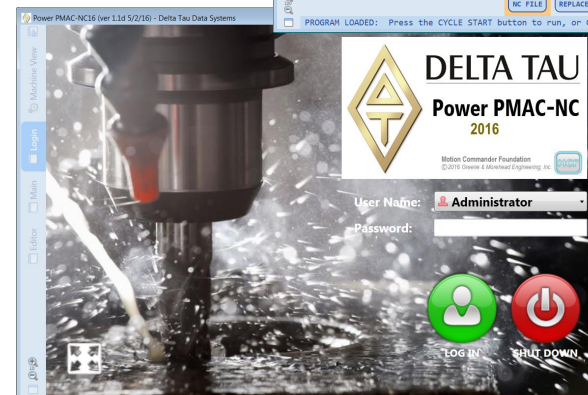
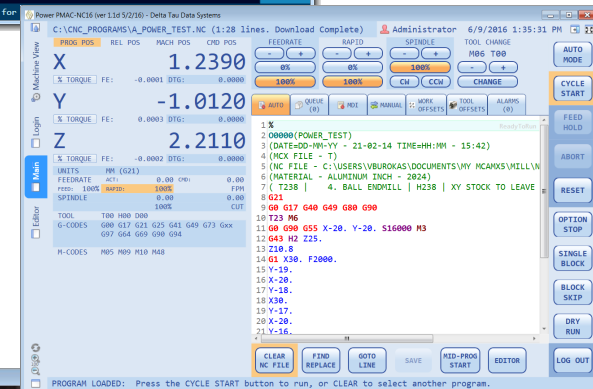
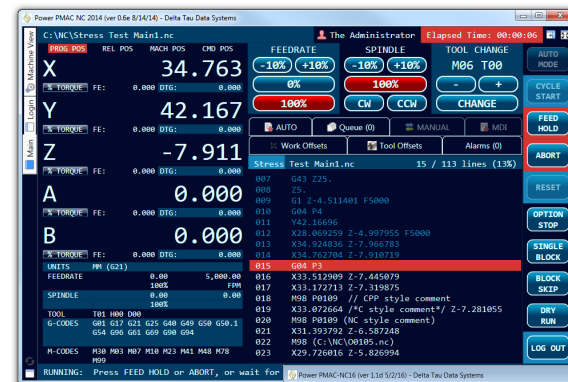


ODT – Power Pmac NC 16 Software

March 2018
Vincent Burokas



- **Capability for PMAC to execute G-code style programs implemented in 1990.**
- **First Delta Tau CNC Control System Deployed 1992.**



What is an ODT CNC System?

Power PMAC CNC controls are flexible, open architecture, real-time, high performance manufacturing solutions.



Operator Interface

Windows Based HMI
with
Power PMAC NC16
(ODT or OEM)

*Optional - No HMI
PMAC does not need an
HMI to execute G-code.*

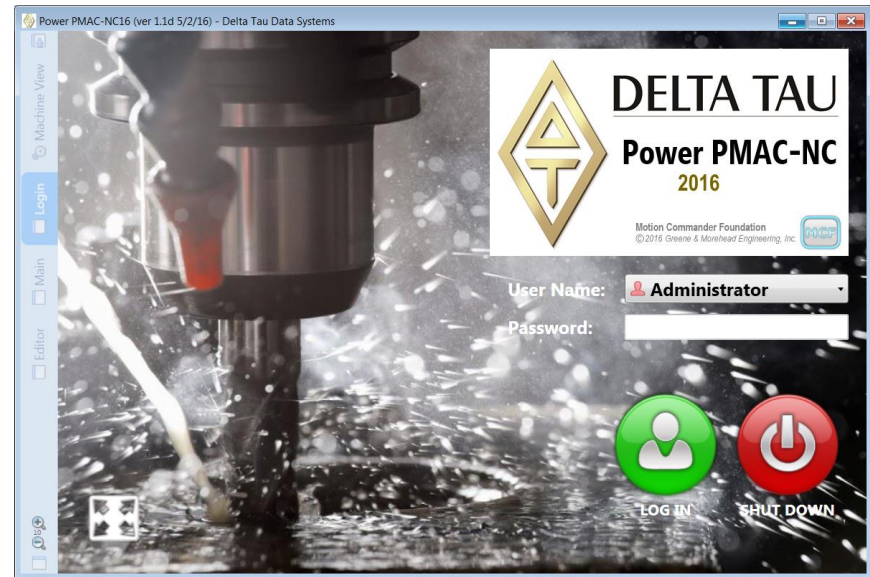
Power PMAC Control

Software Enabled to
execute G, M, T, & D
codes via a special set of
sub-programs loaded
into PMAC. These sub-
programs are fully
customizable.

Motors, Drives, and I/O

Various options are
available including
Ethercat, Analog,
Macro, Step/Direction,
and other interface
options.

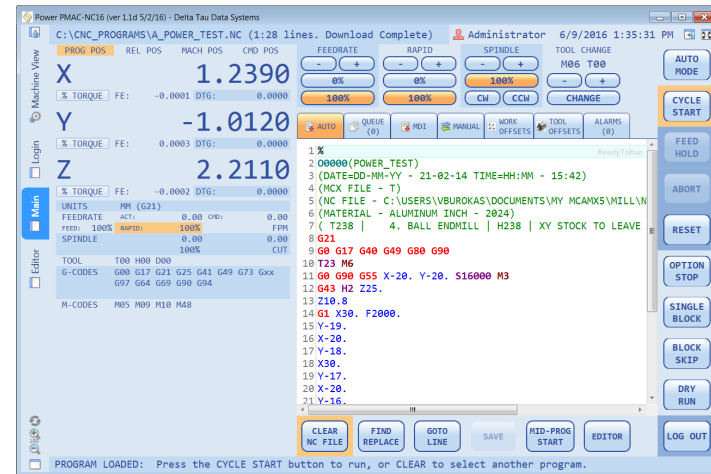
The Power PMAC NC16 Software

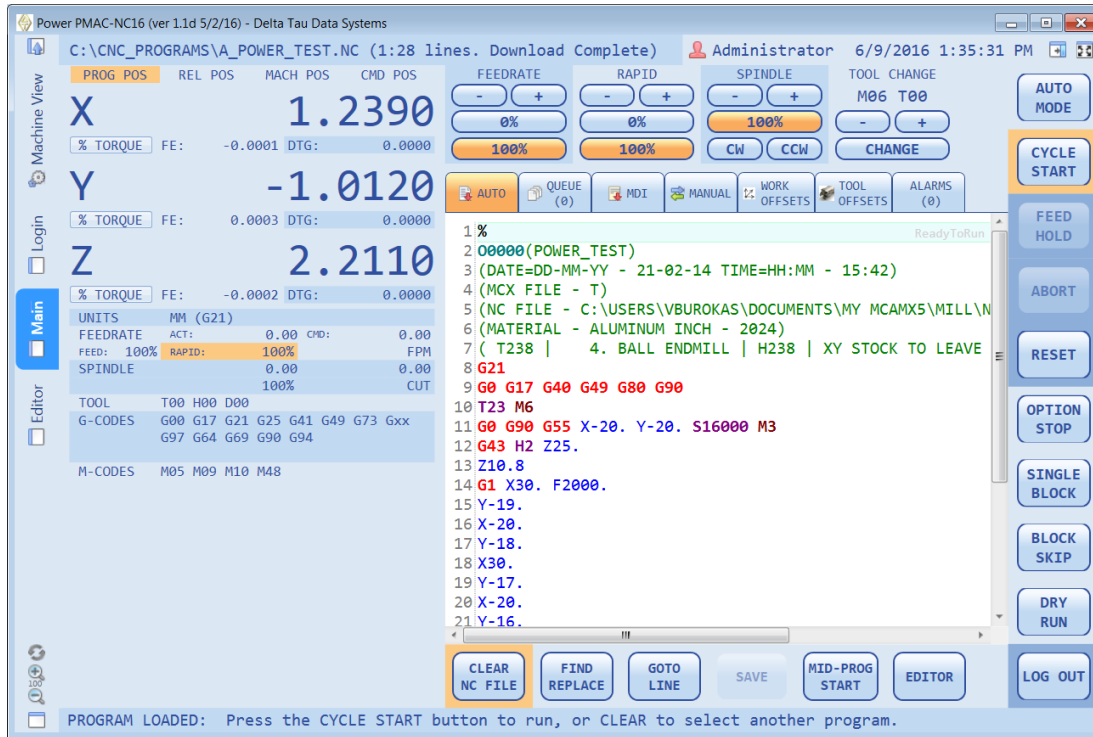


Power PMAC NC Design Goals:

- **Create an Open Architecture CNC HMI for Power PMAC.**
- **Maintain Power PMAC's motion capability while maintaining industry standards (more or less...).**
- **Keep the code exposed to the machine builder for customization (Key word...Open).**
- **Utilize Microsoft Visual Studio to create the HMI.**

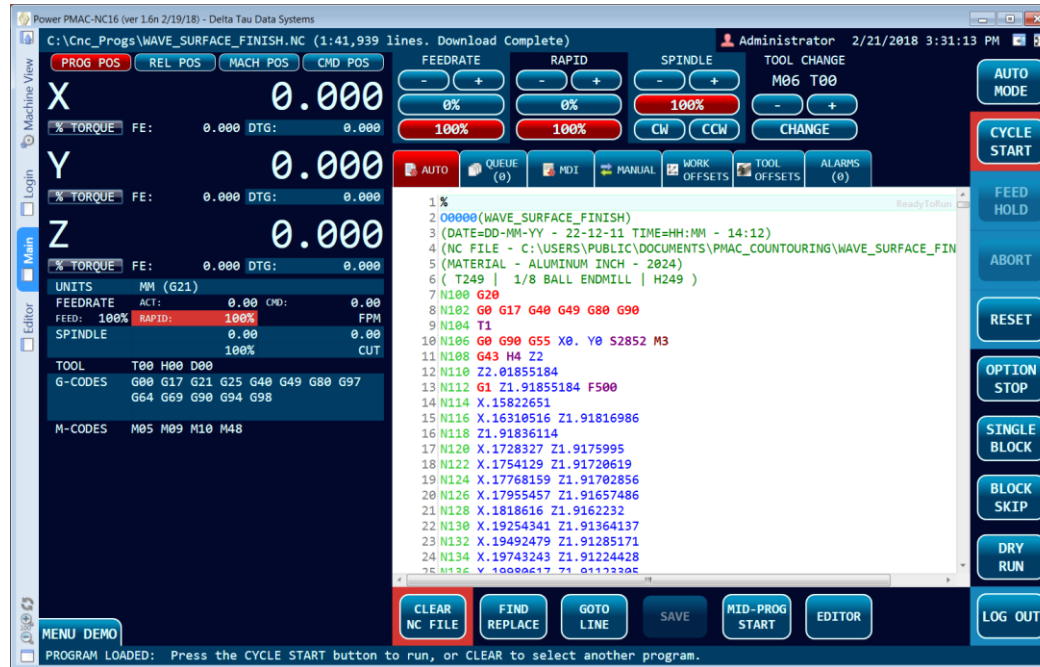
The Power PMAC-NC Executable code is hardware dongle protected!





