**IQAN Training Recordings**

**Product Overview**

* [**Hardware Offering**](https://publish.vidavee.com/publish/17988C60D1F24E0C99DF40D1CC1181BC.doc?AF_deliveryChannel=landingpage)
* [**Software Offering**](https://publish.vidavee.com/publish/18C68E4A7188DD85F685FB244088EC81.doc?AF_deliveryChannel=landingpage)
* [**Electronics Introduction**](https://publish.vidavee.com/publish/127580B799EDDC4FA24FBE0371D58DCF.doc?AF_deliveryChannel=landingpage)

**Application Development Focus**

* [**IQAN Design 6 Overview**](https://publish.vidavee.com/publish/E6214A5B9AC00D4C253528610C2BAC93.doc?AF_deliveryChannel=landingpage)
* [**Interactive Project Build**](https://publish.vidavee.com/publish/CC2E988C6B37EC1374E0E328025E3637.doc?AF_deliveryChannel=landingpage) **– System Layout**
	+ **New Project – MD4 master**
	+ **Add MC41**
	+ **Connect CAN A of both to diagnostic bus**
	+ **Change MC41 address to 1**
	+ **Connect CAN A of both to master modules together to create a master bus**
* **Interactive Project Build – LST VIN to control Motor**
	+ **Add VIN for LST**
	+ **Show convenience and select device type as LST**
	+ **Add VIN to MC41**
	+ **Show VIN populated on MC41**
	+ **Change LST VIN to C1:9**
	+ **Add MAC**
* [**Object List**](https://publish.vidavee.com/publish/3105B61EE52056B4D154B6D7AD4060CE.doc?AF_deliveryChannel=landingpage)
* [**Interactive Project Build**](https://publish.vidavee.com/publish/94CF68C570358B488053C164F28D9F9E.doc?AF_deliveryChannel=landingpage) **– Implementing a Deadband**
	+ **Add Math channel**
		- **Name: LST MAC**
		- **Add multi-vector object**
		- **Input: LST VIN**
		- **4 pts (-100,-100), (-10,0), (10,0), (100,100)**
	+ **Add current output “Motor COUT”**
	+ **Manual setup of mode parameters from data sheet (slide)**
		- **Min current 180 mA**
		- **Max current 900 mA**
	+ **Add motor current out to MC41 C1:14/39/55**
	+ **Set PWM Frequency for COUT to 500 Hz**
* [**Qcode**](https://publish.vidavee.com/publish/72F7252D9B0DE3955048892C9C0E7FA3.doc?AF_deliveryChannel=landingpage)
* [**Interactive Project Build**](https://publish.vidavee.com/publish/26B97FB6C5241B7133C055778ABAB25E.doc?AF_deliveryChannel=landingpage) **– Qcode example**
	+ **Add Math Channel and Switch to Qcode**
		- **Name: LST Qcode**
		- **Result := Vector (LST VIN, (-100,-100), (-10,0), (10,0), (100,100))**
	+ **Compare Old and New**
	+ **Simulate and test**
* **Exercise – Add LSL VIN MC41 C1:8 / COUT MC41 C1:15/40/56 to control Cylinder using a DMAC channel**
	+ **Add Voltage Input Channel**
		- **Name: LSL VIN**
		- **Device Type: IQAN-LSL**
		- **Drop onto MC41 and check pin assignment**
	+ **Object List Version**
		- **Add Dual Direction Math Channel**
		- **Name: LSL DMAC**
		- **Controlling +/-: Multi-vector object**
		- **Input: LSL VIN**
		- **4 pts (-100,-100), (-10,0), (10,0), (100,100)**
	+ **Qcode Version**
		- **Add Math Channel**
		- **Name: Command Qcode**
		- **Qcode:
		command := vector(LSL VIN, (-100, -100), (-10, 0), (10, 0), (100, 100))**

