2 Day**

Module	**Content**	**Delivery Method**	**Time** (Hours)
1 - Overview	• Project Overview/Epsilon II Statement of requirements.	Exercise	1
2 – Preliminary Design	• Preliminary Design. • Controls Line-up. • Select Hardware. • Networks. • Perform Electrical Calculation.	Exercise	3
3 – Design Tool Wiring Diagrams	• GM CCRW Standards. • Drawing Packages and Templates. • Project Design Guidelines. • Air Sizing Calculation. • Verify Tool Panels and Drawings.	Exercise	3
4 – Design System/Cell Wiring Diagram	• System and Cell Drawing Packages and Templates. • Cell Level Drawing Packages and ECS Templates. • Cell Power Distribution and Networks. Buss Drop – Section CA. 480VAC Power Distribution – Section CB. 24VDC Power Distribution – Section CC. DeviceNet – Section CD. EtherNet – Section CE. Bonding – Section CG. Skid Crossover – Section CM. Cell Air Header – Section G. Cell Water Header – Section I. Cable Sizing BOM Reference – Section YA. • System Networks.	Exercise	4

GCCH-1 Certification – **1/2 Day**

Module	**Content**	**Delivery Method**	**Time** (Hours)
1 - Certification	• Certification	Test	4

Summary of Exercises

Listed below is a summary of the student hands-on activities and exercises for the course. Unique equipment and software for completing a particular exercise is shown in the right column that is in addition to the baseline training equipment required for conducting the entire course.

Module	Lab / Section Name (sections noted in bold)	Unique Equipment & Software required
Core Module 1: Overview	**1.7.1. Location of the GCCH-1 Document** Hands-on Activity (HA)	Web Browser
	1.7.2 GM SupplyPower Login and Password (HA)	Web Browser
Core Module 2: Architecture	**Exercise 1** Identify PLC Span of Control on layout by using markers.	Exercise 1 – PLC Handout
	Exercise 2 Identify PDP Span of Control on layout by using markers.	Exercise 2 – PDP Handout
	Exercise 3 Identify HMI Span of Control on layout by using markers.	Exercise 3 – HMI Handout
	Exercise 4 Identify E-Stop Span of Control on layout by using markers.	Exercise 4 – ESTOP Handout
Core Module 3: Overview	**3.11.3. Enter a Cell** (HA)	GM Trainers – (ECS-4009)
	3.11.4. Exit a Cell (HA)	GM Trainers – (ECS-4009)
Core Module 4: Documentation and Naming	**4.2.3. Location GCCH-5A** (HA)	Web Browser
	4.3.3. Location GCCH-5I (HA)	Web Browser

Module	Lab / Section Name (sections noted in bold)	Unique Equipment & Software required
	4.6. Location of GM Configuration for EPLAN P8 (HA)	Web Browser
Core Module 8 : Global eTools	**8.3.1. Location of Global eTools – GeRWD Home Page** (HA)	Web Browser
	8.3.2. Location of Global eTools – EPLAN Home Page (HA)	Web Browser
	8.3.3. Location of Global eTools – xRWD Home Page (HA)	Web Browser
Project Module 1: Overview	**1.2.1. Exercise- Epsilon II Statement of Requirements (SOR).** Identify requirements of an SOR.	cCRWBidPackagefor EPSILONIISORV1.1.pdf
Project Module 2: Preliminary Design	**2.3.1. xRWD Exercise** Determine prox switches and valves needed for unit.	AA065B1 Cell Layout MAA15847 Tool Layout.pdf MAA15843_xrwd.xls MAA15847_xrwd.xls MAA15846R_xrwd.xls
	2.4.1. Select Panels Exercise Select panels for cell.	ECS Choice List – AA065B1 Cell.xls AA065B1 ECS Cell Panels Layout.ppt
	2.5.1. Network Exercise Determine the number and layout for the DeviceNet networks.	MCP_Networks.xls AA065B1 Cell Networks Layout.ppt Reference ECS Drawing Packages Reference WDS Skid SEW Drawing Packages
	2.6.1. PDP Selection Exercise Confirm that PDP is sized correctly.	CCRW Global PDP Specification & Application Matrix Open PDP Selection.xls spreadsheet
	2.6.2. MCP Selection Exercise Select MCP.	ECS Choice List – AA065B1 Cell.xls

