

# Directions to Conduct the Refinery Burner Simulation SAND2010-6259P

August 12, 2010, G. M. Pollock

**Set IPs:** Execute the .bat files listed at the end of this document to set and reset the required network IPs.

## **BRING LAPTOP SYSTEMS and PLC CONTROLLER UP:**

- 1) Ensure the correct dongles are in the Scada PLC controller (S917478) and in the laptop running TOPDOC. The SoftPLC lite dongle goes in the PLC, and the TOPDOC dongle goes in the PC.
- 2) Connect the network cables between the laptops and the correct PLC controller.
- 3) Turn on both laptop systems (One running TOPDOC, UMBRA, and CLEARSCADA in a VMware Player, and one running trustAnchor) and the SCADA PLC controller.
- 4) Once everything is booted up and you have logged in:
- 5) Bring up and properly initialize: TOPDOC, UMBRA, and the ClearSCada HMI (ClearScada is in the VMware Player).
- 6) Position the windows as desired. [Note: To Reposition the windows, look at the large screen for placement (its viewing area may be different than the laptop view).]
- 7) Drive the simulation by clicking on the appropriate HMI buttons.

## **BRING UP AND INITIATE THE TOPDOC PROGRAM:**

- 1) Initiate the SoftPLC TOPDoc program. (\*see bottom of last page)
- 2) Select the SNL PLC definition at the top of the left panel.
- 3) Click "Detect on Net" to verify the IP address: which should be 192.0.1.110. If you get an IP of: 10.0.1.100, you have the cable connected to the wrong port on the PLC controller. The cable should connect to the port at the top, in the middle of the back of the controller. (The port in the bottom right most corner is the wrong one. This depends on the PLC controller. )
- 4) Next, click the SNL plc definition again, Click on the Module panel to make sure you have the correct drivers selected.
- 5) Click on "edit remotely" to determine whether the correct program is running or not.

## **BRING UP AND INITIATE UMBRA:**

- 1) Click on the UmbraViewer half-moon crescent icon, the third column in the top row of the laptop desktop icons. ( The viewer icon, wherever it is located.)
- 2) Minimize the Umbra console debug window – looks like a windows command prompt window.
- 3) When everything comes up and you have a prompt in the uvview window (you have to click on the uvview window to enable it) Select the Libraries drop-down and pick: com, cppUtil, gbs, particleSystem, RoadPlanner, sensors, SoS, Terrain, umbutil. They may already be selected.
- 4) Then position the cursor directly on the prompt line which is different for different versions ( e.g. "(Umbra481) 1 %" ) and type:  
"parseXML /data/projects/IO/trustAnchorReboilerExperiments.xml -file"  
And hit return. [Alternatively, if you have run the setup before hit the up arrow until it displays the above line then hit return.]
- 5) A launcher window will pop up. Make sure Refinery, multiRTU, burner, and TrustAnchorRTU is selected; then click ok.
- 6) Wait for the smoke to clear in the Umbra0 graphics view window; you can reposition it while waiting if you wish.
- 7) If you want to view the trustAnchor variables in the simulation, then press the up arrow twice again in the uvview window and execute the command: "monitor trustAnchor".
- 8) The Umbra history will remember the last commands executed, so if you don't execute "monitor trustAnchor" one time, you may only need one up arrow, when starting, to reach the parseXML command above.
- 9) Position the windows as you wish, minimizing any windows you don't care to see.
- 10) In the uvview window (after clicking to make it the active window), select the Views option on the command bar, and then "burner" from the drop down list, which should reposition the graphics to a view directly focused on the refinery burner model.

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## **BRING UP AND INITIATE CLEARSCADA:**