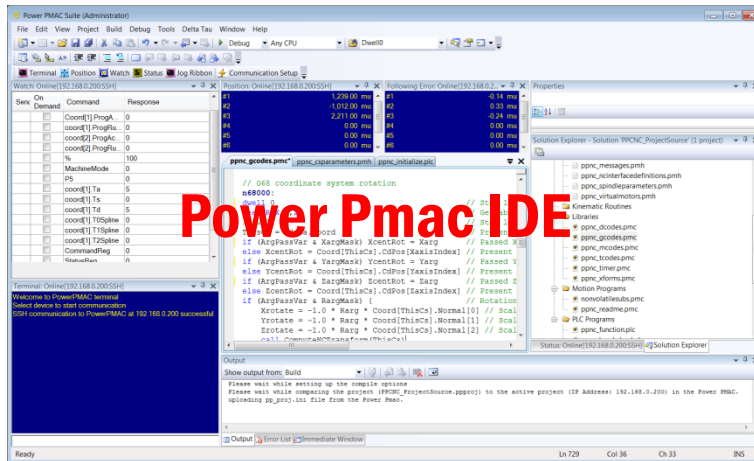
- Support up to 10 axes
- Configurable for Machine Type
- Colorized NC File Editor
- Mid-Program Start
- Execution Monitor
- Active G and M-codes
- NC File Queue
- Jogging, Homing and MDI
- User Login System
- Foreign Language Translation
- Logging and Plotting Tools
- Companion PMAC Project
- Multiple Messaging Levels

Power PMAC NC16 (cont.)

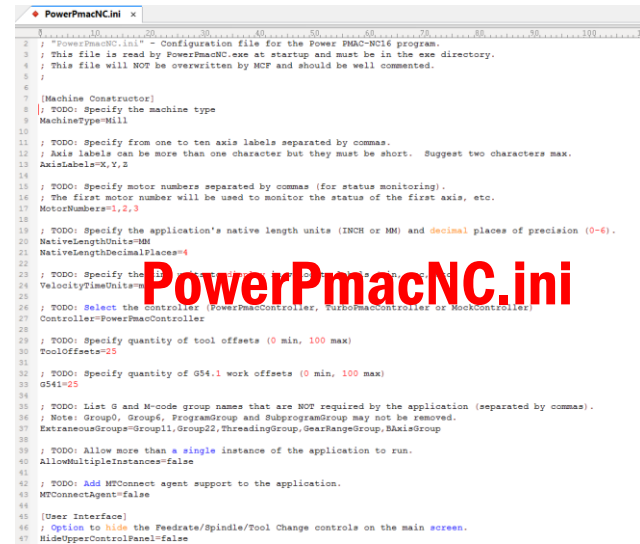


- Compatible with Windows 7 or newer (64-bit or 32-bit)
- Include Customizable G/M/T/D Subprogram Code
- Choice of Fixed or Rotary Buffer Mode
- Secure SSH/SFTP communications with Power PMAC
- Colored NC file editor handles files up to 100 MB (not max program size!)

Power PMAC NC Runtime (version)



PowerPmacIDE



PowerPmacNC.ini

What can you customize using the Runtime Version?

- Number of axes
- Axis labels
- Type of Machine
- Custom Messaging
- Login screen images
- Internationalization
- Complete access to the G\M\T\D subprogram source code (100% open PMAC source).
- Buffer Options and Parser Options

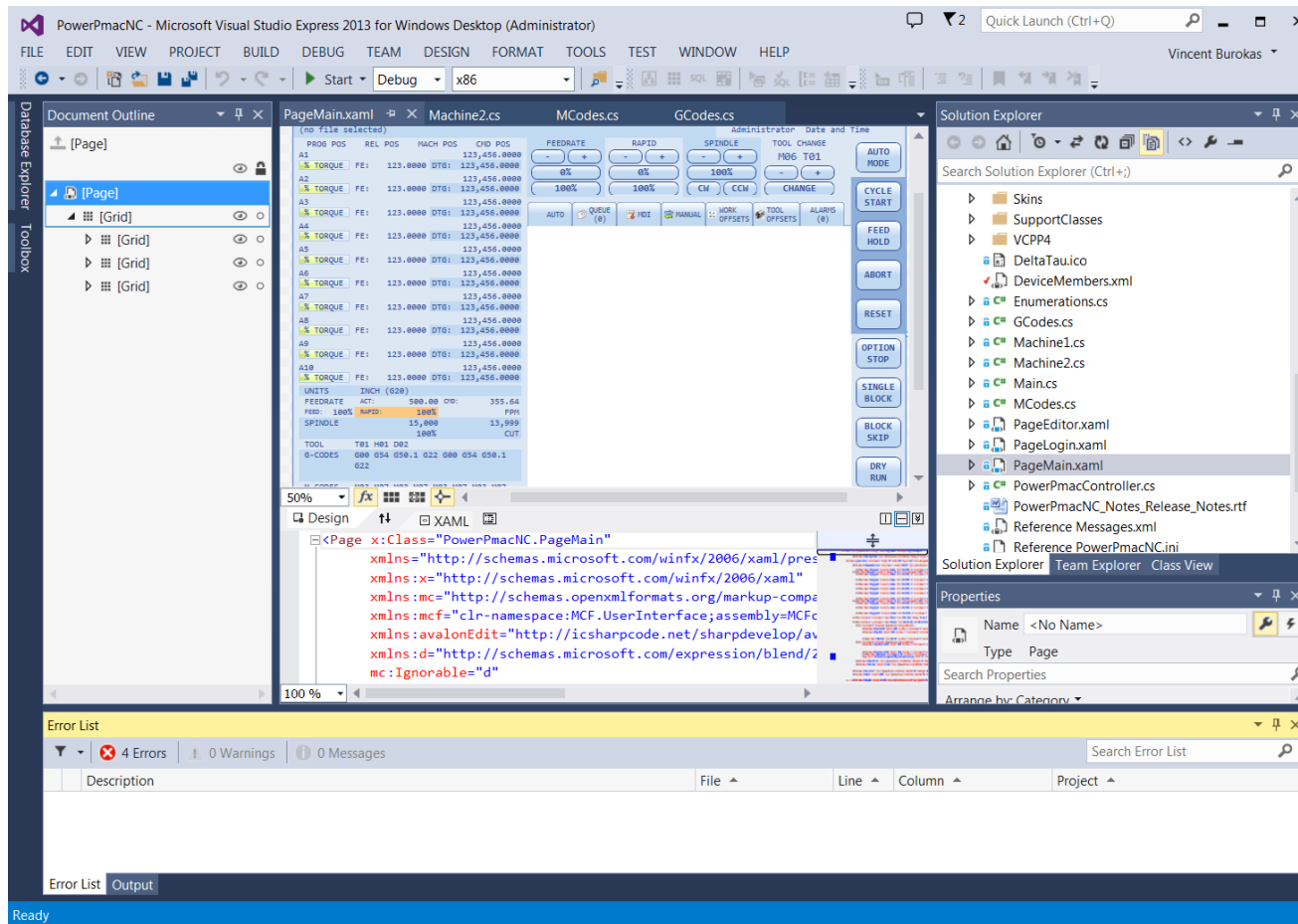
.ini Configuration File (for HMI configuration)

```
◆ PowerPmacNC.ini x
0
1
2 ; "PowerPmacNC.ini" - Configuration file for the Power PMAC-NC16 program.
3 ; This file is read by PowerPmacNC.exe at startup and must be in the exe directory.
4 ; This file will NOT be overwritten by MCF and should be well commented.
5 ;
6
7 [Machine Constructor]
8 ; TODO: Specify the machine type
9 MachineType=Mill
10
11 ; TODO: Specify from one to ten axis labels separated by commas.
12 ; Axis labels can be more than one character but they must be short. Suggest two characters max.
13 AxisLabels=X,Y,Z
14
15 ; TODO: Specify motor numbers separated by commas (for status monitoring).
16 ; The first motor number will be used to monitor the status of the first axis, etc.
17 MotorNumbers=1,2,3
18
19 ; TODO: Specify the application's native length units (INCH or MM) and decimal places of precision (0-6).
20 NativeLengthUnits=MM
21 NativeLengthDecimalPlaces=4
22
23 ; TODO: Specify the time units to display in velocity labels (min, sec, etc)
24 VelocityTimeUnits=min
25
26 ; TODO: Select the controller (PowerPmacController, TurboPmacController or MockController)
27 Controller=PowerPmacController
28
29 ; TODO: Specify quantity of tool offsets (0 min, 100 max)
30 ToolOffsets=25
31
32 ; TODO: Specify quantity of G54.1 work offsets (0 min, 100 max)
33 G541=25
34
35 ; TODO: List G and M-code group names that are NOT required by the application (separated by commas).
36 ; Note: Group0, Group6, ProgramGroup and SubprogramGroup may not be removed.
37 ExtraneousGroups=Group11,Group22,ThreadingGroup,GearRangeGroup,BAxisGroup
38
39 ; TODO: Allow more than a single instance of the application to run.
40 AllowMultipleInstances=false
41
42 ; TODO: Add MTConnect agent support to the application.
43 MTConnectAgent=false
44
45 [User Interface]
46 ; Option to hide the Feedrate/Spindle/Tool Change controls on the main screen.
47 HideUpperControlPanel=false
48 ; Specify either three or five jog speed buttons to match the pendant.
49 ThreeJogSpeeds=true
50
```

- Machine Type
- Number of Axes
- Axis Labels
- Native Units(mm/in)
- Display Precision
- Time Units (min/sec)
- Number of Tool Offsets
- Number of Work Offsets
- G-Code groups to visualize
- MT Connect Enable
- HTTP Server Enable
- Auto Login Enable with Language
- HMI Display Options
- NC File and Buffer Options
- Sub-Program Options
- Parser Options
- External Assembly Enable
- Private Label/Logo Options

Power PMAC NC 16 SDK (version)

- **Extensively customizable .NET application written in C#/WPF**
- ***Software Development Kit (SDK)* is distributed via GitHub for easy updates**
- **Builds with Visual Studio (must support .NET 4.6.1)**



Power PMAC NC SDK...

The image displays five screenshots of the Power PMAC NC SDK software interface, showing various control screens and parameters.

Top Left Screenshot: Main control screen showing axes (X, Y, Z, W, C) and their positions. The interface includes buttons for FEEDRATE, SPINDLE, TOOL CHANGE, and various overrides.

Top Right Screenshot: Panel ID selection screen. It displays a list of parameters including Panel ID, Panel Count, Panel Height, Process Time, Hole Count, Scale, and Rotation. The interface includes buttons for START, PAUSE, RESET, and LOG OUT.

