

FANUC Oi-F Plus Series CNC Control and Visual Shot Peening™

- Fanuc Oi-F Plus series controller utilizing RS274, the international standard language of machine tools, with additional G and M codes for blasting cycles.
- Process monitoring with alarm function including air pressure, systems, and motion.
- Process parameters for air pressure and media flow status are stored in the part program and include set point, high alarm, and low alarm. Access to these parameters is guarded by a security level password database.
- Diagnostic I/O status screen.
- FANUC Dual Check safety function.
- In-cycle screen shows air pressure and media flow with hi/low settings, speed and location of each axis, and key system status.



Process Fault Interrupt.

During the cycle, the process will be interrupted should certain parameters be out of tolerance. If this happens, the machine is put into feed hold and the blasting is paused. A warning screen along with a red fault light are presented to the operator. Certain faults can be acknowledged, and the process allowed to continue, others will abort the cycle.

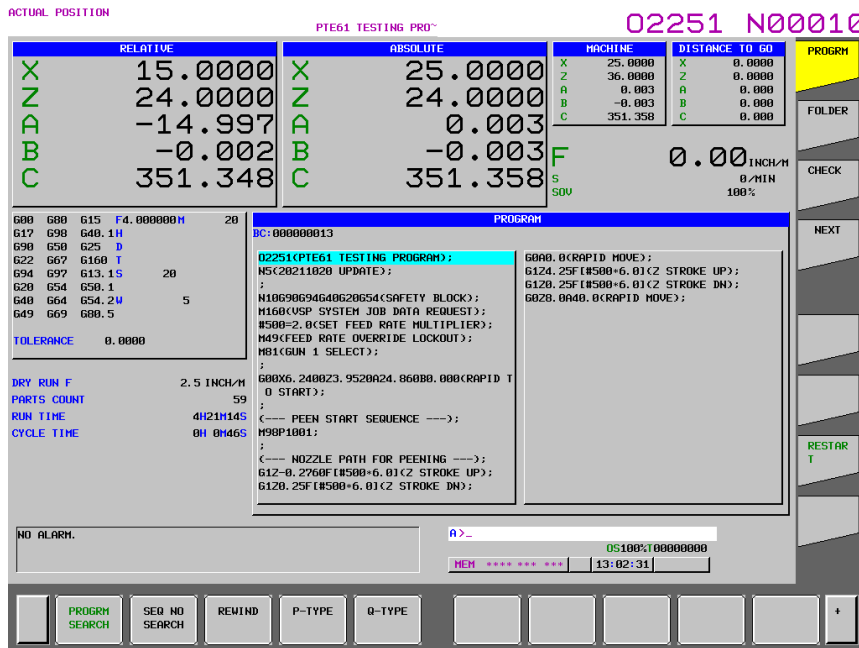
Fault examples include:

- Acknowledge and allow to continue: High or low air pressure or media flow can often be corrected without need for cycle abort. Likewise, safety features activated during a cycle such as 'door open' or 'light curtain cross' can be cleared without cycle abort. If cleared, the cycle is allowed to continue.
- Acknowledge and cycle abort: Critical faults that could lead to part or machine damage are not allowed to continue. A drive fault is an example when attempting to continue could cause damage or unintended process result.



Teach pendant.

The handwheel/teach pendant with enabling switch allows for easy positioning and programming. The machine can be moved in any axis to any position at any speed. From this point, the nozzle position can be captured and automatically inserted into a part program where desired, making programming quick and easy.



Fanuc Picture Operation screen condenses various status views into one central location for simplicity and convenience.

Dry Run mode allows the operator to test the program in the shortest amount of time by automatically utilizing rapid feed-rates and minimized program dwells throughout. The blast system and shuttle (if present) are disabled, allowing prove-out of programmed nozzle / part motion without live processes.

Single-Block mode allows the operator to step through each part program block for testing purposes. In this mode, each time the Cycle Start is pressed, the machine executes the next operation, then stops (typically used in conjunction with Dry Run).

Teach in Handle mode allows the operator to create a program while inserting coordinates of the current position obtained through handle moves.