**Result := command**

* + **Add Current Output channel**
		- **Name: Cylinder COUT**
		- **Input Channel: LST DMAC**
		- **Default Mode Currents: 180 min, 900 max, both directions**
		- **Drop onto MC41 and check pin assignment**
* [**Function Groups**](https://publish.vidavee.com/publish/EE88937B9AF3AF5D3D1F6819447B34E1.doc?AF_deliveryChannel=landingpage)
* [**Interactive Project Build**](https://publish.vidavee.com/publish/7A48E67DABD399E61C18FA84B9A6EE4D.doc?AF_deliveryChannel=landingpage) **– Create Cylinder Function Group**
	+ **Create function group “Cylinder Functions”**
	+ **Drag LSL VIN, LSL DMAC and Cylinder COUT to new group**
	+ **Create function group “Motor Functions”**
	+ **Drag LST VIN, LST MAC, and Motor COUT to new group**
* [**Interactive Project Build**](https://publish.vidavee.com/publish/5029288387CD326E97563189520AF365.doc?AF_deliveryChannel=landingpage) **– FP2000 to stop cylinder at ends**
	+ **Add 2 DIN inputs**
		- **Cyl Extend Limit DIN**
		- **Cyl Retract Limit DIN**
	+ **Drop Cyl Extend Limit DIN on MC41 C1:10**
	+ **Drop Cyl Retract Limit DIN on MC41 C1:24**
	+ **In DMAC for cylinder, add limiting + dual object**
		- **Input: Cyl Extend Limit DIN**
		- **Out 1: 0**
		- **Out 2: 100**
	+ **In DMAC for cylinder, add limiting – dual object**
		- **Input: Cyl Retract Limit DIN**
		- **Out 1: 0**
		- **Out 2: -100**
	+ **Change Command Qcode:**
		- ****
	+ **Simulate and test**
* [**CAN / J1939 Introduction**](https://publish.vidavee.com/publish/74C6580229C54379871E71623548EFE7.doc?AF_deliveryChannel=landingpage)
* [**Interactive Project Build**](https://publish.vidavee.com/publish/51F16D18B69F7A1D571B853506CF2143.doc?AF_deliveryChannel=landingpage) **– Limit cylinder function based on engine speed**
	+ **Add J1939 device (Engine)**
	+ **Connect CAN B of both master modules to J1939 bus**
	+ **Add JPIN (Manual Method)**
		- **Name: SPN 190 Engine Speed**
		- **Unit: RPM**
		- **Length: 2 Bytes**
		- **Resolution: 0.125**
	+ **Add JFIN**
		- **Name: EEC1**
		- **PGN: 61444 or 0xF004**
		- **Parameters: SPN 190 Engine Speed**
		- **Bit offset: 25**
	+ **Add EEC1 to engine**
	+ **Add channels using CAN database (Database Tool Method)**
	+ **Demonstrate timeout warning and fix**
	+ **Add to limiting + in LST DMAC**
		- **Vector Object**
		- **Input: SPN 190 Engine Speed**
		- **In 1: 700**
		- **Out 1: 20**
		- **In 2: 1300**
		- **Out 2: 100**
	+ **Add to limiting – in LST DMAC**
		- **Vector Object**
		- **Input: SPN 190 Engine Speed**
		- **In 1: 700**
		- **Out 1: -20**
		- **In 2: 1300**
		- **Out 2: -100**
	+ **Add Math Channel**
		- **Name: Limiter Qcode**
		- **Qcode:
		// Qcode to determine command limit based on engine speed
		Engine\_Speed\_Limit := vector(Engine Speed, (700, 20), (1300, 100))**

