

1.0 WinPCA - Control and Data Acquisition Software

1.1 System requirements

- IBM compatible computer: 80486 DX or higher
- hard disk with 4MB available memory space
- Monitor with VGA or better resolution
- CD ROM or 3 ½" Floppy Drive
- Com 1 or 2 RS-232 Serial Port
- 4MB of RAM or higher
- Microsoft Windows version 3. 1, Windows 95, 98, 2000 or XP.

1.2 Installation

1.2.1 Disk installation

- 1.2.1.1 Start WINDOWS
- 1.2.1.2 Insert disk labeled No. 1 into floppy drive A:
- 1.2.1.3 Select in the Windows program manager START then RUN
- 1.2.1.4 Enter the command "A: SETUP"
- 1.2.1.5 Click the "OK" button.
- 1.2.1.6 First, the Setup files are transmitted and then the welcome mask of the installation program appears. Next, the "Installation" dialog box appears, where the target directories are defined. Change any presets and select "Continue" to proceed with the installation.
- 1.2.1.7 After files of the first disk are transmitted, a prompt appears to insert disk 2. Select "OK" to continue the installation.
- 1.2.1.8 With all data of disk 2 transmitted successfully, the program returns with a related message, which will be acknowledged with "OK".
- 1.2.1.9 For WINDOWS 2000 and XP, a patch file, pca27v2.exe, must be copied into the WinPCA target directory to overwrite the installed file to implement the program in 2000 and XP.
- 1.2.1.10 Now, WinPCA can be started immediately.
- 1.2.1.11 Without authorization WinPCA will only operate in DEMO mode and communication will not be established with the machine.

1.2.2 Registration

- 1.2.2.1 For licensing to enable the full version of WinPCA, select in the opened program from the menu "Optionen" select "Register".
- 1.2.2.2 Under the "Lizensierung" window note the IDENT # unique to your computer.
- 1.2.2.3 In disk 2 is a WORD document – "Softwarekey". Print this out. This fax form is to be filled out and returned with your company NAME and IDENT # to Microtap USA.
- 1.2.2.4 This form will be returned by fax with a unique key "NUMMER".
- 1.2.2.5 Refer to step 9.2.2.1 above to return to the "Lizensierung" window. Key in here the Name, precisely as recorded with upper and lower case letters and blanks and the "NUMMER", with the information found on the authorized "License data".

Restart the WinPCA program.

1.2.3 Cable connection

- 1.2.3.1 An RS232 cable is supplied and connected to the DB9 port in the back of the microtap. The opposite end should be securely connected to the available serial communication port on your computer. Use the 9 to 25 pin adapter if required.

1.3 System Setup

1.3.1 Set Language, Software Version, and Comport

After initial installation, the communication port between the PC and the microtap machine has to be defined.

- 1.3.1.1 Initial operation of WinPCA will display the German language. Go to "Optionen" select "System Setup". For activation, the switch button to select the available item has to be clicked on and slid to the appropriate position.
- 1.3.1.2 Under COUNTRY toggle from DEUTSCH to ENGLISH. In order to set the language the proper COMPORT must be active.
- 1.3.1.3 Under SOFTWARE determine if our machine is **Ver.3 or Ver.4. The choice must reflect the primary number shown on the display when the microtap machine is turned on.** For example, if **Ver.4.9** 19.12.00 is displayed, this is a Ver.4 machine. Toggle SOFTWARE to Ver.4.
- 1.3.1.4 Under MODE select METRIC or INCH based on the mode of the microtap machine. **Both machine and computer need to be in the same MODE.**
- 1.3.1.5 Under COMPORT select COM2, then OK. If RS232 INFO reads "COMPORT von Windows bereits belegt", COM2 is not connected to the microtap or COM1 is the available COMPORT. Toggle to COM1 and select OK. RS232 will display "COMPORT ist verfügbar".
- 1.3.1.6 Select "Exit" and WinPCA will close. The System Setup will be retained.

1.3.2 Machine parameter

Storage of operating parameters is beneficial to save then reestablished system settings from prior processes.