- 1) Click on the VMware Player icon.
- 2) When it comes up, select the saved file that has "HMI" in the path name when you point at it (this will most likely be the first one listed, which is the last one that was used) "c:\Documents and Settings\DigitalBond\Desktop\HMI\Trust Anchor SCADA.vmx" is the correct file.
- 3) When that comes up, click on the Clear Scada service manager icon to see whether or not the DBServer is running. The DBserver runs for two hours, and then shuts off.
- 4) If the DBserver is not running, click the green start button. (To turn it off, click the red stop button.)
- 5) A message at the bottom of the pop-up window should state whether the DBserver is running or not.
- 6) Also, there is a icon with a "c" in the middle of it at the far right of the command line at the bottom task bar, if the icon is blue, the DBserver is running, if it is grey, it has stopped for some reason (time-out most likely)
- 7) Once the DBserver is running, click on the ViewX icon
- 8) Once that window comes up, depending on how the system was shut down, it may initiate a demo program. If not, proceed to step 10. Otherwise, an Alarm banner will appear across the bottom of the ClearScada window as part of one of the sales demos for ClearScada. At the far left, probably in red, two numbers will appear over each other. [One of the main sales demos will display a fourteen over another fourteen.] You need to disable the bell or an alarm will sound in a few moments. (Not sure this will happen with a VM, but in any case you don't want the flashing distractions of the demo error messages.) Dismiss the Alarm banner by closing it after disabling the alarm.
- 9) If the alarm banner is flashing at the bottom, you can disable the alarm bell by pointing and right clicking at the numbers (14? Depends on the demo) flashing in red in the lower left portion of the Alarm banner panel at the bottom; then select disable bell -- if that entry is one of the options. If the option is enable bell instead of disable bell, do not select, just leave it alone. If you do not disable the bell, an alarm may sound after a short while.
- 10) Next, select File Log on... and log on with the user name "Eng" which is case sensitive, there is no password so leave it blank and then click ok.
- 11) Expand main
- 12) Expand RefineryBurnerMonitor
- 13) Click on the desired HMIs, one of which is the last entry titled: "RefineryBurnerHMI"
- 14) If the title on the window that comes ups says: "RefineryBurnerMonitor.RefineryBurnerHMI[Design]" you are in design mode and must switch to running mode. You can also tell that you are in design mode if the background is covered in dots, and rulers show on the top and left edges (unless someone changed that option by clicking on the icons available above, but in any case, it will still say [Design]).
- 15) To switch to running mode, you will need to click on the small icon that looks like a triangle on top of a ruler with a pencil starting to trace the angle. This is an icon on the second line of icons, in the fifth grouping of icons (the only icon in the fifth group), or the 10<sup>th</sup> icon on that line. If it isn't activated, click on the refinery burner HMI design in the viewing window. (clicking in the database panel disables the design icon) If you are in design mode, the background of this icon will be white instead of grey.
- 16) Once that is clicked it will no longer be highlighted, the dots in the background of the HMI will go away, and the title on the window will now read: "RefineryBurnerMonitor.RefineryBurnerHMI", and you are running the HMI.
- 17) If you wish to make more room, you can now close the database panel by clicking the small "x" in the upper right corner of the database panel to the left. [to get the database back if needed, click on the 18<sup>th</sup> icon on the second line, it is in the 10<sup>th</sup> group of icons on that line, and looks like a couple of inverted golf clubs with a couple of horizontal lines to the right, an abstract concept of a hierarchical file structure]
- 18) You can click to expand the size of the HMI to fill the space and then roll the mouse center wheel to enlarge or shrink the size of the HMI to the desired size. To make it as large as possible click on View then design then View again and deselect design, then click the page icon at the far left. Close the database and the alarm banner panels, if open. Use the mouse wheel to set the desired size.
- 19) You can also click the small x to the left of the error bar on the bottom, but be sure to disable the bell first. [You can get this back by selecting View, then Alarm Banner in the drop-down list]
- 20) When you click on window, you want the RefineryBurnerHMI to be selected.
- 21) If you click on the little page icon, the last icon on the second line of command icons, it will also make the viewing area a little larger.
- 22) Position and size the window as you wish, the top left works ok.

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## **DETAILS FOR RUNNING THE CORRECT LADDER PROGRAM:**

- 1) If you wish to run the correct ladder program (not buggy), in the Module panel of the SNL def, you want the following modules to be clicked (and only these modules):
  - Driver MBIPMast.TLM
  - Driver MBIPSlav.TLM
- 2) Click on edit remotely to see which program is running. The 1<sup>st</sup> line of the ladder program will tell you which program is currently executing. If the 1<sup>st</sup> line reads: "Management Demo on June 2, 2009, you have the correct program. If you do not have the correct program:
  - a. Kill the current ladder logic program
  - b. Select the STARTUP panel in the SNL def window.
  - c. Select SoftPLC/App/TRUST3 in the app text entry box.
  - d. Click on remote Send to send this information to the PLC ( This tells the plc which program to run upon startup)
  - e. Restart the PLC (can turn the on button on then off, but takes longer) by logging in to admin (click "remote console" user: xxxx; password xxxxxx), then "/etc/init.d/softplc.sh restart"
  - f. Once the PLC has restarted, click on edit remotely and check that the correct program is running

## **DETAILS FOR RUNNING THE Buggy LADDER PROGRAM:**

- 0) Click edit remotely in TOPDOC.