**Result := Engine\_Speed\_Limit**

* + **Add Math Channel**
		- **Name: LSL Qcode**
		- ****
	+ **Simulate and test**
* [**Interactive Project Build**](https://publish.vidavee.com/publish/4ABBEB26F2E347F12C647DF8365B5215.doc?AF_deliveryChannel=landingpage) **- MD4 User Interface Design**
	+ **Add Display Page “Main Page”**
	+ **Add menu button (Add / Symbol Button / Image Library / menu small)**
	+ **Set action “enter menu system”**
	+ **Simulate and show**
	+ **Add Valve Currents**
		- **Add / Visual Controls / Label**
		- **Text: Cylinder Current**
		- **Alignment: Right**
		- **Add / Visual Controls / Value**
		- **Input channel: Cylinder COUT**
		- **Show: Value and Unit**
		- **Repeat or copy/paste for Motor Current**
	+ **Add LSL and LST commands**
		- **Repeat Valve Current steps for LSL and LST commands**
	+ **Add engine speed gauge**
		- **Visual Controls / Image Gauge / Image Library / Gauge Dial 4 Segment**
		- **Width: 400**
		- **Foreground: Blue**
	+ **Modify engine speed gauge properties**
		- **Input Channel: SPN 190 Engine Speed**
		- **Range Max Value = 4000**
		- **Needle Color: Red**
		- **Needle Length: 160**
		- **Needle Base Width: 10**
		- **Needle Tip Width: 0**
		- **Needle Anchor Color: Red**
	+ **Add RPM labels (0, 1, 2, 3, 4)**
	+ **Add Image library**
		- **Show import from library**
		- **Show import custom image**
		- **Add gauge image**
	+ **Add another engine speed gauge**
		- **Input Channel: SPN 190 Engine Speed**
		- **Range min angle: 225**
		- **Range max angle: 315**
		- **Range max value: 8000**
		- **Needle Color = blue**
		- **Needle Length = 100**
		- **Needle Width = 5**
		- **Anchor Color: medium grey**
	+ **Simulate and test**
* [**Interactive Project Build**](https://publish.vidavee.com/publish/F215C98280836600D90C6EA456B5820F.doc?AF_deliveryChannel=landingpage) **– PID (MC41)**
	+ **Add PID channel “Motor PID”**
	+ **Add FIN channel**
		- **Name: Motor Speed FIN**
		- **172 Hz = 1720 RPM**
		- **Add to MC41 C1:11**
	+ **Add 4 function parameter channels “I gain”, “P gain”, “D gain”, “Motor PID Command”**
	+ **Add state parameter channel “PID Enable SP”**
		- **Default State: Disabled**
		- **Add one state and rename to “Enabled”**
	+ **Add Internal Digital Channel**
		- **Name: PID Enable IDC**
		- **Object List:**
			* **Function Selector: PID Enable SP**
			* **Disabled: No Objects**
			* **Enabled: Single object, input true**
		- **Qcode:**
			* **Function Selector: PID Enable SP**
			* **Disabled: No Qcode**
			* **Enabled: Result := true**
	+ **Link support channels to PID channel “Motor PID”**
		- **Command: Motor PID Command**
		- **Feedback: Motor Speed FIN**
		- **P regulator: P Gain**
		- **I regulator: I Gain**
		- **D regulator: D Gain**
		- **Enable: PID Enable IDC**
	+ **Create adjust group “Motor Parameters”**
	+ **Add “P Gain”, “I Gain”, “D Gain” to adjust group**
	+ **Add “Motor Speed Command” and “PID Enable SP” to adjust items**
	+ **Explain difference between Adjust Groups (Adjustable via IQAN Run and User Interface) and Adjust Items (Adjustable via User Interface only)**
* **Interactive Project Build – PID (MD4)**
	+ **Add state picker to Main Page**
		- **Interactive Controls / State Picker**
		- **Input: PID Enable SP**
	+ **Add Value and Label controls for Motor Speed Command**
		- **Copy and paste LSL VIN label and value controls**
		- **Change text to “Motor Speed Command”**
		- **Change input to Motor PID Command**
	+ **Add Value and Label controls for Motor Speed Feedback**
		- **Copy and paste LSL VIN label and value controls**
		- **Change text to “Motor Speed Feedback”**
		- **Change input to Motor Speed FIN**
	+ **Add slider on interface and tie to Motor Speed Command**
		- **Interactive Controls / Slider**
		- **Input: Motor Speed Command**
		- **Width: 400**
* **Interactive Project Build – PID (MC41)**
	+ **Adjust min / max values**
		- **Expand Adjust Items**
		- **Select Function Parameters category**
		- **Expand each item to show min / max / step size**
		- **Motor Speed Command = 0 to 500, step size 10**
		- **Gains = 0 to 15, step size 0.01**
	+ **Link PID Enable SP to LSL MAC using Function Selector**
		- **Function Selector: PID Enable SP**
		- **Disabled: Use existing object list / Qcode**
		- **Enabled: Motor PID**
* [**Interactive Project Build**](https://publish.vidavee.com/publish/2D0B517948B368639F08A9D99B8CA42D.doc?AF_deliveryChannel=landingpage) **– Add Video to project**
	+ **Add SV to system**
	+ **Add small video window to main page (160x120 narrow)**
	+ **Add video page to display pages**
	+ **Add video button on main page and link to video page**
	+ **Add large video window to video page (640x480 wide)**
	+ **Add return button on video page and link to main page**
* [**Independent Exercise 1**](https://publish.vidavee.com/publish/804DF85C97EC5A07CC9EF7C73BA59475.doc?AF_deliveryChannel=landingpage) **– Implement the RF50 input as a cylinder speed clamp**
* [**Review Exercise Solutions**](https://publish.vidavee.com/publish/B65E7AB2DF901E8866D1320C06913E01.doc?AF_deliveryChannel=landingpage)
	+ **MC41: Add voltage input channel to Cylinder Functions group**
		- **Name: RF50 VIN**
		- **Device Type: RF50**
		- **Drop onto MC41 and verify connection on C1:25**
	+ **Add math channel to convert degrees to %**
		- **Name: RF50 MAC**
		- **Controlling: Vector Object, input = RF50 VIN, points = (-45, 0), (45, 100)**
	+ **Link RF50 MAC to LST DMAC channel**
		- **Object List:**
			* **Limiting +: Single object with input RF50 MAC**
			* **Limiting -: Math object with operator = \*, operand 1 = RF50 MAC, operand 2 = -1**
		- **Qcode:**
			* **Modify Limiter Qcode channel:**
	+ **MD4: Add value channel to display and link to RF50 VIN**
	+ **Add label**
* [**Independent Exercise 2**](https://publish.vidavee.com/publish/3862E7AD5B5B5645E38020A54C0D568B.doc?AF_deliveryChannel=landingpage) **– Automatic Cylinder Cycle**
* [**Review Exercise Solutions**](https://publish.vidavee.com/publish/8E6629D28B1224EF03A32C8A5DCAA033.doc?AF_deliveryChannel=landingpage)
	+ **In the cylinder functions group, add a digital parameter channel**
		- **Name: Cylinder Mode DP**
		- **True Text: Auto**
		- **False Text: Manual**
	+ **Add channel to adjust items**
	+ **On the main page, add a Switch control**
		- **Input: Cylinder Mode DP**
	+ **On the main page, add a label control next to the switch**
		- **Text: Cylinder Mode**
	+ **Add an Internal Digital Channel**
		- **Name: Cyl Extend Latch IDC**
		- **Activating**
			* **Single Object**
			* **Cyl Extend Limit DIN**
			* **Combination: Latching Or**
		- **Blocking**
			* **Single Object**
			* **Cyl Retract Limit DIN**
	+ **Add a Math Channel**
		- **Name: Auto Cyl Cmd MAC**
		- **Controlling**
			* **Dual Object**
			* **Input: Cyl Extend Latch IDC**
			* **Out 1: -100**
			* **Out 2: 100**
	+ **Modify the LST DMAC channel**
		- **Single Object: Auto Cyl Cmd MAC**
		- **Dual Object:**
			* **Input: Cylinder Mode DP**
			* **True: Object B**
			* **False: Object A**
	+ **Add Math Channel**
		- **Name: Auto Cyl Cmd Qcode**
	+ ****
	+ **Modify LSL Qcode**
		- ****
	+ **Simulate**
* **Add signal generators in IQAN simulate to toggle prox switch inputs**
	+ **Add Cyl Extend Limit DIN and Cyl Retract Limit DIN to Simulation Group**
	+ **Configure Cyl Extend Limit DIN:
	**
	+ **Configure Cyl Retract Limit DIN:
	**

