



A Metrology Software Products Ltd document

ezLinkNC Installation, Configuration and User Guide

- a guide for system administrators -

*Metrology Software Products Ltd
6J, Greensfield Court,
Alnwick, Northumberland,
ENGLAND, NE66 2DE*

*Tel: (+44) 01665 608193
Fax: (+44) 01665 608194*

[Email: postmaster@metsoftpro.com](mailto:postmaster@metsoftpro.com)

History

*When
26/09/2007
27/09/2007*

*Who
Peter Hammond
Peter Hammond*

*What
Issue 1
Added machine passoff results.*

1 Contents

1 Contents.....	2
2 Installation Guide.....	3
3 System Overview.....	4
3.1 Siemens 840D Configuration.....	4
3.2 Probing data and fitting results.....	5
3.3 Configuring ezLinkNC for the Siemens connection.....	6
3.4 Initial Powerup of remote PC and ezLinkNC startup.....	6
3.5 Exporting probing data from the controller to the remote pc.....	7
3.6 Importing an alignment to the controller.....	7
4 Machine Trials.....	8
4.1 Flat Plate test.....	8
4.1.1 Aims.....	8
4.1.2 Method.....	8
4.1.3 Results.....	8
4.1.4 Conclusions.....	8
4.2 Foreplane Trials.....	9
4.2.1 Aims.....	9
4.2.2 Method.....	9
4.2.3 Results.....	9
4.2.4 Conclusions.....	10

Illustration Index

Illustration 1: Siemens 840D configuration.....	4
---	---

Index of Tables

Table 1: Siemens controller directories.....	5
Table 2: Remote PC directories.....	5
Table 3: Foreplane test result summary.....	9

2 Installation Guide

- 1) Please ensure that the target PC meets the minimum hardware specification and operating system requirements before attempting to proceed with an installation.
- 2) ezLinkNC can be installed by inserting the product CD and following the install program instructions.
- 3) By default the installation process creates a full installation of the software into the path:

C:\Program Files\msp\ezLinkNC\ezlinkNC_XXXXX

It will also appear in the startup menu. Start -> Programs -> Msp -> ezLinkNC -> ezLinkNC_XXXXXX

- 4) It is very important that the user accounts for the RemotePC have complete read/write access to the program directories and the directories described in section 3.2 above.

Typically the safest mechanism is to allow full access to the following installation directories :-

C:\Program Files\msp

and

C:\Program Files\delcam

3 System Overview

EzLinkNC provides an interface between a PC and a machine tool controller. The exact nature of the interface depends on the specific controller. However, the aim is to present the PC data in a common format irrespective of the machine controller type.

This section summarizes the various controller configurations.

3.1 Siemens 840D Configuration

The Siemens 840D controller has a PC integrated into the controller. It is possible to connect to this PC via a standard ethernet connection. EzLinkNC takes advantage of this to provide a file-based transfer mechanism.

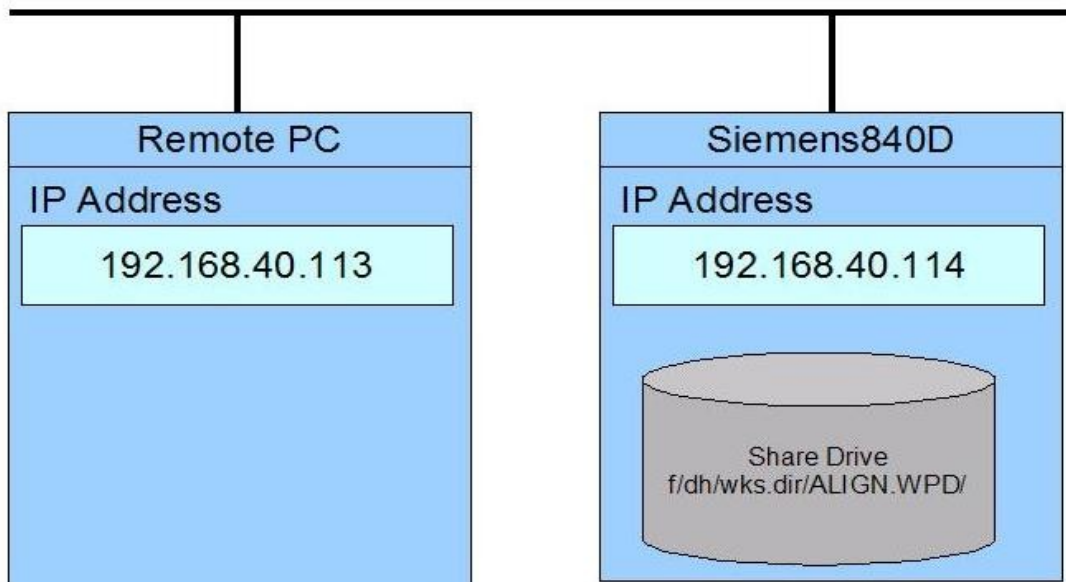


Illustration 1: Siemens 840D configuration

The controller and remote PC are connected by Ethernet. Both PCs are given IP addresses and are both members of the "Workgroup". The standard Siemens controller is configured such that the F: drive contains the data that is usable by the remote PC. This directory must be shared such that the remote PC has access to it.