Module	Lab / Section Name (sections noted in bold)	Unique Equipment & Software required
Project Module 3: Preliminary Design	**3.3.1. Station Drawing Package Exercise** Complete the station drawing.	WD-MAA15847_Prelim(2007-11-14).pdf MAA15847_Tool Layout.pdf
	3.4 Air Sizing Exercise Confirm the air flow of the system.	None
Project Module 4: Design Controller (WD's) Wiring Diagrams	**4.2.1. Referencing ECS's & Station WD's Exercise.** Determine ECS #s to be used.	WD-LD07AA065B1_Prelim(2007-11-15).pdf WDT-G06-BODY1CELL_MAIN_RevC(2007-05-10)_en.pdf
	4.3.1. Buss Drop Exercise - Section CA Determine bus drops.	WD-LD07AA065B1_Prelim(2007-11-15).pdf WDT-G06-BODY1CELL_MAIN_RevC(2007-05-10)_en.pdf
	4.3.2. 480VAC Power Distribution Exercise - Section CB Determine power distribution cables.	WD-LD07AA065B1_Prelim(2007-11-15).pdf WDT-G06-BODY1CELL_MAIN_RevC(2007-05-10)_en.pdf
	4.3.3. 24VDC Power Distribution Exercise - Section CC Determine DeviceNet layout.	WD-LD07AA065B1_Prelim(2007-11-15).pdf WDT-G06-BODY1CELL_MAIN_RevC(2007-05-10)_en.pdf
	4.3.4. DeviceNet Exercise - Section CD Determine 24VDC connections.	WD-LD07AA065B1_Prelim(2007-11-15).pdf WDT-G06-BODY1CELL_MAIN_RevC(2007-05-10)_en.pdf AA065B1 Cell & Station Device Assignments.xls AA065B1 Cell DeviceNet Layout.ppt
	4.3.5. Ethernet Exercise - Section CE Label the IP Addresses.	WD-LD07AA065B1_Prelim(2007-11-15).pdf WDT-G06-BODY1CELL_MAIN_RevC(2007-05-10)_en.pdf

Module	Lab / Section Name (sections noted in bold)	Unique Equipment & Software required
	4.3.6. Bonding Exercise - Section CG Determine which panels are shown in the bonding interconnect.	WD-LD07AA065B1_Prelim(2007-11-15).pdf WDT-G06-BODY1CELL_MAIN_RevC(2007-05-10)_en.pdf
	4.3.7. Skid Crossover Exercise - Section CM Label light curtains.	WD-LD07AA065B1_Prelim(2007-11-15).pdf WDT-G06-BODY1CELL_MAIN_RevC(2007-05-10)_en.pdf AA065B1 Cell Skid Crossover Light Curtains.ppt
	4.3.8. 24VDC Safety Reset Motion Exercise – Section CM Complete safety reset motion 24VDC connection.	WD-LD07AA065B1_Prelim(2007-11-15).pdf WDT-G06-BODY1CELL_MAIN_RevC(2007-05-10)_en.pdf
	4.3.9. Controller Air Header Exercise - Section G Complete the pneumatic air feeds and hoses.	WD-LD07AA065B1_Prelim(2007-11-15).pdf WDT-G06-BODY1CELL_MAIN_RevC(2007-05-10)_en.pdf
	4.3.10. Controller Water Header Exercise - Section I Complete the welding hose sizes.	WD-LD07AA065B1_Prelim(2007-11-15).pdf WDT-G06-BODY1CELL_MAIN_RevC(2007-05-10)_en.pdf
	4.3.11. Cable Sizing Exercise Determine cable sizing.	None