1.3.2.1 Menu

File

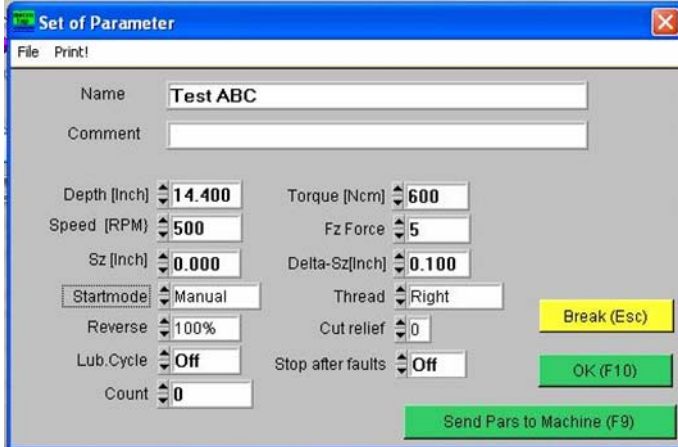
- OPEN: A previously stored parameter set is loaded from disk.
- SAVE AS: Storage of a new or changed parameter set.
- DELETE: Removal of parameter sets from disk.

Print

1.3.2.2 Parameters

- Name: Input of additional information as cutting tool type, work piece etc. with maximum 40 characters.
- Comment: Comment line to the parameter set with maximum 40 characters.
- Depth: Thread depth in millimeters or inches.
- Speed [rpm]: Cutting speed in revolutions per minute.
- Sz: Spindle advance distance to the work piece in auto mode (see machine manual). **This should not be set without knowing actual machine setting.**
- Startmode: Spindle start mode for type of spindle advance (see machine manual).
Manual: for push button start or Fz Force start
Autostart:
- Reverse: Spindle speed for reversal of cutting tool in percent of advance cutting speed.
- Lubrication Cycle: Number of cutting cycles until next lubrication cycle occurs.
- Count: Cycle counter, gives message to the machine display after preset counter value is reached.

Torque: Preset for the torque limitation to protect the cutting tool.
 Fz Force: Preset force between tool and work piece upon which the spindle starts rotating (for use in Manual with ZAP-option only).
 Delta Sz: Value for +/- position tolerance between cutting tool and work piece. (for use in Auto Sz with ZAP-option only).
 Thread: Selection of right or left-hand thread.
 Cut Relief: Number of desired cut relief cycles during one cutting cycle (2.5mm depth min).
 Stop after faults: maximum number of allowed torque limited cut relief cycles for quality criteria.



1.3.2.3 Function keys

Break (Esc): Closes the PARAMETER window. Changes or entrees are not being stored.
 Send Parameters to Machine (F9): Sends the set parameters from the PC into the tapping machine via the serial interface. For proper transfer, ensure that the tapping machine is in the working menu (depth, speed, torque) before attempting a data transfer. Repeat the procedure, if one of the above was set wrong.
 OK (F10): Transfers the set parameters into the evaluation software and exits the parameter window.

1.3.3 Torque History

Main screen showing torque readings of last 300 cuts.

1.3.3.1 Menu

File

Save Work: saves the recorded cuts (Torque peak values) in ASCII-code under *.his

Exit Program: ends WINPCA. All not saved data will be lost!

Parameter! Opens the parameter window for entering machine parameters

Evaluate! Opens the evaluation window for viewing and processing of cutting cycles and cutting histograms.

Statistics! Opens the statistics module with data of the actual recorded cutting torque values.

Options

Machine Keyboard Locked: locks the machine keyboard for data entry. Repeated clicking on this option releases the lock again.

Display Reverse Torque: reads and displays the maximum reverse torque with Mean Values.

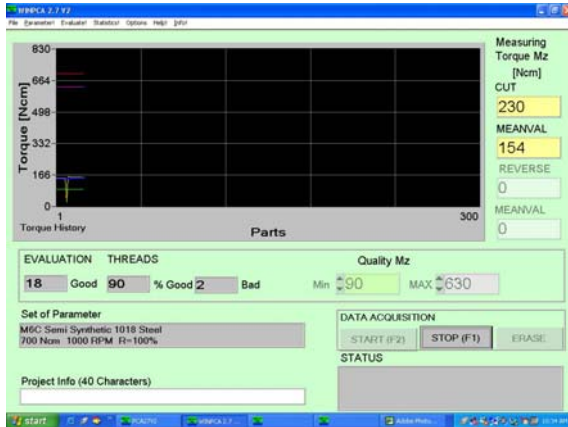
Work with Mean Values: computes and displays the average cut torque value.

System Setup: selection of COM port and user language (see System Setup)

Help! Operating instructions

Info! License information

1.3.3.2 Monitor



Parts Graph: displays the first 300 tapping torque values. Subsequent torque readings are displayed and shown in the histogram window.

X-axis: number of machine cycles.

Y-axis: display of the maximum torque of each cut in Ncm.

Yellow line: measured torque values.

Red line: maximum torque value, preset in parameters.

Blue line: display of floating mean value of the torque to filter large deviations.

Magenta and green line: display of upper and lower preset quality torque monitoring window.