Configuring the Siemens controller requires someone familiar with the workings of the controller to configure the network. This document describes what is required and assumes that personnel familiar with the controller would be able to.

For convenience, it might be helpful on the remote PC to map the shared network drive on the controller PC; however, this is not essential.

3.2 Probing data and fitting results.

The probing cycle on the Siemens controller writes the probed data to a file. On completion of the probing the file is saved and made visible to the Remote PC. During the configuration it must be decided where this file is to be located. Similarly the Remote PC will also create a Siemens sub program file that comprises the result of PSFixture part alignment. Again the location of this must be decided.

The following tables gives an example of the file. In this case note the path includes the name of the controller pc, "Waricut". Also notice that both the probing data and the alignment paths are the same.

Siemens controller directories	
Probing data path	//Waricut/f/dh/wks.dir/ALIGN.WPD/Probing.spf
PsFixture alignment path	//Waricut/f/dh/wks.dir/ALIGN.WPD

Table 1: Siemens controller directories

EzLinkNC reads probing data from the controller and formats it into the standard MSP format that can be used by other MSP products. During this conversion the data is saved onto the local hard disk. The probing data files are given a unique name in the following format :-

PC_yyyymmddhhmmss.MSR for example PC_20070926174325.MSR

The process of transferring the data from the controller to the remote PC is known as Exporting the data from the controller and is actioned through the File->Export menu.

EzLinkNC configuration provides the facility to define the paths on the Remote PC into which the probing data from the controller is to be exported to.

Remote PC directories	
Probing data path	C:\Waricut\MSR

Table 2: Remote PC directories

3.3 Configuring ezLinkNC for the Siemens connection.

EzLinkNC is configured via file called ezlinknc.cfg which is located in the same directory as the ezlinkNC executable. (C:\Program Files\msp\ezLinkNC\ezLinkNC_30105 for example)

In the section above the paths where the data is to be read and written were defined. Below is an example configuration file with this information.

```
[Connection]
MachineType=Siemens840d
#Fanuc16i
#Siemens840d

[Siemens840d]
SPFProbingFile=//Waricut/f/dh/wks.dir/ALIGN.WPD/probing.spf
MSRToDir=C:\Waricut\MSR
ExportPerl=Siemens840d_Export.pl
;
; Used by "Export" to move file from Siemens PC, process and save in psFixture application
; runs Perl program specified by ExportPerl
;
FitFromDir=C:\Waricut\MSR
; Directory in which to store the fix result, Perl decides on the file
; name which at present is PsFix.spf
FitToDir=\\Waricut\f\dh\wks.dir\ALIGN.WPD
ImportPerl=Siemens840d_Import.pl
;
; Use by "Import" to move file from psFixture to Siemens PC
; runs Perl program specified by ImportPerl
;
PollTime=200
;
; Time in milliseconds between polls for ProbingFile
;

[Fanuc16i]
; No options for fanuc yet
```

The file has been annotated to provide help on the various configuration parameters.

3.4 Initial Powerup of remote PC and ezLinkNC startup

The remote PC should not be powered up until the controller is powered. This allows the network connections to be established correctly between the remote PC and the controller.

Once powered start ezLinkNC. If the Remote PC does not have access to the Controller PC then the capture log will give warnings, for example :

```
* W *      SPFProbingFile directory /Waricut/f/dh/wks.dir/ALIGN.WPD/probing.spf not found
* W *      FitToDir Directory \\Waricut\f\dh\wks.dir\ALIGN.WPD not found
* M *      Waiting for /Waricut/f/dh/wks.dir/ALIGN.WPD/probing.spf
```

The prefix W indicates a warning the M indicates an information message.

If the RemotePC does not connect to the controller PC then it may be for the following reasons :-

- 1) Ensure that both PC's are connected to the network. (Not some installations provide a network switch that allows the controller pc to be accessed by the machine manufacturer remotely.

- 2) The connection requires the remote PC to log in to the controller PC. To do this open up a windows explorer. Open up the My Network Places -> Microsoft Windows Network -> WorkGroup

Now click on the Controller PC. (for example "Waricut") you will be asked to provide a user and password. (For Siemens the default is "auduser" and "SUNRISE" note capitals!)

When you have connected to the controller PC close down ezLinkNC and restart. The two warnings should have disappeared.

3.5 Exporting probing data from the controller to the remote pc

During normal operation ezLinkNC is polling the Probing data path on the controller PC to see if a file is available and if it is it posts a message into the log to inform the user that a file is available for export.

A message is provided to indicate that ezLinkNC is waiting for a file and where it is looking.

The export button is greyed out until a probing file is available.

On pressing the export button the probing file is read from the controller and, if necessary reformatted to MSP's required format and saved to the probing data path of the remote PC with the correct unique name.

3.6 Importing an alignment to the controller

EzLinkNC operates in conjunction with Delcam Fixture and allows the result of the Fixturing operation to be imported into the controller. The import menu option, File,Import provides this facility.