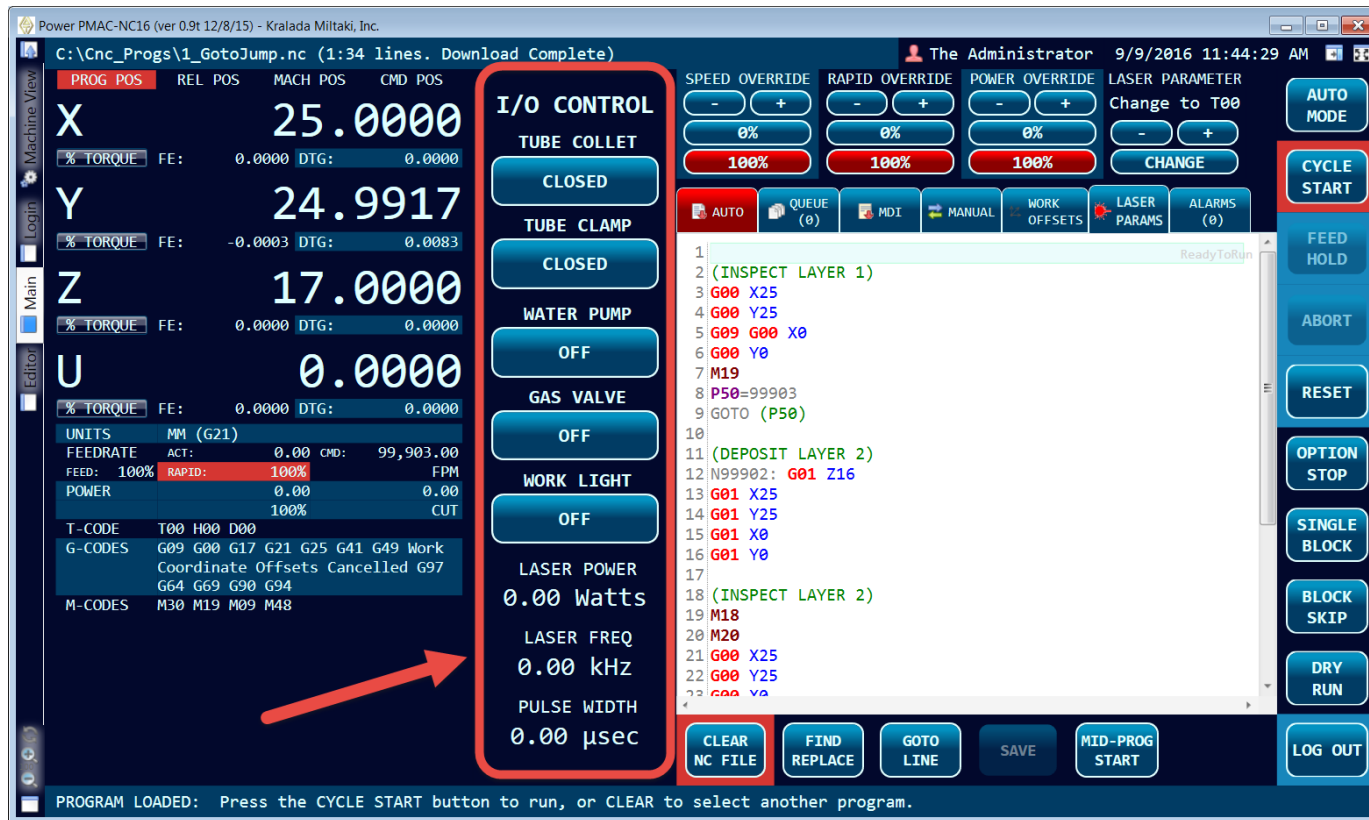
Middle Left Screenshot: Laser control screen. It shows speed and power overrides, laser parameters, and a list of M-Codes. The interface includes buttons for AUTO, MANUAL, WORK OFFSETS, and LASER PARAMS.

Middle Right Screenshot: EDM Parameters screen. It displays parameters for EDM (Electrical Discharge Machining) including voltage, current, and various tool parameters. The interface includes buttons for EDM, SPINDLE, and CRASH RESET.

Bottom Left Screenshot: Laser control screen with a live video feed of the laser cutting process. It shows speed and power overrides, laser parameters, and a list of M-Codes. The interface includes buttons for AUTO, MANUAL, WORK OFFSETS, and LASER PARAMS.

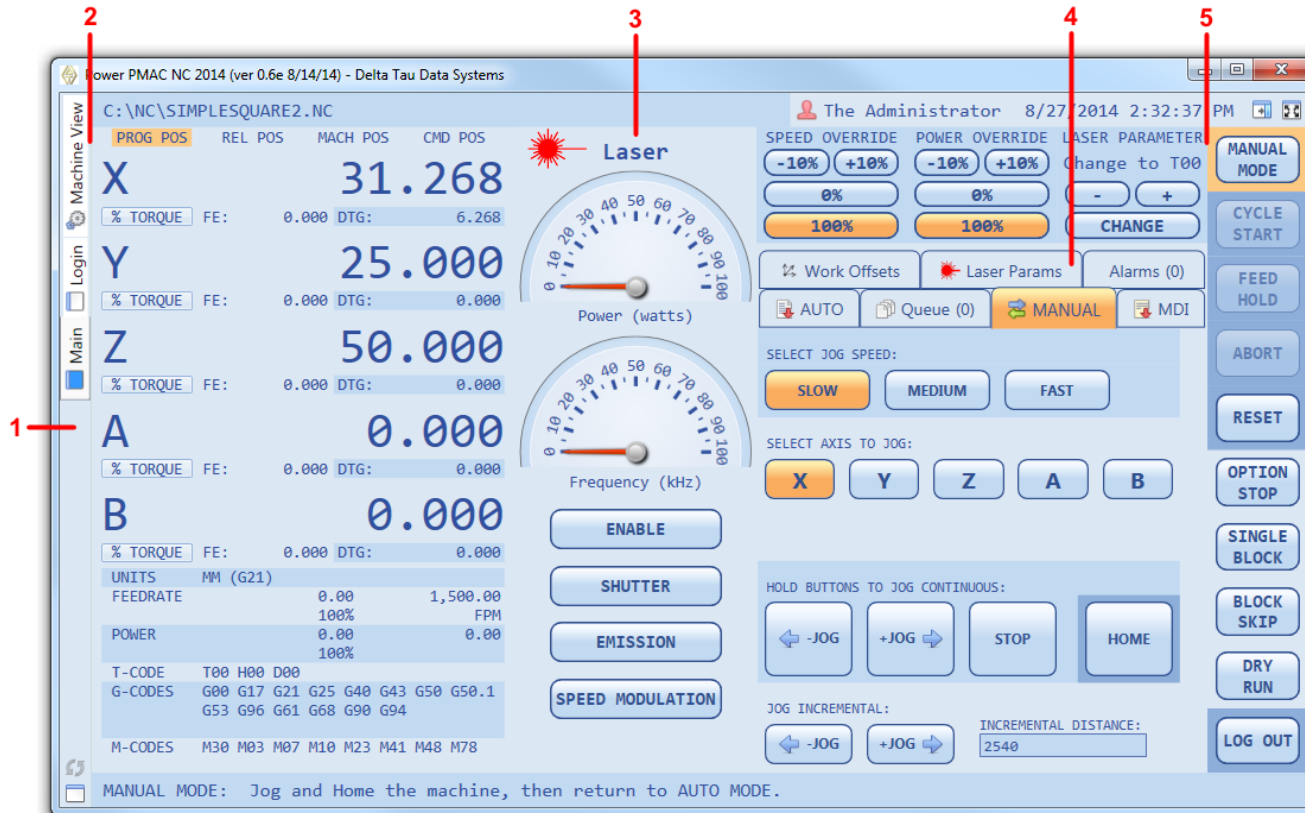
Bottom Right Screenshot: Panel ID selection screen. It displays a list of parameters including Panel ID, Panel Count, Panel Height, Process Time, Hole Count, Scale, and Rotation. The interface includes buttons for START, PAUSE, RESET, and LOG OUT.

External Assemblies



- External Assemblies allow customization without modifying the main source code.
- Useful for adding application specific features which greatly improve HMI functionality!

External Assemblies can be added in five different locations.
SDK examples show how to support Skins and Internationalization.



External Assemblies

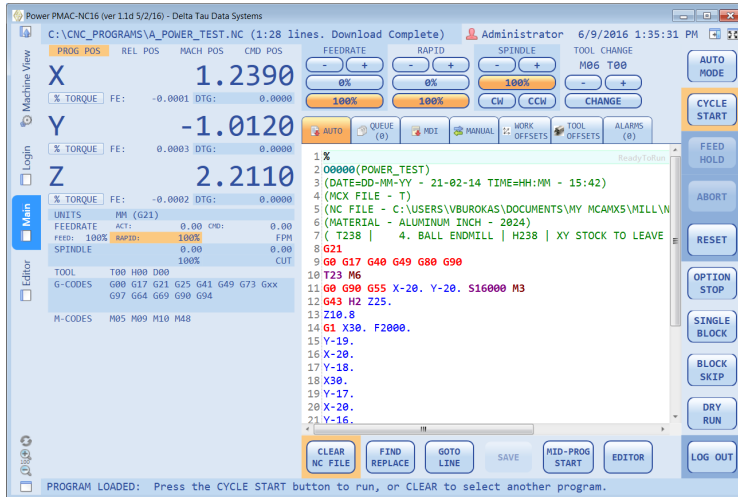
External Assemblies can be used to create significant modifications to the HMI when required. The example below is included with the SDK.

The screenshot displays the Delta Tau Data Systems HMI interface. On the left, the 'Main' screen shows coordinate readouts for X (25.0000), Y (24.9920), and Z (17.0000), along with feedrate and speed information. A red box highlights the 'POWER' section, which includes a '100%' indicator and a 'CUT' button. In the center, a 'Laser' control panel features two analog meters: 'Power (watts)' and 'Frequency (kHz)', both with scales from 0 to 100. Below the meters are four buttons: 'ENABLE', 'SHUTTER', 'EMISSION', and 'SPEED MODULATION'. To the right, a 'POWER OVERRIDE' section is highlighted with a red box, showing a '100%' indicator and a 'CHANGE' button. Below this is a table of parameters for T-Code, Speed, Power, Frequency, Height, Offset, and Path Offset. The table lists parameters T01 through T25, with values for each parameter. At the bottom right, there are buttons for 'MANUAL MODE', 'CYCLE START', 'FEED HOLD', 'ABORT', 'RESET', 'OPTION STOP', 'SINGLE BLOCK', 'BLOCK SKIP', 'DRY RUN', and 'LOG OUT'. A status bar at the bottom indicates 'AUTO MODE: Press the LOAD button to select a program.'