**Diagnostic / Technician Focus**

* [**IQAN Design Diagnostics and Additional Features**](https://publish.vidavee.com/publish/33B0FAE69311EDF011AF3E2A1DF5B7FD.doc?AF_deliveryChannel=landingpage)
	+ **Measure Groups**
		- **Create Cylinder Functions Group**
		- **Drop in some cylinder related channels**
	+ **Logs**
		- **Create Statistics Log**
		- **Engine Speed > 2000 Counter**
	+ **Component Navigator**
	+ **Multimeter**
	+ **Project Properties**
	+ **Project Statistics**
	+ **Comments**
	+ **Languages**
	+ **External Functions**
		- **Create external function with the Motor Functions function group**
		- **Add adjustable channels to adjust items**
		- **When added back to main program, add gains to adjust group**
* [**IQAN Security Features**](https://publish.vidavee.com/publish/409C7ABAA1F23A0B7E2DD9AAD30EE66B.doc?AF_deliveryChannel=landingpage)
	+ **User Levels**
		- **Apply user level to adjust group**
		- **Demo in IQAN run**
	+ **PIN Codes**
	+ **Application Passwords**
	+ **Function Group Passwords**
	+ **Safe Passwords**
* [**IQAN Resources and Connectivity**](https://publish.vidavee.com/publish/322FD12AA1A94360B0D9BC30891254E2.doc?AF_deliveryChannel=landingpage)
	+ **Help Box**
	+ **PDF documentation**
	+ **Solution Library**
	+ **Forum**
	+ **IQAN Store**
	+ **Connectivity**
* [**IQAN Run Overview**](https://publish.vidavee.com/publish/A1BA700C5DA1A216A1152587EC27D490.doc?AF_deliveryChannel=landingpage)