Custom G & M codes for peening

G-Codes include:

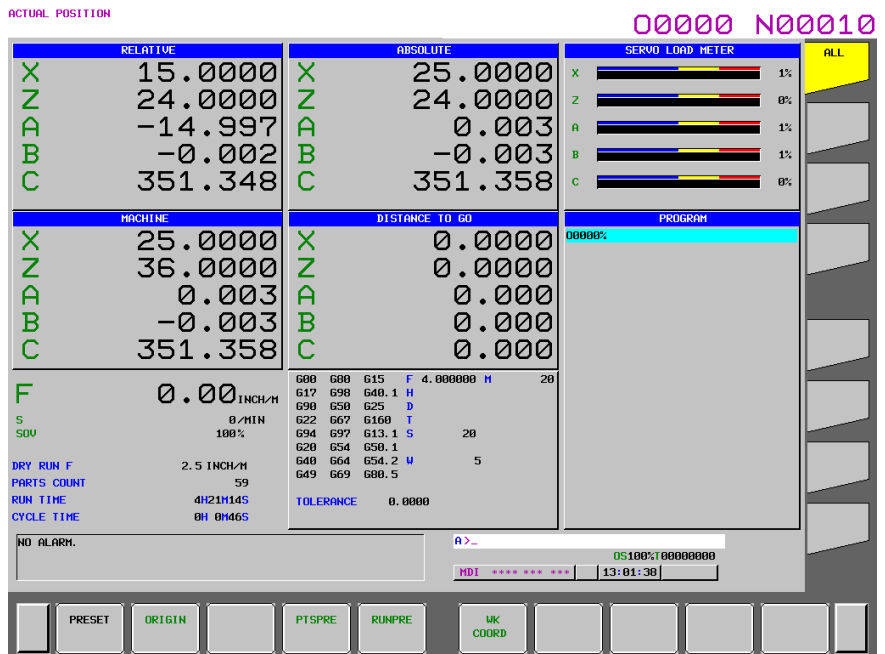
G162 sets active blast process parameters
 Pressure, Pressure Limit (psi)
 Flow, Flow Limit (lb. / min)
 Data Logging interval (sec)

G199 strategically sends axes to the home position
 (Retract Z until home, then other axes)

M-Codes include:

M19: Table Orient (optional feature)
M20 / M21: enables / disables peening alarms
M49: disables feed rate override
M70 / M71: turn on / off media return system
M72 / M73: turn on / off blast media
M74 / M75: turn on / off blast air
M76 / M77: sets / cancels media replenish dwell
M160~M163: configures data logging functions

Macro Programs are efficiently utilized to provide clear maintainable programming for normal machine operations, exclusive peening processes, and optional functions.

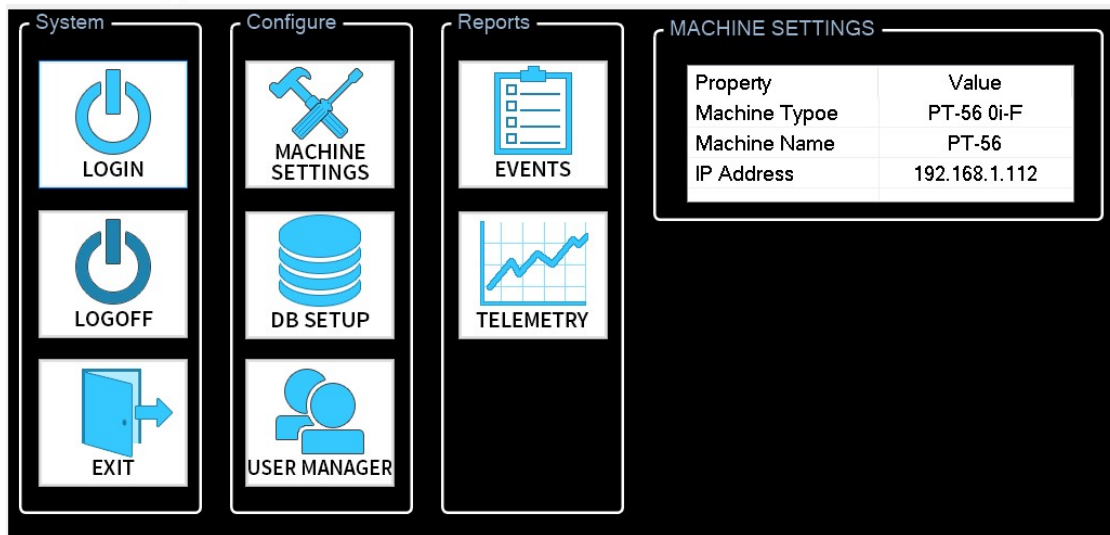


Visual Shot Peening™

Visual Shot Peening™ is our support software designed for shot peening and abrasive blasting applications requiring data logging, user security, program storage, and control (DNC) that includes the following features:

- **NC Program Download and Select.** A button is provided on the application which allows the user to download NC Programs to CNC memory and automatically select one as the Main Program to run. The user will be prompted for an Operator ID which is validated against the SQL database. If validated with the appropriate security level, the user can select the NC Program for download. If the NC Program is already stored in CNC memory, it is overwritten by the new downloaded program.