After selecting this option a file select dialog is opened. This defaults to the directory where Delcam Fixture has written the alignment file. For the Siemens machine the file will have the suffix .spf.

Select from the list the correct file. It has the same unique number as the probing data file and additional part serial number information.

When the file has been selected it is transferred to the controller pc and a message is displayed in the capture log to indicate this.

4 Machine Trials.

The trial was divided into two tests. The first was to create a very simple program for aligning a flat plate. The waterJet system is a 3 axis system where the part is in general aligned reasonably well but Z axis variance can effect the cutting performance. The ideal cutting is achieved when the gap between the material and the nozzle is constant. For plate materials this is generally not a problem but for preformed parts where the z axis must move then aligning the part is important. (Typically the gap should be 3mm +/- 1mm)

4.1 Flat Plate test.

The flat plate test is designed to test the system independently of the application. By choosing a flat plate the material and substrate are ideal for the machine and the results should therefore provide a good indication of the machine's standard capability.

4.1.1 Aims

The aim of the test is to prove the data format, data transfer mechanism and the alignment.

The misalignment of the plate to the Z axis is to allow +/- 5mm over a 200mm length. This is far more than is required for the actual workpiece but should prove the

4.1.2 Method

1. Create a program for probing the rectangular plate with 4 points. Position the plate within the machine and run the program.
2. Process the measured data through ezLinkNC and BaeForeplane.
3. Re-run the probing routine using the alignment produced by Bae Foreplane
4. Compare the measured result with the predicted results from Bae Foreplane.
5. Repeat steps 1 – 4 for alternative plate mis-alignment.

4.1.3 Results

1. The Export of probing data from the controller to the remote PC was succesful.
2. The translation from the (Ridders) Siemens format to the MSP format was valid.
3. The data input to Bae Foreplane for both non-weighted and weighted configurations was correct.
4. The Import of the alignment data into the Controller PC from the remote PC was valid.
5. The sign convention of the Alignment data was valid.
6. The repeat measurements of the probing. (See Plate1,Plate2,Plate3,Plate4 results in archive)

Plate 1: Plate lifted approx 4mm

Plate 2: Rotation about Y axis

Plate 3: Rotation about X axis

Plate 4: Compound rotation

In all these cases the errors prior to alignment were approx 4 – 5 mm. After the alignment the errors were within 0.050 mm. Which was considered acceptable.

4.1.4 Conclusions

The installation was proved to achieve what was required of the system from a functional point of view.

4.2 Foreplane Trials

The foreplane is located on the machine in a fixture. The fixture uses conical location pins (Acorns) which are able to position the part to within 5 mm. A probing program had been created to take a sample of points, distributed around the part to provide good “balance” for the alignment.

The trial used 12 points only.

Unlike the Fanuc control on the hard-metal machine the Siemens probing has the advantage that the probing results are reported in the “Aligned” coordinate system. Therefore it is possible to run a probing sequence through BaeForeplane and generate the alignment and also a predicted result. A subsequent run will then show the real effect on the machine.

4.2.1 Aims

1. To verify the probing program and the point distribution.
2. To process the foreplane data through ezLinkNC and BaeForeplane.
3. To verify the predicted deviations after alignment are reproduced on the machine.

4.2.2 Method

1. Run the production probing program for the ForePlane
2. Process the measured data through ezLinkNC and BaeForeplane.
3. Re-run the probing routine using the alignment produced by Bae Foreplane
4. Compare the measured result with the predicted results from Bae Foreplane.

4.2.3 Results

1. The Export of probing data from the controller to the remote PC was successful.
2. The translation from the (Ridders) Siemens format to the MSP format was valid.
3. The data input to Bae Foreplane for both non-weighted and weighted configurations was correct.
4. The Import of the alignment data into the Controller PC from the remote PC was valid.
5. The repeat measurements of the probing. (See Panel3,Panel3PostAlignment results in archive)

Panel3: Initial probing of panel

Panel3PostAlign : Second probing after alignment

Panel3W: Initial probing of panel processed using weighted configuration

Panel3WPostAlign: Second probing result processed using weighted configuration.

	Run	Mean	Range	Standard Deviation
7.	Panel3 (Unaligned)	-1.3123	6.6183	2.8232
8.	Panel3 (Predicted)	-0.1013	1.3764	0.4716
9.	Panel3PostAlign. (Actual)	0.0994	1.2622	0.4094
10.	Panel3W (Predicted)	-0.1013	1.3765	0.4716
11.	Panel3WPostAlign(Actual)	0.0994	1.2623	0.4094

Table 3: Foreplane test result summary

The fixture alignment prior to the alignment gave errors of the range 6.6 mm.

The actual results varied from the predicted results. The variation for the mean deviation being the largest. (0.2mm) the variation of range was within 0.02mm and the standard deviation being (0.06mm)

The results for the weighted fit and non weighted fit were the same.

4.2.4 Conclusions

The initial part location gave error in the range of 6.6 mm which is within the expected value.

The realignment reduced the error range to within 1.3 mm. This represents the combination of misalignment and part error.

The default weighting values are 1 for all points and therefore it is proved that the neutral weighting has no effect.

The trial shows that the system is functioning to the requirements of the process.