Quality MZ Selections

Input windows, Mz min and max: The user can preset the torque values with set points for the quality evaluation.

Good: number of cuts produced within the defined upper and lower quality control criteria.

% Good: percentage of good cuts from all cycles.

Bad: number of bad cuts produced with quality errors.

Display windows

Set of Parameter: Name of the parameter labeled in PARAMETER plus torque, RPM, and reverse.

Project Info: Text input for project comments for the current project.

Status: Information of the connected tapping machine such or error messages.

Function keys

Start (F2): Begin recording of the torque of each cut and display in the histogram.

Stop (F1): Interrupt recording of torque values. Pressing 'Start' can continue the recording.

Erase: Deletes all currently recorded cutting data and graphs, which have not been stored on disk.

NOTE

Save measured data for further evaluation under FILE, SAVE AS with a user defined file name.

1.3.4 Evaluation

The torque readings over the depth of each cut.

1.3.4.1 Menu

File

Save as

Data Single Cut: Stores the actual single cut as ASCII file with the preset file extension *. cut. These can be further processed under Microsoft Excel.

Image of Multicut: Stores the image of overlaid cuts with the preset file extension *. mcu. Under the use of this feature, a graphical image of actual cuts is stored. These multi cut images cannot be evaluated in other program areas, such as, "statistics".

NOTE: See AutoSave and AutoSaveAll below for effective data collection.

Load

Data Single Cut: Loads *. cut files with single cut data in ASCII format from disc and displays them.

Image of Multicut: Loads *. mcu files with images of overlaid cut data to be graphically displayed. No statistical functionality or other post-processing features are available.

Histogram: Loads *. his files with multiple max, torque values in ASCII format for display.

Delete

Data Single Cut: Deletes individual cuts *. cut - files from disc.

Image of Multicut: Deletes multi cuts *. mcu - files from disc.

Histogram: Deletes histogram *.his - files from disc.

Option

Scale

Auto: At each load or transfer of cutting data, the display scaling is automatically adjusted to the area of received data.

Manual: Opens a window to define fixed scale values, regardless of what actual area the currently displayed data would cover. Also, loaded data from disc are displayed without checking the required display area.

Tendency: Opens a window to activate the graphical meanval around a new cut or histogram. The function is taken in account after activation with the next displayed data set and is shown as a red line. The choice of short, medium, and long is available.

✓Plot Meanval Only: Displays the single tendency line without Cut value variations.

✓Mittelwerk aus Cursorposition: Displays meanval between the movable red and green vertical cursors.

✓Next graph overlaid: When selected, the next incoming graph from either the tapping machine or from disc will be overlaid. A different color graph displays over the displayed graph.

Cut no. Color

1. black, 2. green, 3. yellow, 4. magenta, 5-n .black

The automatic save functions below create a date stamped file folder under the primary Work folder.

Each saved cut file is time stamped.

✓AutoSave: The initial selection requires Transfer Cut (F2) for the first cut to be displayed and then prompt "Save this cut data?" requires a response. Subsequent cuts are displayed and prompted.

✓AutoSaveAll: For saving each cut file without prompts, first select AutoSaveAll and then AutoSave. The first cut requires Transfer Cut (F2) to initiate the save function.

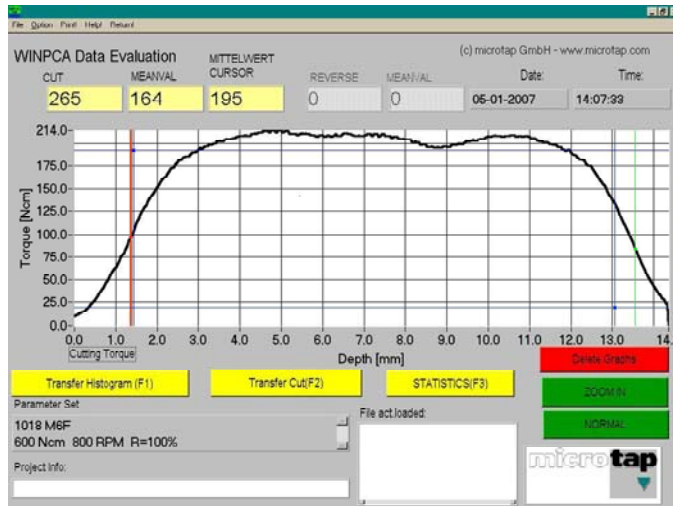
Print! Prints the actual graph under usage of the currently activated printer under WINDOWS.

Printouts onto fax programs etc., is not possible.

Help! WinPCA help menu.

Return! Closes the module and returns to the main screen.

1.3.4.2 Monitor



Graph is showing meanval tendency.