The 1<sup>st</sup> line of the ladder program will tell you which program is currently executing. To run the buggy ladder program, TRBUGGY1 PLC program should be running. If it is not, kill the ladder logic program window and do the following:

  - a) Kill the current ladder logic program
  - b) Select the STARTUP panel in the SNL def window.
  - c) Select SoftPLC/App/TRBUGGY1 in the app text entry box.
  - d) Click on remote Send to send this information to the PLC ( This tells the plc which program to run upon startup)
  - e) Restart the PLC (can turn the on button on then off, but takes longer) by logging in to the remote console. [You should be logged in as root@SNL or root@ccccc, where ccccc is the name of your desired local PLC definition ] then type "/etc/init.d/softplc.sh restart" (the directory you are in doesn't matter)
  - f) Once the PLC has restarted, click on edit remotely and check that the correct program is running

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## Short Command list:

### **Switching from one program to the other program:**

- 1) Kill the current ladder logic program window
- 2) Maximize the TOPDOC preferences window
- 3) Select the startup panel
- 4) Change the app text box to point to:
  - a. BUGGY1 if you want to run the buggy program next, or
  - b. TRUST3 if you want to run the correct program next
  - c. Send the new data to the PLC, which tells it the program it should run the next time it reboots, by clicking on REMOTE send
- 5) Restart the PLC, either click the on-off button (takes the longest) or login the remote console using root and xxxxxx (or xxxxxx) and execute the command, “/etc/init.d/softplc.sh restart”, from any directory. Minimize the admin window.
- 6) Once the PLC has restarted and completed initialization, Click edit remotely.
- 7) Make sure the PLC is running the desired program.
- 8) Minimize the PLC window and the TOPDOC window.
- 9) Check the HMI to make sure the program is in the start state, if it is not, click on Power OFF and turn off all of the other buttons on the HMI, wait for it to reset.
- 10) Position the Ladder Program window as you wish, bottom left works ok.
- 11) Kill Umbra by closing the graphics window Umbra0.
- 12) Restart Umbra as specified above to make sure it is initialized properly.
- 13) Ready to go ....

**INITIALIZE REQUIRED IPs:** (Depending on your system configuration, you may require more statements; check your configuration with the ipconfig command in a cmd shell so that you know how to reconfigure your system before you execute the following initialization .bat file)

TO SET IPs: Place these commands into a .bat file and execute them to establish the required IP addresses:

```
netsh interface ip set address name="Local Area Connection" static addr=192.0.1.50 mask=255.255.255.0 gateway=192.0.1.50 1
netsh interface ip add address name="Local Area Connection" 192.0.1.100 255.255.255.0
netsh interface ip add address name="Local Area Connection" 192.0.1.101 255.255.255.0
netsh interface ip add address name="Local Area Connection" 192.0.1.102 255.255.255.0
ipconfig
pause
```

TO RESET: Place the following commands into a .bat file and execute them to reset the system IP address:

```
netsh interface ip set address name="Local Area Connection" dhcp
ipconfig
pause
```

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## **POSSIBLE PROBLEMS:**

- 1) HMI does not appear to be responsive:
  - a. Check to make sure the DBserver is still running (has to be restarted every two hours)
  - b. Make sure you are not in design mode -- you must be in run mode and logged in as "Eng".
- 2) You may not be running the correct ladder program.
- 3) Umbra may need to be reinitialized each time you run through the demo.
- 4) TOPDoc comes up and says it is unable to find the software key ...
  - Make sure you have the right dongle installed, one is for TOPDOC, and the other is for the PLC.
  - If the right dongle is installed and you are getting the "unable to find the software key" message,
  - Go to C:\SoftPLC\bin\keylok2
  - Take out the dongle
  - Execute the Install script that is in the keylok2 directory
  - Put the dongle back in and let the hardware wizard run as needed.
  - You might need to go to the control panel and click on add hardware to get the wizard to run, then it will scan for hardware, say you have already installed the hardware if it asks (dongle must be plugged in) then select USB Dongle –Software Protection Device, which is near the end. Finish.
  - Try to restart TOPDOC again, a new login box should appear, just click ok, then close the next window that pops up. At that point, you should be able to click the PLC button in the panel to the left.
- 5) You may need to restart the PLC if the system becomes confused.
- 6) You try to send or fetch data from the PLC and it will not allow you to connect to the PLC:
  - a. Log in to the remote console using root and "xxxxxxx" or [ "xxxxxxx" if that doesn't work]
  - b. Execute /etc/init.d/softplc.sh start if there is a green OK to the right continue
  - c. If not, execute /etc/init.d/softplc.sh restart and you should get a green ok to the right
  - d. Remote Fetch the module data to see which drivers been selected
  - e. Select the correct drivers and complete a remote send if you made any changes
  - f. Select the Startup panel and select the program to run, click remote send, if it asks you for the old password, give it "xxxxxxx" [or try "xxxxxxx"] if that does not work.
- 7) If the PLC is not turned on, you will get an error when you try to detect it on the net.

\* Be sure the SOFTPLC program has been installed in the correct directory; it must be located in: C:\SoftPLC\app\XXXXXX, where XXXXXX is the name of the ladder logic program to run on the SoftPLC controller. Log in user default, no password, just click ok on window re SoftPLC News and Updates, click PLC on the left panel.