**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)

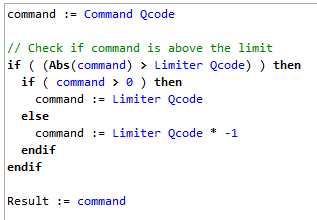
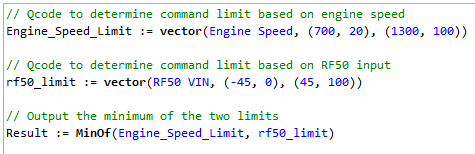
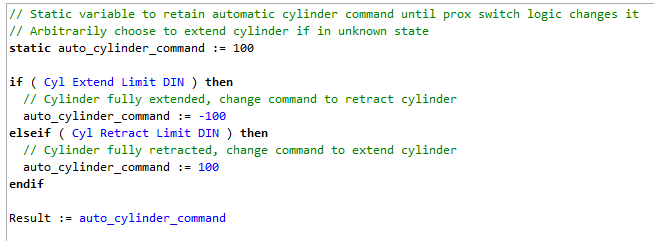
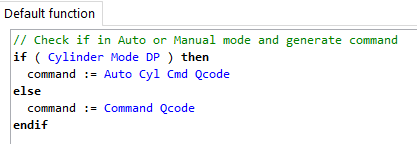
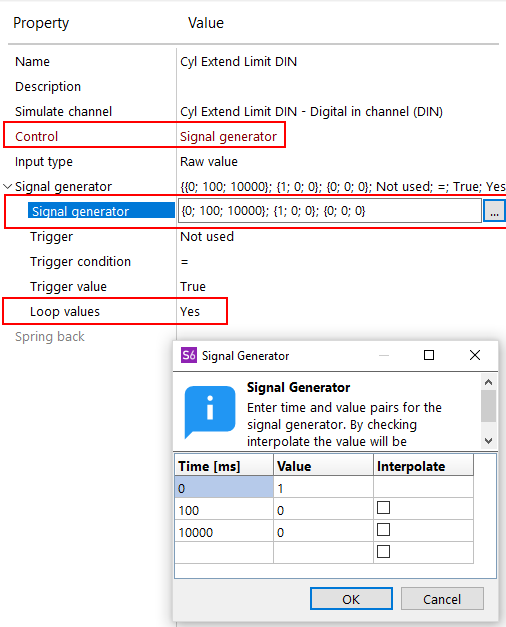
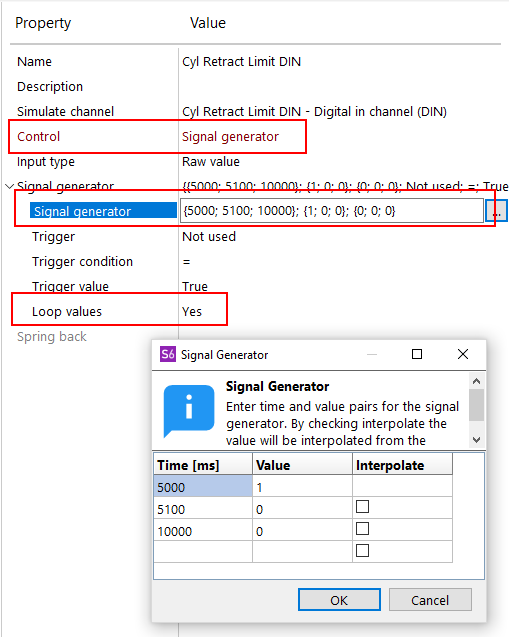
**Application Development Focus**

* [**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)