T-Code	Speed	Power	Frequency	Height	Offset	Path Offset
Parameter T01	0	0	0	0.0000	0.0000	0.0000
Parameter T02	0	0	0	0.0000	1.5875	0.0000
Parameter T03	0	0	0	0.0000	0.0000	0.0000
Parameter T04	0	0	0	0.0000	0.0000	0.0000
Parameter T05	0	0	0	0.0000	0.0000	0.0000
Parameter T06	0	0	0	0.0000	0.0000	0.0000
Parameter T07	0	0	0	0.0000	0.0000	0.0000
Parameter T08	0	0	0	0.0000	0.0000	0.0000
Parameter T09	0	0	0	0.0000	0.0000	0.0000
Parameter T10	0	0	0	0.0000	0.0000	0.0000
Parameter T11	0	0	0	0.0000	0.0000	0.0000
Parameter T12	0	0	0	0.0000	0.0000	0.0000
Parameter T13	0	0	0	0.0000	2.7940	0.0000
Parameter T14	0	0	0	0.0000	0.0000	0.0000
Parameter T15	0	0	0	0.0000	0.0000	0.0000
Parameter T16	0	0	0	0.0000	0.0000	0.0000
Parameter T17	0	0	0	0.0000	0.0000	0.0000
Parameter T18	0	0	0	0.0000	0.0000	0.0000
Parameter T19	0	0	0	0.0000	0.0000	0.0000
Parameter T20	0	0	0	0.0000	0.0000	0.0000
Parameter T21	0	0	0	0.0000	0.0000	0.0000
Parameter T22	0	0	0	0.0000	0.0000	0.0000
Parameter T23	0	0	0	0.0000	0.0000	0.0000
Parameter T24	0	0	0	0.0000	0.0000	0.0000
Parameter T25	0	0	0	0.0000	0.0000	0.0000

Power PMAC-NC Architecture

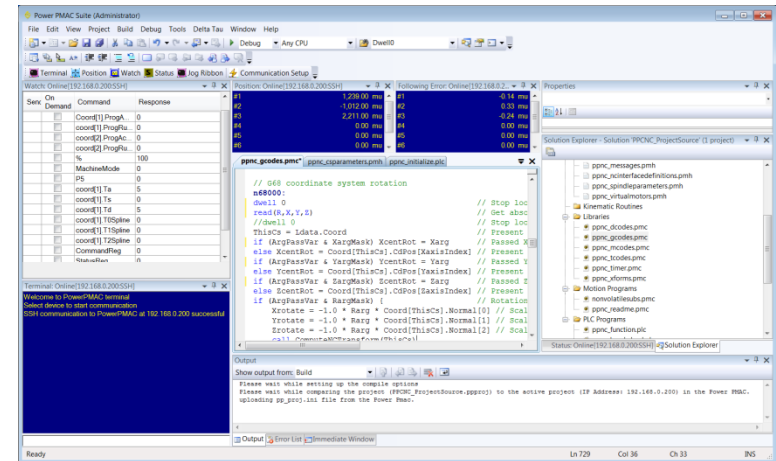
Power PMAC-NC16 HMI



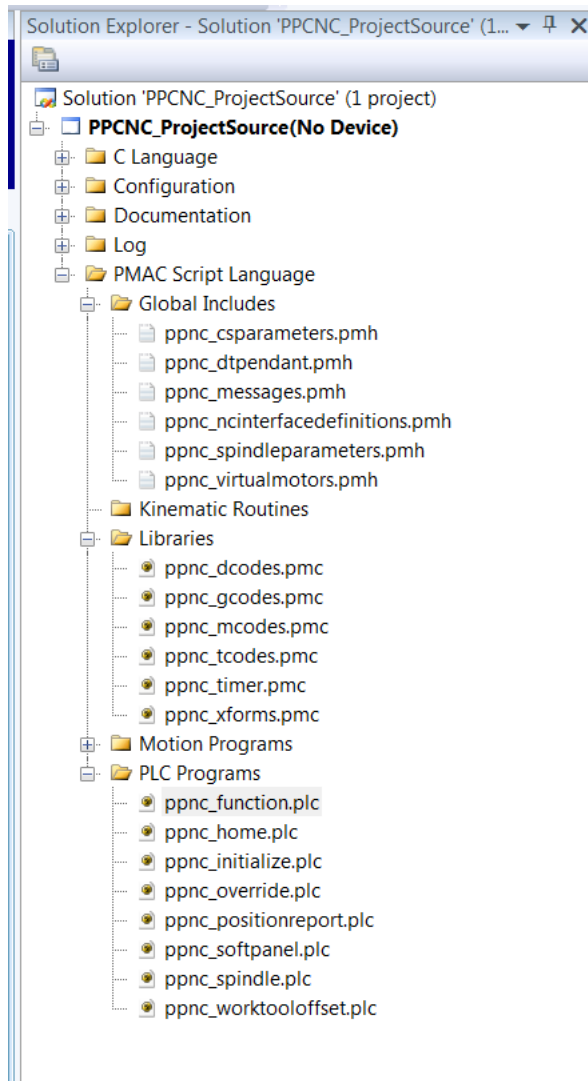
The Power PMAC-NC requires a specific project be loaded into the PMAC to function. The project provides the correct logic for the PMAC to HMI handshaking.



Power PMAC-NC16 Project



The Power PMAC Project



A comprehensive, completely customizable, Power PMAC CNC project is included with the Power PMAC NC 16 Software.

Files Include:

- Sub-Programs for G/M/T/D Codes
- Header Configuration Files
- PLC's for logic and functions

```
58 // G00.001 Canned Cycle Read-In Sub-Routine
59 n1:
60
61 dwell 0
62 ThisCs = Ldata.Coord
63
64 if (GCodesGroup3 == 1) Abs_Mode = 0
65 else if (GCodesGroup3 == 0) Abs_Mode = 1
66
67 // Store XYZ Positions if passed. Else use current position.
68
69 if (ArgPassVar & XargMask)
70 if (Abs_Mode == 1) X_Pos = Xarg
71 else X_Pos = Xarg + Coord[ThisCs].CdPos[XaxisIndex]
72 else X_Pos = Coord[ThisCs].CdPos[XaxisIndex]
73
74 if (ArgPassVar & YargMask)
75 if (Abs_Mode == 1) Y_Pos = Yarg
76 else Y_Pos = Yarg + Coord[ThisCs].CdPos[YaxisIndex]
77 else Y_Pos = Coord[ThisCs].CdPos[YaxisIndex]
78
79 if (ArgPassVar & ZargMask)
80 if (Abs_Mode == 1) Z_Pos = Zarg
81 else Z_Pos = Zarg + Coord[ThisCs].CdPos[ZaxisIndex]
82 else Z_Pos = Coord[ThisCs].CdPos[ZaxisIndex]
83
```

What does the NC Parser do?

- Line number appending and program buffer servicing
- Services/Differentiates G-Code, Parametric Code, and Native PMAC Formats (mixed code)
- Volatile/Non-Volatile subprogram parsing and buffering
- Sub-program verification during parse (Do they exist?)
- Tracks modal G/M-codes and D/F/H/S/T values for Mid-Program Starts
- Services Block Skip command
- Parses Canned Cycles modally with Power PMAC rules
- Pre/post line appending
- Pre/post file appending
- Services NC-style and C-style comments
- Services custom NC pre-parser functionality
- Interprets Macro (alias) definitions
- Controls Canned Cycle Modal Parsing
- Rearranges G-code Order for proper PMAC interpretation
- Regulates what G-codes are allowed to pass through to PMAC
- and more...

The NC Parser is approximately 3,000 lines of very carefully coded logic which takes the NC part program and rearranges it so PMAC can understand the syntax!

The NC Parser...

Power PMAC-NC16 (ver 1.5p 11/28/17) - Delta Tau Data Systems

C:\Cnc_Progs\1_SubTest.nc (1:23 lines. Parsing Complete)

NC Main NC O0102.nc NC O0103.nc NC O0105.nc

NEW OPEN SAVE SAVE-AS CUT COPY PASTE UNDO REDO PARSE DOWNLOAD FINISHED

1 (SUB PROGRAM INCLUDE === P0105)
2 (SUB PROGRAM INCLUDE === O0103)
3
4 #include "C:\Cnc_Progs\ProgMacros.txt"
5
6 #define SubOffset 5000
7 #define #3 P777
8 #define #4 P778
9
10 #3=105+SubOffset
11 #4=103+SubOffset
12
13 G94
14 ((Sticky Comment Here))
15 G17 G40 G90
16 G00 X0 Y0 Z0 F500
17 M98 P[#3]
18 G04 X2
19 M98 P[#4]
20 G91
21 X1
22 G04 x2
23 M30

Open Files

ProgMacros.txt x

1
2 #define LockOn M5000
3 #define LaserPulse M5001
4
5 #define LaserLock 0
6 #define DoorOpen 1
7

NcProgram.pmc

1 open subprog 5000,256,512 // 00000
2 P724=0
3 N10 bstart P777=105+5000 bstop
4 N11 bstart P778=103+5000 bstop
5 N13 bstart G94 bstop
6 N14 P724==1
7 N15 bstart G17G40G90 bstop
8 N16 bstart G00X0Y0Z0F500P50==500 bstop
9 N17 dwell0 P725==17M98P(P777)
10 N18 bstart G04X2 bstop
11 N19 dwell0 P725==19M98P(P778)
12 N20 bstart G91 bstop
13 N21 bstart X1 bstop
14 N22 bstart G04X2 bstop
15 N23 M30
16 close
17
18 open subprog 5102,256,512 // 00102 (POCKET TOOLPATH AT ZERO DEGREES - POCKET 1)
19 N3 bstart G03X0.2Y-0.2I0.2J0 bstop
20 N4 bstart G01X0.225Y0 bstop
21 N5 bstart G03X0.15Y0.15I0J0.15 bstop
22 N6 bstart G01X0Y0.2 bstop
23 N7 bstart G03X-0.15Y0.15I-0.15J0 bstop
24 N8 bstart G01X-0.45Y0 bstop
25 N9 bstart G03X-0.15Y-0.15I0J-0.15 bstop
26 N10 bstart G01X0Y-0.2 bstop
27 N11 bstart G03X0.15Y-0.15I0.15J0 bstop
28 N12 bstart G01X0.225Y0 bstop
29 N13 bstart G03X0.2Y0.2I0J0.2 bstop
30 N15 M99;return
31 close
32
33 open subprog 5103,256,512 // 00103 (SUBPROGRAM FOR CHAMFERING POCKETS)
34 N2 bstart G91G01Z-0.175F50.0P50==50.0 bstop
35 N3 M98P5102D53F8.0
36 N4 bstart G90G00Z0.1 bstop

Parser Logical Expression Support

```
3 G21 G55
4 G0 G17 G40 G49 G80 G90
5 S6000 M3
6 T1 H2
7 G01 G43 Z0 F1500
8 P5001=45
9 P5007=11
10 P5009=1500
11 P5011=360 // (Number of Holes)
12 P5018=40 // (Radius)
13 P5026=0
14 P5101=1
15 P5102=P5001
16 P5103=360 / P5011
17 P5104=1
18 P5105=P5026 - P5007
19 N10:
20 IF (P5101 > P5011){Goto 100}
21 P5110=P5024 + COS(P5102) * P5018
22 P5111=P5025 + SIN(P5102) * P5018
23 G83 X[P5110] Y[P5111] R[P5104] Q9 Z[P5105] p2 F[P5009]
24 G80
25 P5101=P5101 + 1
26 P5102=P5102 + P5103
27 Goto 10
28 N100:
29 M30
```

P-Q-M Variables

Special characters will trigger the parser to send the lines as native PMAC code:

If, else, while, do, goto, =, {}, |

Full use of Power PMAC's mathematical functions.

Execution Monitoring

- Split-Screen Execution Monitor for Subprograms
- Active G and M-Code Display
- Axis Status
- Elapsed Time
- Taskbar Progress Indicator



Production Dashboard

Power PMAC-NC16 (ver 1.6n 2/19/18) - Delta Tau Data Systems

NC Program Completed: "C:\Cnc_Training\1_1SubTest.nc" (Elapsed Time: 00:00:48)

Administrator Search Machine...

