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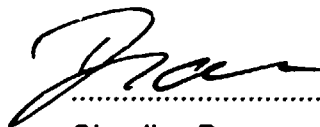
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Contract No.: 95/178

Final Report

**According to the above mentioned contract
this final report is a summing of the UNIDO
project DG/CPR/91/321 between the inquiry
(Bid Response Sheet) at 25th of August 1995
and the Training on site ending
at 25th of March 1996.**



.....24 April 1996

Claudius Braun

**Power Automation GmbH
CNC Automatisierungstechnik
Frankfurter Straße 10/1**

71732 Tamm

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History

At 25th of July 1995 the company Power Automation located at Frankfurter Straße 10/1 in 71732 Tamm, Germany was invited from the United Industrial Development Organization (UNIDO) and the Government of People's Republic of China (the Government) with the Bid Response Sheet to submit a written proposal for the development / Technology Transfer of a 32 bit CNC control system.

Attached to the Bid Response Sheet the Terms of Reference and the Technical Specification of the CNC-system have been transmitted.

Closing date for the bid was the 25th of August 1995. Signed at 18th of August 1995 the proposal of Power Automation was sent to UNIDO in Vienna.

Between September 1995 and early autumn 1996 there have been discussions with UNIDO/UNDP and the Government about the proposals.

During autumn 1996 negotiations between UNIDO/ the Government and Power Automation took place. Dated 29th of November 1996 three copies of UNIDO contract No. 95/178 have been sent to Power Automation to sign.

Signed at 30th of November 1996 from UNIDO side and 5th of December 1996 from Power Automation side the contract, including UNIDO General conditions of Contract and Annexes B, C, D has been concluded with a total grand sum of 550.000,00 US \$.

This total grand sum covered:

- **Expenditures of the experts;**
- **Trainee's / trainer cost including international and local traffic and accommodation abroad;**
- **Training services;**
- **Technology Transfer of Know-how / Know-why and Documentation;**
- **Two prototypes of PA 8000 system;**
- **Object-code and source-code of the required specification according to the Terms of Reference.**

Government

Since years it was the intention of the Government of People's Republic of China to enhance the CNC technology in China with the support of a foreign company experienced in the development of PC-based CNC technology and willing to transfer this technology.

The Government finally convinced the UNIDO to support and to sponsor this project.

Within the Ministry of Machinery Industry there are several groups designing and developing electronics such as simple CNC controllers for the machinery industry.

One of them is the company China Zhufeng Numerical Control LTD (Zhufeng) coming out of the Beijing Machine Tool Research Institute.

After the settlement of the UNDP project DG/CPR/321 Zhufeng has been selected to be the company getting the transferred CNC-technology and to get training abroad to enhance its knowledge in state of the art CNC-controllers.

Zhufeng is a focal point of CNC developments in China. The center presently has over 60 technical staff. Zhufeng is well equipped with hardware and software and has four laboratories, that is, software development, hardware development, system integration/testing and servo system laboratories.

The laboratories have a main frame computer, four workstations and 25 terminals to develop hardware. New software tools are used for these computers. Testing devices for PC-boards are available as well.

With this equipment there is no doubt about, that Zhufeng is in the position to develop new integrated PC-boards.

Zhufeng has accumulated some experience in the CNC and allied areas as follows:

- Developing a 8-bit CNC-system for lathes based on 6809 microprocessor.
- Designing and developing a STD-bus CNC-system for lathes.
- Developing CNC software for grinding machines, punching machines and sharing machines
- Modifying and/or changing for local assembly of servo units and CNC systems based on the know-how introduced by the Japanese company Fanuc.
- Retrofitting a number of old CNC machines.