X-axis: The display of an individual cut shows the x-y graph in the x-axis in the processed depth. With the option "display reverse torque" active, the occurring torque values during reversals are also displayed. This display of depth results in the double depth. If during the cutting cycle a chip clearance cycle occurs, this also causes the displayed thread depth to be lengthened by the chip clearance cycles. In the display of histograms, the x-axis graph is changed from displaying thread depth to number of cuts.

Y-axis: Displays occurred torque. Torque values displayed in positive direction represent cutting torque, values displayed in negative direction represent reverse torque or chip relief torque.

Zoom Cursor: The two blue cursor hooks in the graphics display are used to select a particular area of the complete graph for closer review. Select and move each intersection with left mouse button to window the desired section to be enlarged. Hit the ZOOM IN button to enlarge the area selected. Hit the NORMAL button and the display returns to normal graph display.

1.3.4.3 Function keys

Transfer Histogram (F1)

Displays recorded torque values onto an evaluation screen and graphically shows each sequential cut mean value.

Transfer Cut (F2)

Transfers single cut data from the tapping machine via the COM port. The tapping machine has to be in idle position during transfer. The last cut data is stored in the tapping machine and F2 will send when activated.

NOTE: In Auto Start Mode, movement of the spindle out of home position, then the last recorded cut is overwritten with the idle torque values.

Statistics (F3)

The Statistics window graphs the occurrences of torque values and calculates the mean value and standard deviation from the actual graphical values.

The values given are for the total data from the full Evaluate graph. If Cut and Reverse are chosen, the Meanval and Standard Deviation are for totals.



$$\text{Average or mean value} = \sum_{i=0}^{n-1} x_i / n \quad \text{StdDev} = \sqrt{\sum_{i=0}^{n-1} [x_i - \text{ave}]^2 / n}$$

Zoom In button

Zooms in on the selected area between the two blue cursor hooks in x-y direction.

Normal button

Cancels the selected zoom and returns to normal graph display.

Delete Graph button

Deletes all displayed graphs.

1.3.4.4 Info Window

Parameter Set

Display of the actual or loaded parameter set (see PARAMETER).

Project Info

Text input for task comments for the current project.

File act. loaded

Displays the last loaded file name from disc.

1.3.5 Statistics

The display of acquired statistics data from current history.

1.3.5.1 Menu

Print!

The actual graph is being sent to the currently activated Windows printer

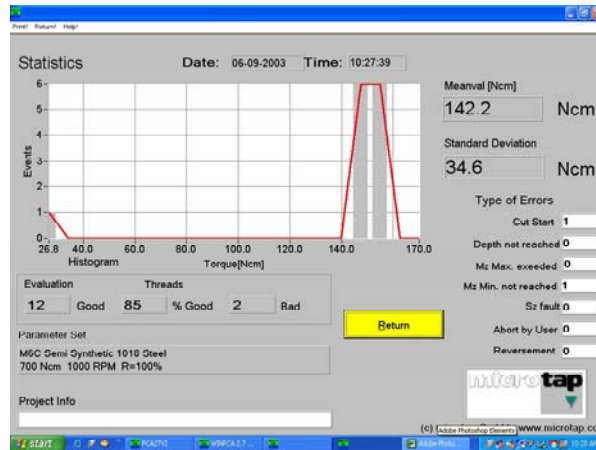
Return!

Closes the statistics module and returns to the main screen.

Help!

Operating instructions.

1.3.5.2 Monitor



Graph

X-Axis Display of total area of different occurred torque values

Y-Axis Display of number of occurrences of different torque values

Display windows

Mean Value Displays calculated mean value of displayed torque values in Ncm.

Standard Deviation Displays standard deviation from mean value in Ncm.

Evaluation Threads

Good: Number of threads which fulfill the preset quality criteria.

% Good: Percentile fraction of good number of cuts over the total number of cuts.

Bad: Number of cuts, which do not fulfill the preset quality criteria.

Parameter Set: Display of the actual or loaded parameter set (see PARAMETER).

Project Info: Text input for task comments for the current project.

Display of errors recorded errors in type and quantity.

Cut start: Failure of cutting tool to begin cycle.

Depth not reached: This was due to exceeding preset torque and not reaching preset depth.

Mz Max exceeded: The maximum preset quality torque value was exceeded.

Mz Min not reached: The minimum preset quality torque value was not reached.

Sz-fault: The tolerance window "Delta Sz" for the spindle advance distance, as defined in the parameter set window, was exceeded.

Abort by user: The process was aborted by the user, for example: pressing the start button again during the tapping process.

Reversal: More then three occurrences of excess torque were registered.