Machine View

- Power PMAC-NC16
 - Controller
 - Messages
 - Status
 - Production**
 - Axes
 - Tool
 - NC File
 - G-Codes
 - M-Codes
 - Tool Offsets
 - Work Offsets
 - G30 Secondary Return
 - Pins
 - Settings
 - Message Log (49.3 KB)
 - Notes
 - EULA
 - Information

Production

Production timers and parts counters.

- Total Run Time 4 hours, 43 minutes, 8 seconds
- Total Tool Time 3 hours, 57 minutes, 4 seconds
- Run Time 0 hours, 2 minutes, 55 seconds
- Tool Time 0 hours, 0 minutes, 0 seconds
- Timer Enable None
- Parts Required 145 pieces
- Parts Counter1 24 pieces
- Parts Counter2 24 pieces
- Dashboard Production**

Dashboard

Production timers and parts counters.

Machine Parameters

Date	2/21/2018
Time	5:05:09 PM
Total On Time	38:53:28

Controller Timers

Total Run Time	04:43:08
Total Tool Time	03:57:04
Run Time	00:02:55 RESET
Tool Time	00:00:00 RESET

Parts Counter

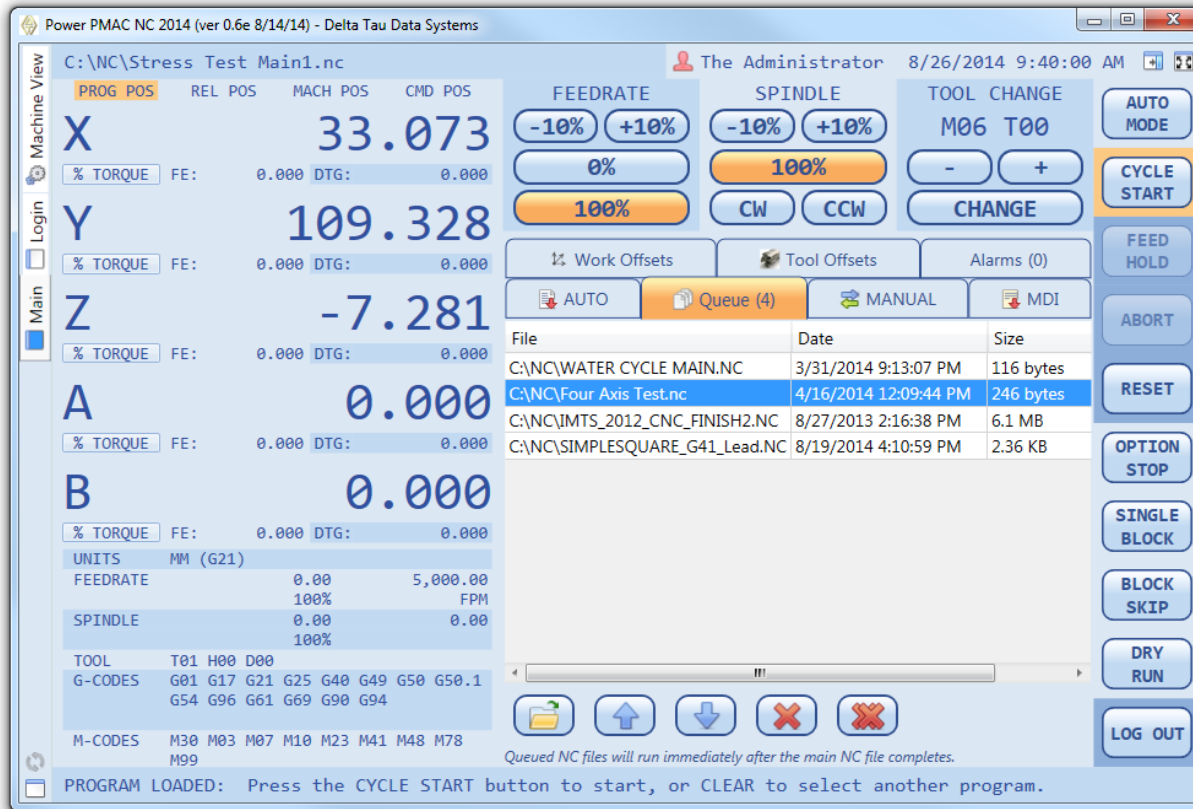
Total Required	145
Parts Counter #1	24 RESET
Parts Counter #2	24 RESET
Remaining	121
Cycle Time	00:00:48

Motion Commander Foundation
© 2018 Greene & Morehead Engineering, Inc.

MCF 2.3.6624 (2/19/2018)

The NC File Queue

Queued NC files execute immediately after the main file completes.



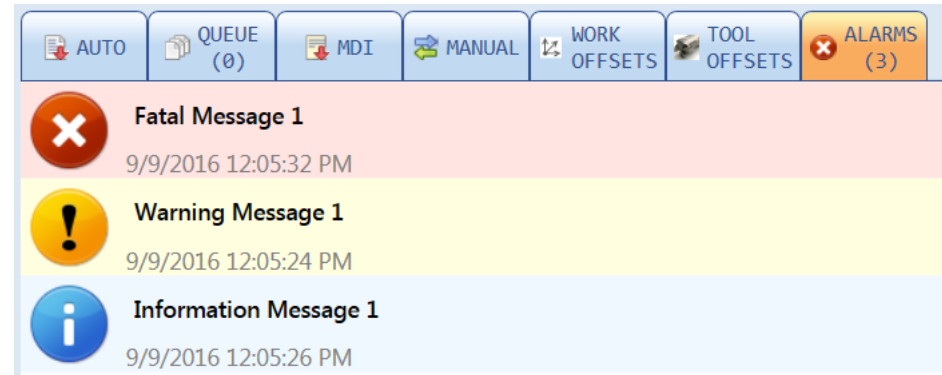
- Drag-and-Drop Support
- Add, Reorder or Delete Files
- Use for machine automation!

Messages and Logging

Alarms, Warnings, Messages, Information and Logging

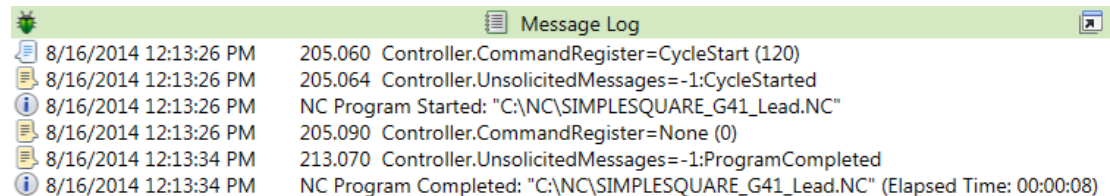
Different Levels of Messaging:

- Alarms
- Warnings
- Messages
- Log Only (No Display – Just Log)



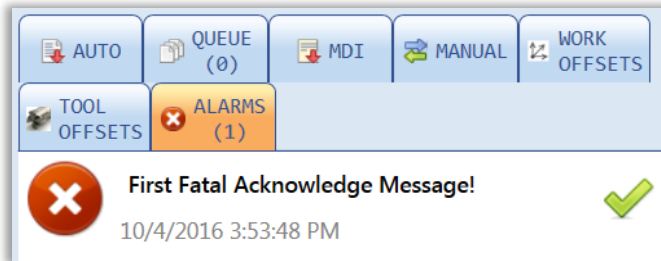
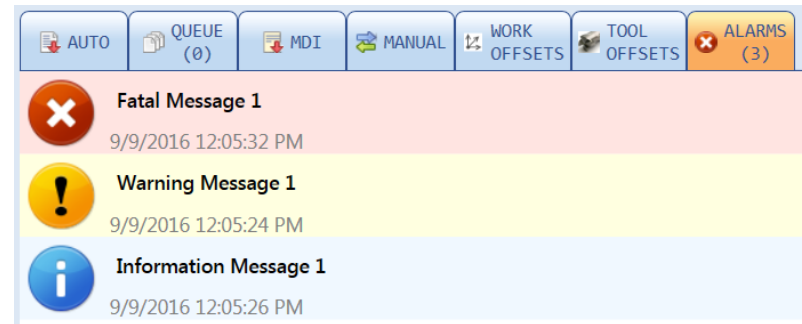
Message Logging:

- Log Buffer Size Customizable
- Logs include date, time, and message



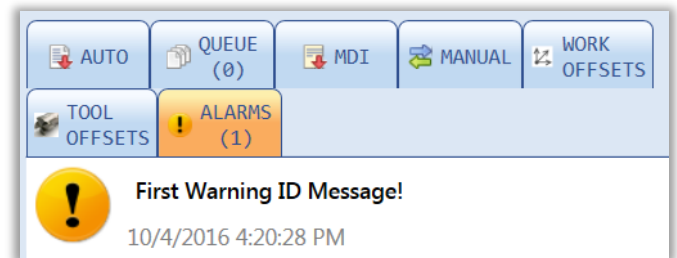
Messages and Logging (cont.)

Persistent, Bitwise Message Display

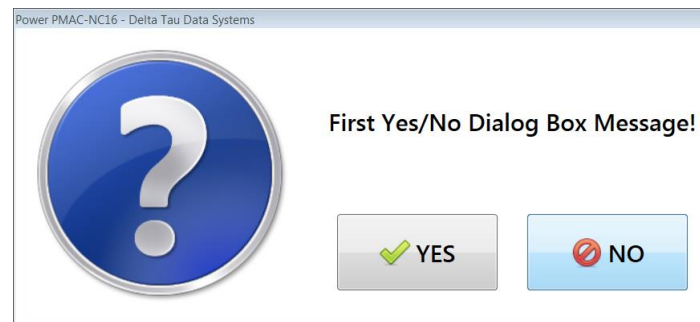
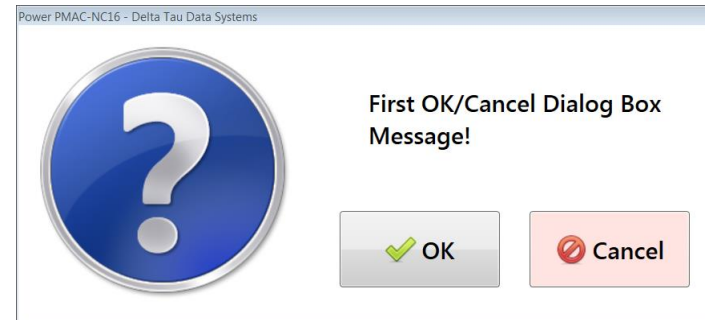
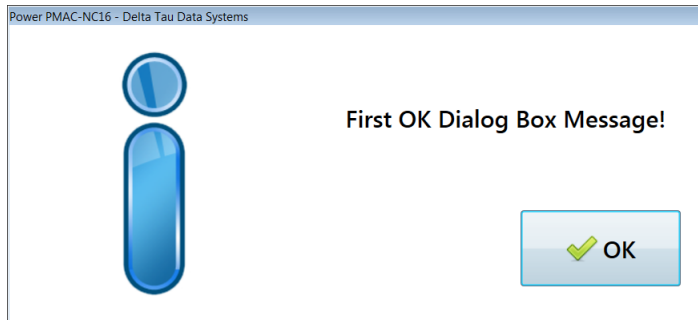


Unsolicited “Send1” Acknowledge Message (Can display queried data within message)

Unsolicited “Send1” Persistent Message with ID Tag (Can display queried plus live data within message)