Trainers and Trainees

Trainers from Power Automation	
Project Leader	Mr. Braun
tec. Team Leader	Mr. Schenk
Software	Mr. Knierim
Software	Mr. Wohnhaas
Software	Mr. Rilling
Software	Mr. Herdtweck
Software	Mr. Munz
Hardware	Mr. Hylla
Hardware	Mr. Liebmann

Trainees from China Zhufeng Numerical Control Co.	
System Manager	Mr. Tong
Hardware	Mr. Wang
Hardware	Mr. Sun
Software	Ms. Wang
Software	Mr. Tang

Workplan / Timeplan

As a part of the contract a detailed workplan/timeplan accepted by UNIDO, Zhufeng and Power Automation has been worked out.

The workplan/timeplan have been signed by the project leader from Zhufeng side Mr. Jiaobi Tong at 15th of December 1995.

It was agreed that 5 members out of Zhufeng will be trained at the facilities of Power Automation (training abroad) divided into 'three' groups.

Two members are the hardware (HW), two members are the software (SW) and one member is the system manager (SM) group.

With little modifications the items of the original agreed workplan have been carried out.

The following table indicates the topics of the training. For more details refer to the:

- First Progress Report signed from PA/Zhufeng at 16.02.1996**
- First Prototype Report signed from PA/Zhufeng at 16.02.1996**
- Second Progress Report signed from PA/Zhufeng at 26.03.1996**
- Second Prototype Report signed from PA/Zhufeng at 26.03.1996**

10.01.1996	All	Topic: Organizational questions
12.01.1996	HW	Topic: Motherboard Topic: Systemboard
	SW	Topic: How to use the functions („Terms of Reference“)
	SM	Topic: How to use the functions („Terms of Reference“)
15.01.1996	HW	Topic: Axes-boards
	SW	Topic: How to use the functions („Terms of Reference“)
	SM	Topic: How to use the functions („Terms of Reference“)
16.01.1996	HW	Topic: Axes-boards
	SW	Topic: How to use the functions („Terms of Reference“)
	SM	Topic: How to use the functions („Terms of Reference“)
17.01.1996	HW	Topic: Axes-boards
	SW	Topic: How to use the functions („Terms of Reference“)
	SM	Topic: How to use the functions („Terms of Reference“)
18.01.1996	HW	Topic: Axes-boards
	SW	Topic: Design structure overview
	SM	Topic: Design structure overview
19.01.1996	HW	Topic: Axes-boards
	SW	Topic: Design structure overview
	SM	Topic: Design structure overview
22.01.1996	HW	Topic: CAM-machine Topic: Axes-boards
	SW	Topic: CAM-machine
	SM	Topic: CAM-machine
23.01.1996	HW	Topic: PC-hardware
	SW	Topic: Graphics for MMI
	SM	Topic: PC-hardware
24.01.1996	HW	Topic: Mechanical parts Topic: Commissioning instructions
	SW	Topic: Graphics for MMI
	SM	Topic: Mechanical parts Topic: Commissioning instructions
25.01.1996	HW	Topic: Softwareproduction
	SW	Topic: Graphics for MMI
	SM	Topic: Softwareproduction

26.01.1996	HW	Topic: Hardware system Topic: Prototype No. 1
	SW	Topic: Graphics for MMI
	SM	Topic: Softwareproduction
29.01.1996	HW	Topic: Prototype No. 1
	SW	Topic: Graphics for MMI
	SM	Topic: Softwareproduction
30.01.1996	HW	Topic: Topic: Partslist
	SW	Topic: Topic: Graphics for MMI
	SM	Topic: Topic: Partslist
31.01.1996	HW	Topic: PLC
	SW	Topic: PLC
	SM	Topic: PLC
01.02.1996	HW	Topic: PLC
	SW	Topic: Topic: Graphics for MMI
	SM	Topic: PLC
02.02.1996	HW	Topic: Design structure overview PLC
	SW	Topic: MMI-software
	SM	Topic: Design structure overview PLC
05.02.1996	HW	Topic: PLC
	SW	Topic: MMI-software
	SM	Topic: PLC
06.02.1996	HW	Topic: PLC
	SW	Topic: MMI-software
	SM	Topic: PLC
07.02.1996	HW	Topic: PLC
	SW	Topic: MMI-software
	SM	Topic: Softwareproduction
08.02.1996	HW	Topic: PLC
	SW	Topic: MMI-software
	SM	Topic: Softwareproduction
09.02.1996	HW	Topic: Softwareproduction
	SW	Topic: MMI-software
	SM	Topic: Softwareproduction
12.02.1996	HW	Topic: Softwareproduction