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- **Job Data Request M Code.** An M Code interface notifying the application to prompt the user for Job data. This M Code is placed at the start of the NC Program. When the M Code is executed, the application will prompt the user for the following data:
 - Operator ID
 - Job ID
 - Customer ID
 - Part ID
 - Serial #
 - Message

The Job Data Input dialog box contains the following fields and controls:

- Program: LCCTEST.MPF
- Job #: J7732111
- Customer: PeenTech
- Part #: PN30G7632
- Serial #: (empty)
- Operator ID: (empty)
- Comments: (empty text area)
- Save button (green)
- Cancel button (grey)

- **Acknowledgement of Special Operator Messages (process faults).** Several special case operator messages (Example: Air Pressure Low, Shot Flow Low) will be monitored by the application. When the CNC detects any of these transitioning from low to high, it forces the CNC into Single Block mode and notifies the application when Program execution has stopped. The application will prompt the operator with the following selections:
 - Acknowledge and continue Program Execution.
 - Abort Program Execution.

If “continue” is selected, the application will signal the CNC to reset Single Block mode and resume execution. If “abort” is selected, the application will signal the CNC to reset Single Block mode and abort Program Execution. The application will post an event to the Events database table indicating what action was taken.

Job Data

Property	Value
Started On	4/16/2021 11:26:50 AM
Status	LOADED
Job	J7732111
Customer	PeenTech
Part	PN30G7632
Program	LCCTEST.MPF
Serial #	SN-A443721
Operator	03275
Comments	Testing #2.
Completed On	NA

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MACHINE STATUS

Description	Status
Connected To CNC	Yes
Units	Inch
In Cycle	No
Feed Hold	No
Dwell (G04)	No
M00 Or M01 Executing	No
Feedrate Override At 0%	No
In Alarm	No
Mode	MDI
Main Program	LCCTEST.MPF
CNC Control	Oi-F
VSP Option Keep Relay	ON
Telemetry Recording	ON (30 Second Interval)

- **Event Logging Table.** Contains the events that are posted to the SQL Events database table. They include, but are not limited to:

- PROGRAM START. This event is posted when the Request for Job Data M code is completed successfully.
- PROGRAM COMPLETE. This event is posted when the Program Part Counter is incremented. This occurs when an M02 or M30 is executed.
- CYCLE ON. This event is posted when Program Cycle goes ON.
- CYCLE OFF. This event is posted when Program Cycle goes OFF.
- FAULT. This event is posted when the CNC goes into the Alarm state.
- OP MSGACK. Special case Operator Message was acknowledged.
- OPMSGABORT. Special case Operator Message initiated program Abort

- o Telemetry Recording. M Codes indicating Start Recording/Stop Recording telemetry data. The Start M Code will pass an argument defining the recording interval (in seconds). NC RESET or End of Program (M30 or M02) will cause recording to stop. An example of the data that can be retrieved from the CNC Control and posted to the Telemetry SQL database table includes:
 - Date/Time
 - Job ID
 - Customer ID
 - Part ID
 - Serial #
 - NC Program
 - Air Pressure
 - Shot Flow Nozzle #1
 - X Axis Position
 - Z Axis Position
 - A Axis Position
 - B Axis Position
 - C Axis Position (Degrees)
 - C Axis RPM

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EVENTS

Date/Time	Type	Job	Customer	Part	S/N	Program	Message
4/16/2021 11:27:01 ...	Telemetry	J7732111	PeenTech	PN30G7632	SN-A443721	LCCTEST.MPF	STARTED Telemetry Recording Every 30 sec.
4/16/2021 11:26:51 ...	JobDataReq	J7732111	PeenTech	PN30G7632	SN-A443721	LCCTEST.MPF	Job Data Request Complete
4/16/2021 11:23:26 ...	Program Done	J7732111	PeenTech	PN30G7632	SN-A477091	LCCTEST.MPF	Program LCCTEST.MPF Completed
4/16/2021 11:23:03 ...	JobDataReq	J7732111	PeenTech	PN30G7632	SN-A477091	LCCTEST.MPF	Job Data Request Complete

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STATUS EVENTS TFI FMFTRY MENU

- o The Event Report feature allows for the generation of lists for events occurring over a given date range. The reports can be filtered by Job ID, Part ID, Customer ID, Serial #, NC Program, etc. The data is housed on an SQL database so the customer can also use favorite tools like Microsoft Power BI to review data.