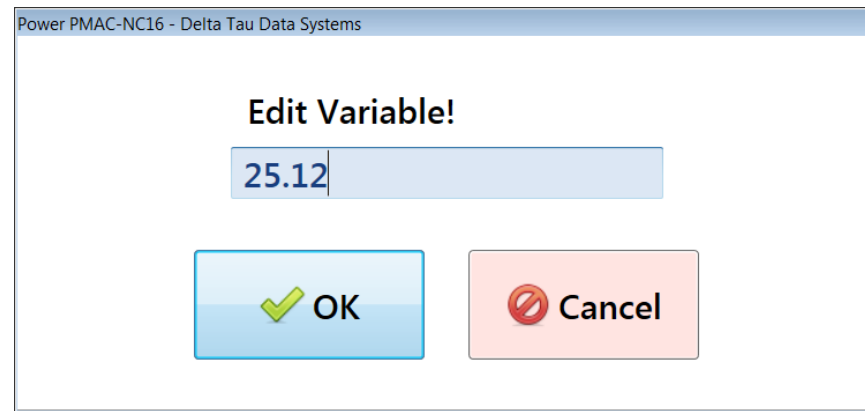
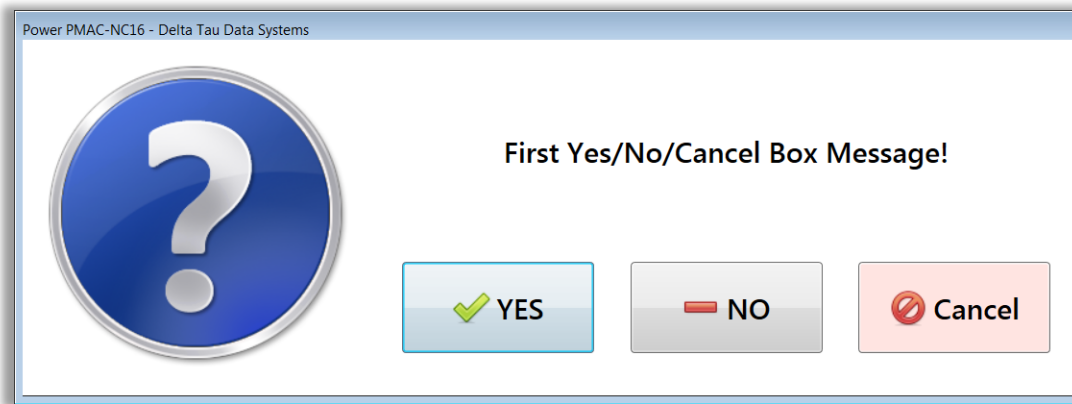


Dialog Boxes with Interaction and Data Input!

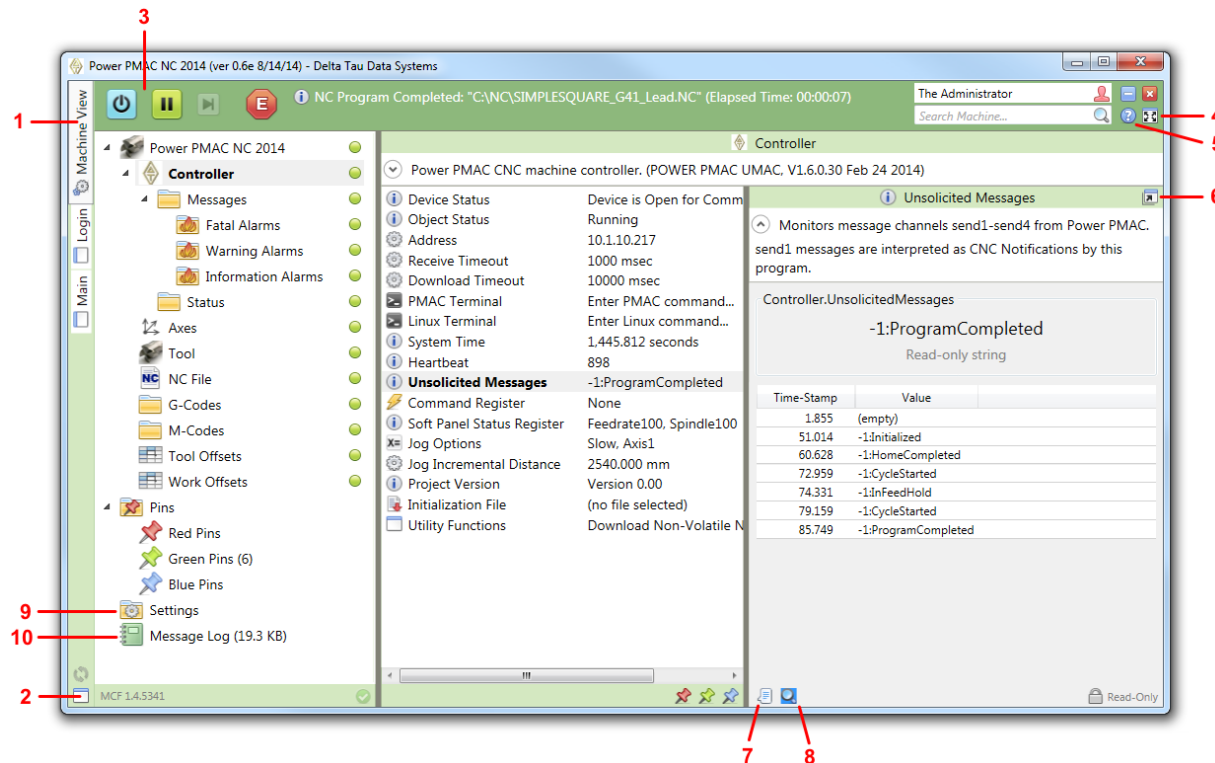


Messages and Logging (cont.)

More Dialog Boxes with Interaction and Data Input!

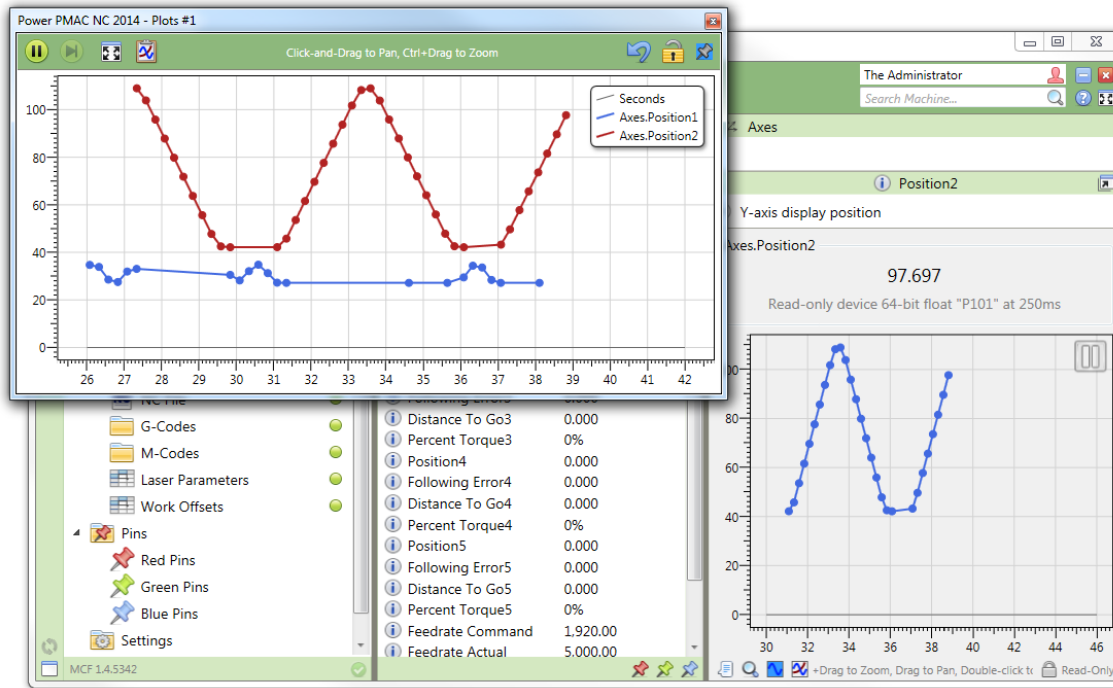


Machine View



1. Navigate between Machine View and the User Interface.
2. Move the User Interface to a Separate Window.
3. Open/Close Communications, control the update cycle.
4. Toggle Full Screen mode.
5. Open the About Box for version information.
6. Open the member page in a Separate Window.
7. Log changes in value to the Message Log.
8. Open the time-stamped list of changes in value.
9. Edit the program Settings.
10. View the Message Log.

Diagnostic Tools



- Terminal for PMAC Commands
- Linux Terminal to Power PMAC
- Log Changes in Variable Values
- Strip Chart Plotting Tools
- Low-Level Data Logger

Unsolicited Message Logger

Power PMAC-NC16 (ver 1.6p 2/21/18) - Delta Tau Data Systems

NC Program Started: "C:\Cnc_Training\CncFiles\WAVE_SURFACE_FINISH.NC"

Administrator

Search Machine...

Machine View

Power PMAC-NC16

Controller

Power PMAC CNC machine controller. (POWER PMAC UMAC, V2.3.2.6 Oct 25 2017)

Device Status: Device is Open for Communication

Address: 192.168.0.200

Receive Timeout: 1000 msec

Download Timeout: 10000 msec

PMAC Terminal: Enter PMAC command...

Linux Terminal: Enter Linux command...

System Time: 1.05:24:34

Heartbeat: 811

Unsolicited Messages: -1:Hello PMAC?

Q-Variable CS: &1

Command Register: None

Soft Panel Command Register: None

Soft Panel Status Register: Feedrate100, Spindle100, Spindle CW I

Dialog Response: None

Jog Options: Speed1, Axis1

Jog Incremental Distance: 0.1969 in

Project Version: Version 1.50

Initialization File: (no file selected)

Utility Functions: Download Non-Volatile NC Subprogram

Unsolicted Messages

Monitors message channels send1-send4 from Power PMAC.

Controller - Unsolicited Messages

-1:Hello PMAC?

read-only string

Time-Stamp	Value
624.105	-1:Hello PMAC?
579.752	-1:CycleStarted
578.808	-1:ResetCompleted
576.646	-1:ProgramAborted
575.805	-1:InFeedHold
571.146	-1:CycleStarted
6.564	-1:Initialized
1.498	(empty)

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MCF 2.3.6626 (2/21/2018)

Read-Only

Unsolicited Message logging screen logs and time stamps all messages sent from PMAC channels 1-4. Terminal for PMAC Commands.

Very useful for troubleshooting and integration!

Dual Screen Capability

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NC Program Started: "C:\Cnc_Training\CncFiles\WAVE_SURFACE_FINISH.NC"

Administrator

Search Machine...