	SW	Topic: NC-kernel
	SM	Topic: Softwareproduction
13.02.1996	HW	Topic: Softwareproduction
	SW	Topic: NC-kernel
	SM	Topic: Softwareproduction
14.02.1996	HW	Topic: Multi-Function-Board
	SW	Topic: NC-kernel
	SM	Topic: Prototype No. 1
15.02.1996	HW	Topic: Sercos-board
	SW	Topic: Sercos interface
		Topic: Cutter compensation
	SM	Topic: Topic: Prototype No. 1
16.02.1996	HW	Topic: PLC questions
		Topic: Prototype No. 1
	SW	Topic: Software options
	SM	Topic: PLC questions
26.02.1996	HW	Topic: Reporting
	SW	Topic: Reporting
	SM	Topic: Reporting
27.02.1996	HW	Topic: Discussion with Beijing No.2
	SW	Topic: Discussion with Beijing No.2
	SM	Topic: Discussion with Beijing No.2
28.02.1996	HW	Topic: Description PA 8000 software
	SW	Topic: Trainer
	SM	Topic: Description PA 8000 software
29.02.1996	HW	Topic: Description PA 8000 software
	SW	Topic: Trainer
	SM	Topic: Description PA 8000 software
01.03.1996	HW	Topic: Description PA 8000 software
	SW	Topic: Trainer
	SM	Topic: Description PA 8000 software
04.03.1996	HW	Topic: Trainer
	SW	Topic: Description of the PA 8000 hardware
	SM	Topic: Report to UNIDO, Beijing
05.03.1996	HW	Topic: Trainer

	SW	Topic: Description of the PA 8000 hardware
	SM	Topic: Description of the PA 8000 hardware
06.03.1996	HW	Topic: Trainer
	SW	Topic: Description of the PA 8000 hardware
	SM	Topic: Description of the PA 8000 hardware
07.03.1996	HW	Topic: Trainer
	SW	Topic: Description of the PA 8000 hardware
	SM	Topic: Description of the PA 8000 hardware
08.03.1996	HW	Topic: Description of the software production
	SW	Topic: Description of the software production
	SM	Topic: Trainer
11.03.1996	HW	Topic: Delivered boxes, Topic: Prototype No. 1
	SW	Topic: Delivered boxes, Topic: MMI
	SM	Topic: Delivered boxes, Topic: Prototype No. 1
12.03.1996	HW	Topic: Description of the software production
	SW	Topic: Description of the software production
	SM	Topic: Trainer
13.03.1996	HW	Topic: Description of the software production
	SW	Topic: Description of the software production
	SM	Topic: Trainer
14.03.1996	HW	Topic: Prototype No. 1
	SW	Topic: MMI
	SM	Topic: Reporting
15.03.1996	HW	Topic: Prototype No. 1
	SW	Topic: MMI
	SM	Topic: Reporting
18.03.1996	HW	Topic: Prototype No. 1
	SW	Topic: MMI
	SM	Topic: Visit of PA people
19.03.1996	HW	Topic: Prototype No. 1
	SW	Topic: MMI
	SM	Topic: Visit of PA people
20.03.1996	HW	Topic: PLC programming
	SW	Topic: MMI
	SM	Topic: Arrangements