Controller

Power PMAC CNC machine controller. (POWER PMAC UMAC, V2.3.2.6 Oct 25 2017)

Power PMAC-NC16 - Main

ncFiles\WAVE_SURFACE_FINISH.NC (1:41,939 lines. Download Complete)

Administrator Elapsed Time: 00:05:21

PROG POS REL POS MACH POS CMD POS

X 0.4055

Y 1.4750

Z 1.6452

% TORQUE FE: 0.0151 DTG: -0.0164

% TORQUE FE: 0.0061 DTG: 0.0000

% TORQUE FE: -0.0113 DTG: -0.0025

UNITS INCH (G20)

FEEDRATE ACT: 196.85 CMD: 500.00

FEED: 100% RAPID: 100% FPM

SPINDLE 2,000.00 2,000.00 CUT

TOOL T01 H04 D00

G-CODES G01 G17 G20 G25 G40 G43 G80 G55

G97 G64 G69 G90 G94 G98

M-CODES M03 M09 M10 M48

FEEDRATE RAPID SPINDLE TOOL CHANGE

0% 0% 100% M06 T00

100% 100% CW CCW CHANGE

AUTO MODE

CYCLE START

FEED HOLD

ABORT

RESET

OPTION STOP

SINGLE BLOCK

BLOCK SKIP

DRY RUN

LOG OUT

WAVE_SURFACE_FINISH.NC 30,155 / 41,939 lines (71.9%)

30142 N970 X.79002735

30143 N972 X.78948041 Z1.78506379

30144 N974 X.77938846 Z1.78432629

30145 N976 X.76120918 Z1.78025176

30146 N978 X.74364584 Z1.77342915

30147 N980 X.7273075 Z1.76404415

30148 N982 X.71272118 Z1.7524542

30149 N984 X.70328301 Z1.74236019

30150 N986 X.70213687 Z1.74134479

30151 N988 X.70158213 Z1.74054111

30152 N990 X.70027669 Z1.73914496

30153 N992 X.57783045 Z1.58738061

30154 N994 X.57451255 Z1.59048584

30155 N996 X.55691268 Z1.60527891

30156 N998 X.5487396 Z1.6109769

30157 N1000 X.52890536 Z1.62311281

30158 N1002 X.52659979 Z1.62428616

30159 N1004 X.50712195 Z1.6327381

30160 N1006 X.48962856 Z1.63896665

30161 N1008 X.48814273 Z1.63937746

30162 N1010 X.47363038 Z1.64270552

30163 N1012 X.45876304 Z1.64512698

30164 N1014 X.44474749 Z1.64648426

30165 N1016 X.43136413 Z1.64691275

30166 N1018 X.41798078 Z1.64648426

30167 N1020 X.40396522 Z1.64512698

30168 N1022 X.38909789 Z1.64270552

Motion Commander Foundation

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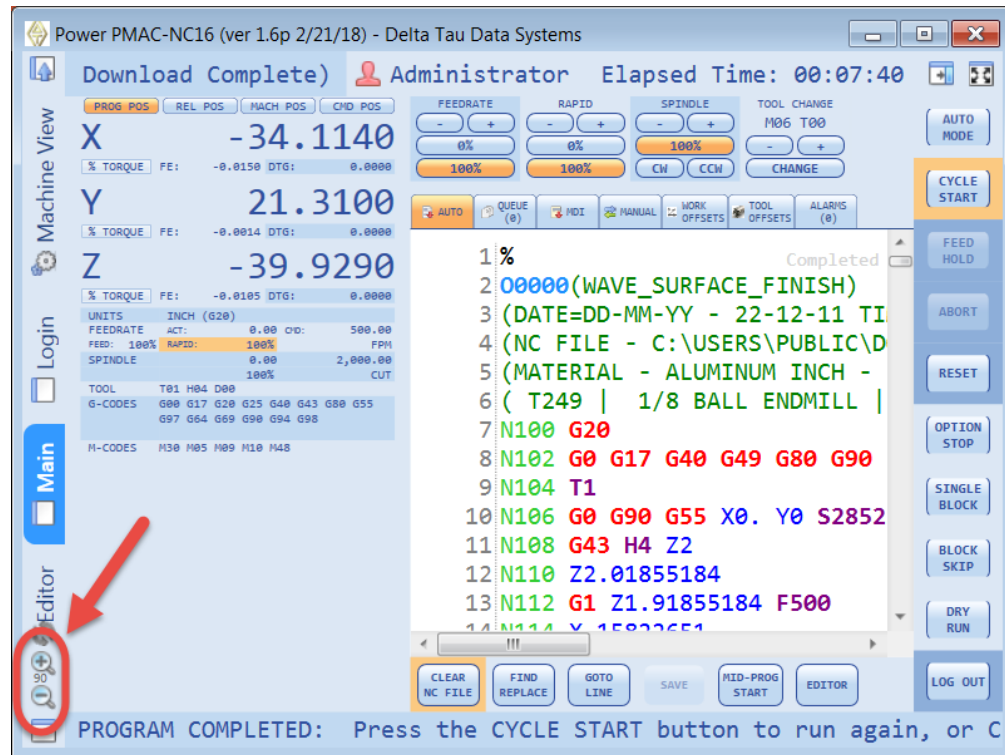
MCF 2.3.6626 (2/21/2018)

Dual-Screen Mode

RUNNING: Press FEED HOLD or ABORT, or wait for the program to finish.

Dual Screen Mode!

Graphic Control Scaling



Screen Control Feature Scaling

Internationalization

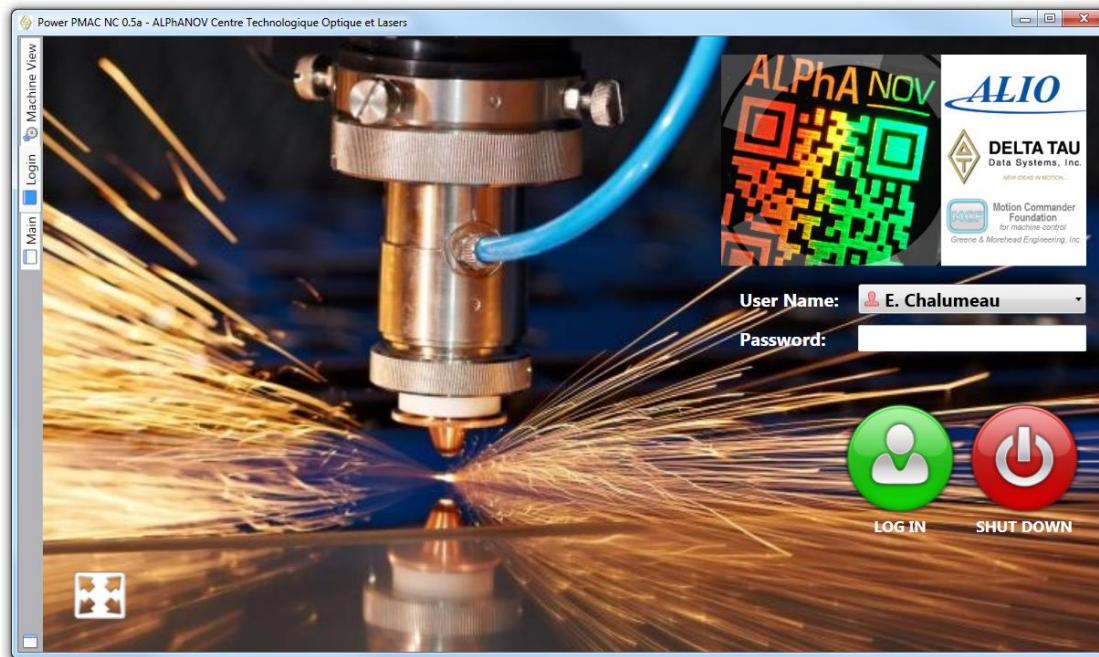
The screenshot displays the Power PMAC-NC16 software interface. A confirmation dialog box is centered on the screen, asking "閉じるよろしいですか。" (Is it okay to close?). The dialog has a large question mark icon and two buttons: "YES" (with a green checkmark) and "NO" (with a red X). Below the dialog, a list of M-codes is visible, showing the results of an initial internet translation to text file that can be edited by a human translator.

M-code	English	Japanese
983		
984	English: Spindle M-code group	Japanese: スピンドル M コード グループ
985		
986		
987	English: Spindle mode	Japanese: スピンドル モード
988		
989		
990	English: Spindle override percent	Japanese: 主軸オーバーライド %
991		
992		
993	English: Spindle Speed Detect G-code group	Japanese: スピンドル速度検出 G コード グループ
994		
995		
996	English: START	Japanese: スタート
997		
998		
999	English: STOP	Japanese: 停止
1000		
1001		

Users may specify one of 38 languages in their profiles.

Initial internet translation to text file that can be edited by a human translator.

Private Labeling – Runtime and SDK Versions



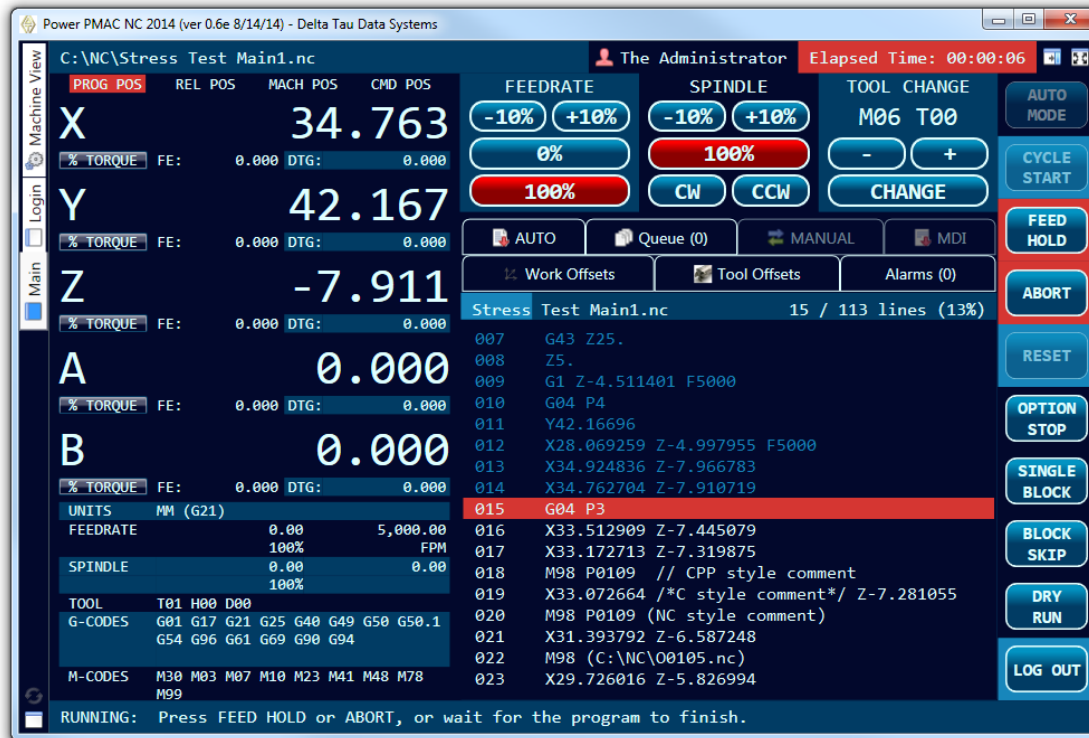
- Company Name
- Login Image
- Splash Image
- Custom Skin

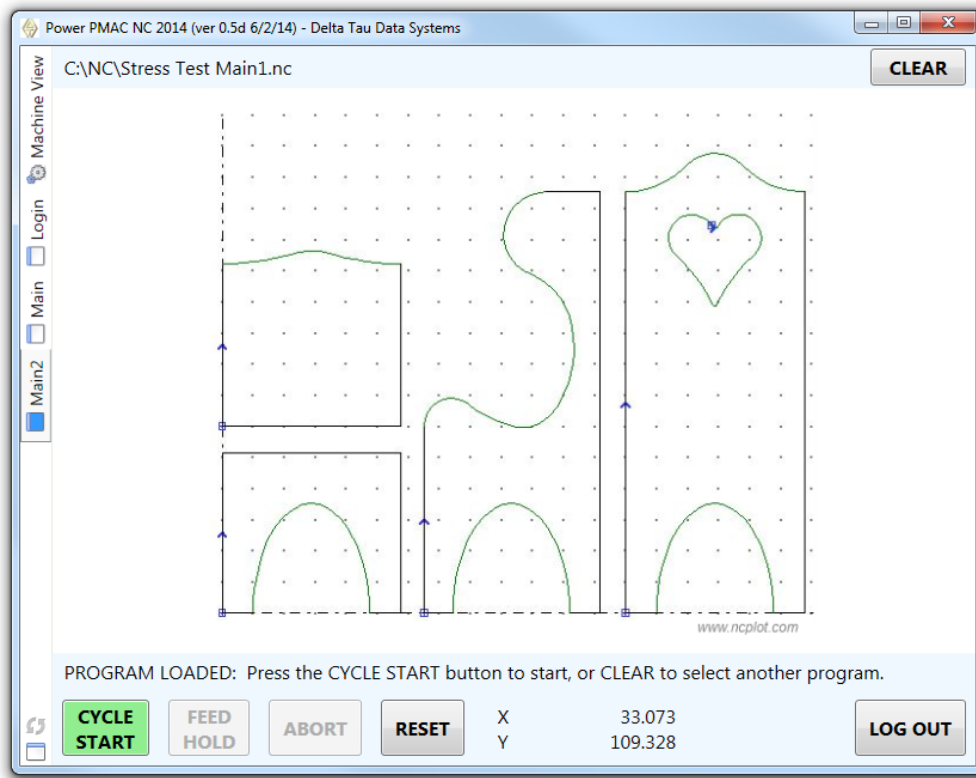
[Private Label]

CompanyName="ALPHANOV Centre Technologique Optique et Lasers"

SplashImage="LaserSplashImage.png"

LoginImage="LaserLoginImage.jpg"



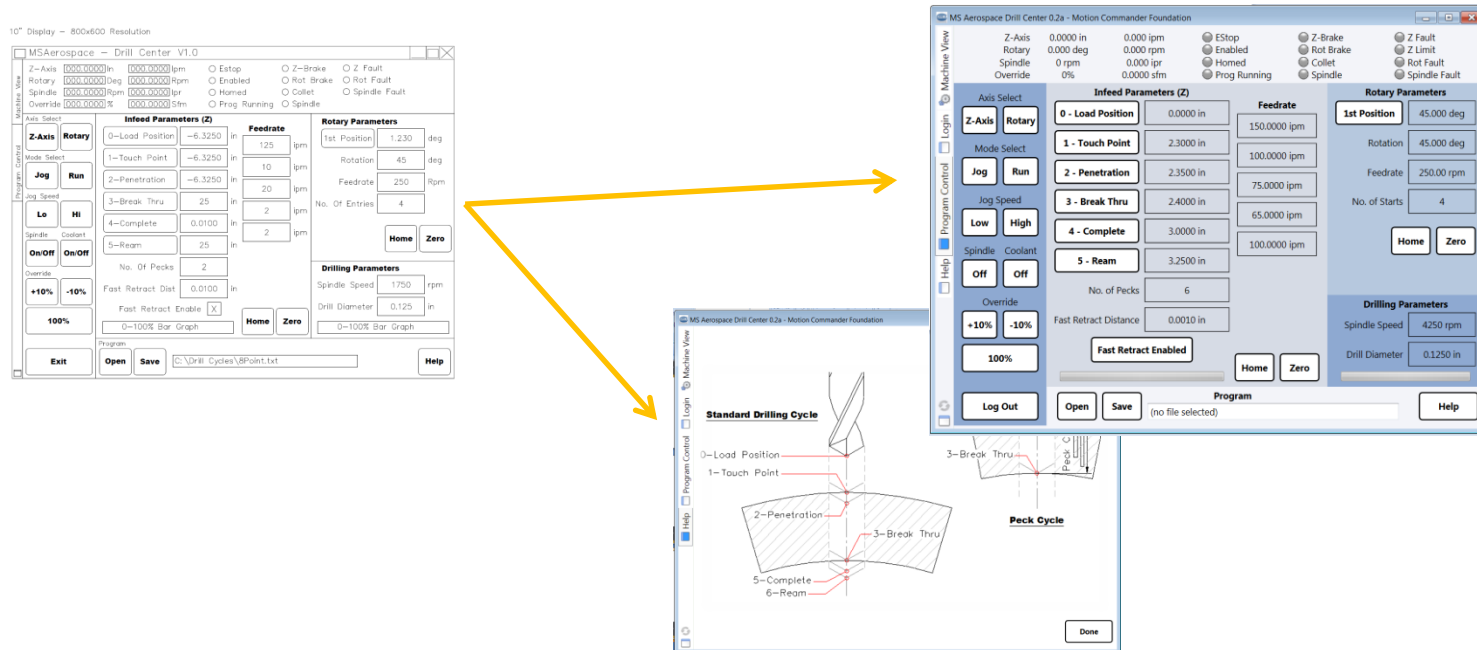


The Main Operator Screen may be replaced with a custom screen, and/or additional screens may be added.

Both WPF and WinForms are supported.

(Source code examples are included with the SDK.)

Custom Software can be created by using the SDK package as a base, and creating a new application on top of the established architecture and solid communications platform.





A machine running the Power PMAC NC program can publish live process data to supervisory systems via the MTConnect standard. MTConnect Agent support can be added to the application with one line of code. Process data to be published is specified in a configuration file.

MTConnect is a read-only standard, meaning that it only defines the extraction (reading) of data from control devices, not the writing of data to a control device. However, the Power PMAC-NC MTConnect agent includes an extension to the standard that allows commands to be sent to the application via HTTP. For example, this capability would enable part programs to be loaded remotely over a secure network.

Power PMAC-NC16 (ver 1.1d 5/2/16) - Delta Tau Data Systems

C:\Cnc_Progs\2012_WESTEC_WITHLETTERS_V2.NC (1:185,898 lines. Dow Administrator Elapsed Time: 00:02:30

PROG POS REL POS MACH POS CMD POS FEEDRATE RAPID SPINDLE TOOL CHANGE

X 150.4470 - + - + - + M06 T00 AUTO MODE

% TORQUE FE: 0.0150 DTG: -101.0530 100% 100% 100% CW CCW CHANGE CYCLE START

Y 77.8000

% TORQUE FE: 0.000

Z

% TORQUE FE: 0.000

UNITS MM (G21) FEEDRATE ACT: 2,000 FEED: 100% RAPID: 1 SPINDLE 10,000 1

TOOL T02 H03 D00 G-CODES G01 G17 G21 G2 P1 G97 G64 G69 M-CODES M03 M09 M10 M4

RUNNING: Press FEED H

MTConnect Client

PowerPmacNC (localhost)

timestamp	sequence	id	value
2016-06-10T11:51:50-07:00	918	ProgramState	Running
2016-06-10T11:51:46-07:00	762	User	Administrator
2016-06-10T11:56:43-07:00	2741	Message	NC Program Started: "C:\Cnc_Progs\2012_WESTEC_WITHLETTERS_V2.NC"
2016-06-10T11:56:43-07:00	2742	PowerPmacNC.MachineState	Running
2016-06-10T11:56:23-07:00	2629	PowerPmacNC.MachineMode	Auto
2016-06-10T11:51:50-07:00	919	PowerPmacNC.ProgramState	Running
2016-06-10T11:51:46-07:00	761	PowerPmacNC.ProgramStateAlarm	inactive
2016-06-10T11:59:14-07:00	6783	PowerPmacNC.Uptime	00:07:44.6102997
2016-06-10T11:59:14-07:00	6784	PowerPmacNC.Lifetime	2:17:34:40.9031268
2016-06-10T11:51:49-07:00	892	PowerPmacNC.ObjectStatus	Running
2016-06-10T11:51:47-07:00	770	Controller.DeviceStatus	Device is Open for Communication
2016-06-10T11:51:49-07:00	893	Controller.ObjectStatus	Running
2016-06-10T11:51:31-07:00	438	Controller.Address	192.168.0.200
2016-06-10T11:51:31-07:00	439	Controller.ReceiveTimeout	500
2016-06-10T11:51:31-07:00	440	Controller.DownloadTimeout	10000
2016-06-10T11:51:32-07:00	441	Controller.CommandTerminal	
2016-06-10T11:51:32-07:00	442	Controller.LinuxTerminal	
2016-06-10T11:59:13-07:00	6781	Controller.SystemTime	534.156437481123
2016-06-10T11:59:13-07:00	6779	Controller.Heartbeat	36E
2016-06-10T11:56:43-07:00	2740	Controller.UnsolicitedMessages	-1:CycleStarted
2016-06-10T11:56:43-07:00	2745	Controller.CommandRegister	None
2016-06-10T11:56:44-07:00	2798	Controller.SoftPanelStatusRegister	Feedrate100, Spindle100, SpindleCW, Rapid100
2016-06-10T11:53:24-07:00	1550	Controller.JogOptions	Speed3, Axis3
2016-06-10T11:51:32-07:00	447	Controller.JogIncrementalDistance	2
2016-06-10T11:51:47-07:00	772	Controller.ProjectVersion	1.11

- Power PMAC-NC16 includes a built-in Telnet server. This server can be used to access the machine remotely.
- The Telnet server can be used for advanced automation scenarios where the machine is being monitored and controlled remotely using script commands.

```
Telnet localhost
-- MCF Telnet Server --
PowerPmacNC> PowerPmacNC.MachineState
Ready
PowerPmacNC> NcFile.MainProgram=C:\NC\A_Big.NC
PowerPmacNC> PowerPmacNC.MachineState
ProgramLoaded
PowerPmacNC> Controller.CommandRegister=CycleStart
PowerPmacNC> PowerPmacNC.MachineState
Running
PowerPmacNC>
```

Power PMAC NC vs. Custom HMI

	Power PMAC-NC	Custom HMI
Development Time	Zero. You get an instantly useable application with hundreds of installed copies worldwide.	6 months to a year. An experienced developer could potentially create a reasonably featured HMI for CNC in 6 months to a year. This would be a minimallistic version with very few features. This does not take into account the co-development of the Power PMAC Project which would be required. You must also consider the long tail of debugging and refinement.
Risk Factor	Little to none.	Huge!
Special Features	<ul style="list-style-type: none">• Parametric programming support• Mid-program starts• Internationalization• MTConnect• MCF's diagnostic tools• ...and many more.	None.
Customizability	Full SDK package available. You start with a fully functional system which you can build on with little to no risk.	Any feature development is from scratch.
Support	Proven and supported system. You get ODT knowledge and support with every install.	In-House home grown support.