21.03.1996	HW	Topic: see Prototype No. 2 report
	SW	Topic: MMI
	SM	Topic: see Prototype No. 2 report
22.03.1996	HW	Topic: see Prototype No. 2 report
	SW	Topic: MMI
	SM	Topic: see Prototype No. 2 report
25.03.1996	HW	Topic: see Prototype No. 2 report
	SW	Topic: MMI
	SM	Topic: see Prototype No. 2 report

Reports

Following reports according to the agreements of the contract have been drawn up and transmitted to

**UNIDO
Contracts Unit, Purchase and Contracts Branch,
Operational Division
P.O. Box 300
A- 1400 Vienna - Austria**

Workplan / Timeplan

The work-/timeplan for the work to be performed in the Project area and at the Home Office in connection with the transfer of know-how and the training abroad and on site has been worked out and signed by both parties as a part of the contract before the training abroad It has been sent to UNIDO at 15th. of December 1995.

Know-How Technology Transfer Report

Describing the Software routines, the documentation for the hardware (drawings) and other technical material delivered. Three copies of this report have been transmitted to UNIDO at 13th of February 1996.



First Progress Report

Describing the training program of the training abroad and including the Prototype No. 1 protocol signed by both parties (PA and Zhufeng). Three copies have been transmitted to UNIDO at 21st of February 1996.

Second Progress Report

Describing the training program, selftraining between 26th of February and 15th of March 1996 and training on-site between 20th of March 1996 and 25th of March 1996 of each trainee including the Prototype No. 2 Protocol signed by both parties (PA and Zhufeng). Three copies have been transmitted to UNIDO at 27th of March 1996.



Progress Payments

A total grand sum of US \$ 550.000,00 for this contract has been agreed between UNIDO and Power Automation.

Progress payments on account of the contract price have been made against Power Automation's original invoices rendered as follows:

1. upon UNIDO's receipt of the Contract countersigned by PA the sum of US \$ 55.000
This sum has been paid at 20th of Dec. 1996

2. upon UNIDO's acceptance of Work- / timeplan confirmed by both parties (PA/Zhufeng) the sum of US \$ 55.000
This sum has been paid at 13th of Jan. 1996

3. upon UNIDO's acceptance of the Technology Transfer Report signed by Zhufeng the sum of US \$ 220.000
This sum has been paid at 13th of March 1996

4. upon UNIDO's acceptance of the First Progress Report, including training abroad and Prototype No. 1 protocol signed by Zhufeng the sum of US \$ 55.000
This sum has been paid at 13th of March 1996

5. upon UNIDO's acceptance of the Second Progress Report, including training on-site and Prototype No. 2 Protocol signed by Zhufeng the sum of US \$ 110.000
This sum has been paid at 11th of April 1996

6. upon UNIDO's acceptance of the Final Report the sum of US \$ 55.000

Summing

The PA 8000 CNC technology according to the „Terms of Reference“ is transferred from Power Automation to the company Zhufeng. Detailed description of the software and the hardware are now at the facilities of Zhufeng.

During the training abroad and the training on-site some members of Zhufeng have been taught how to use this technology. During the training abroad the Zhufeng hardware staff learned how to manufacture a PA 8000 CNC-system (prototype No. 1) During the training on-site the Zhufeng staff has manufactured a second prototype under the supervision of PA staff by them own.

The operation-software and the application-software according to the „Terms of Reference“ has been installed. There have been no difficulties to start up the second prototype.

The staff of Zhufeng is able to develop necessary PLC programs. Existing PLC programs (from the Zhufeng's own CNC-system) have been transferred to the BONUS PLC program of PA.

From the technical point of view Zhufeng is able to manufacture controls (to multiply PA 8000 CNC-systems) according to the requirements of the „Terms of Reference“. This company is able to handle demands for controls for milling machines up to four axes and to deliver controls for cam-shaft grinding machines, because PA has transferred the software for this machines as well.

From the sales point of view Zhufeng needs marketing / sales assistance from external partner (s), because it is a technical, but not a sales driven company.