

Machine Control and Multimedia Communication with Mini-PC

Prof. Dr.-Ing. H. Haehnel, Dipl.-Ing. Martin Schreiber

University of Applied Sciences in Duesseldorf, Josef Gockeln Str. 9, D-40474 Düsseldorf, Germany, Tel: +49 2114 351 308/ 346, Fax: +49 211 4 351 303, email: haehnel@fh-duesseldorf.de,
Frölich & Klüpfel Drucklufttechnik GmbH & Co. KG Wuppertal, Wernerstr. 32, D-42285 Wuppertal, Tel.: +49 (0202) 89 002 0, Fax: +49 (0202) 89 002 22, mschreiber@f-u-k.de

Abstract—The communication need in companies machines - and equipment construction constantly rises. Also small and medium-size enterprises act today more than ever on a global market. On the other hand the enterprises are at a substantial costing and time pressure by the globalization of the markets. Experts act in this connection increasingly in different locations.

In the result of the current research in the context by the Federal Ministry for economics promoted of a co-operation of research project between the FH Duesseldorf, Labor for computer technology and the company Frölich & Klüpfel Drucklufttechnik GmbH & CO. KG was determined that the industrielle use of Multimedia Communication for companies in the context of examined cases of application with a large use which can be expected is possible.

Index Terms—Foundry technology, Web-based Video Diagnostic System, Internet, industrial applications, multimedia communication technology, Decorating Machines, Casting

I. INTRODUCTION

The Automation engineer and/or technical designer must in the area of conflict between functional requirements to the devices and parts of a machine and technical like also technological requirements (co-ordination between electronics and mechanics, production-correct organization etc..) numerous problems clarify.



Figure 1. Decorating Machine of the company Frölich & Klüpfel Compressed Air Engineering GmbH

II. MULTIMEDIA COMMUNICATION AND CONTROL WITH MINI-PC

With the rising complexity of the products and by the early integration of the suppliers into the development process not only extensive tuning processes with numerous

specialists are necessary, but also with start-up and maintenance of these machines and plants with the development and manufacturing of automatic production plants. Crucial it is here to be able to react fast to disturbances and problems at the customer.

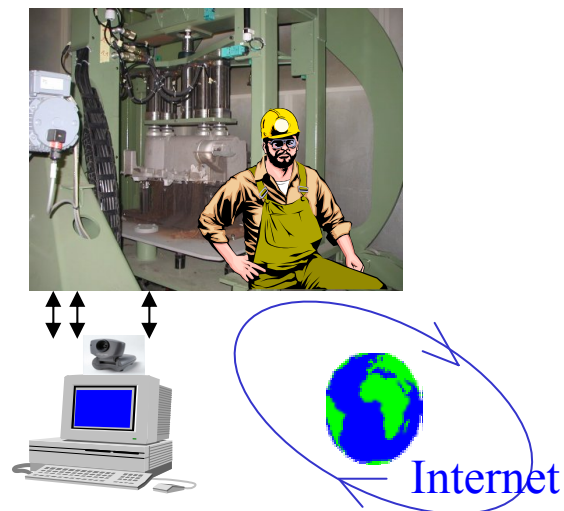


Figure 2. Idea -> Supporting the Start-up and Maintenance of a Decorating-Machine through a Video Diagnostic and remote control system

On the basis of laboratory tests and already available experiences with the employment of Multimedia communication systems 3 possible control concepts were compiled and regarded regarding your economy. The favored concept to see (in the picture) has a Microcontroller C167 as core and a mini PC for Multimedia communication.

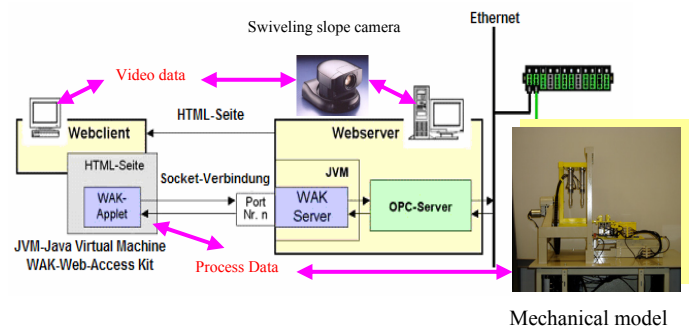


Figure 3. Videoservice- and remote control concept with Mini-PC

III. VIDEO DIAGNOSTIC SYSTEM

In the result of the investigations it showed up e.g. that a visual Web-based transmission of indicator announcements of LCD announcements, or sensor data under adherence to a suitable viewing angle is problem-free possible.



Figure 4. Web-based tests of the developed Video-Client from Cape Town (South Africa)

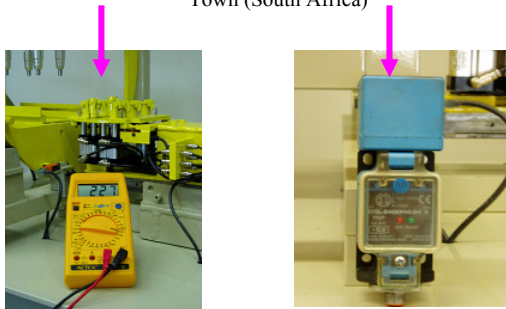


Figure 5. Attempt transmission of LCD indicator values and sensor values

The visualization of the model of a decoring machine, the model asset components, as well as to decoring cast parts and the errors recognizable from it is well possible with the developed video diagnostic system. The start-up and maintenance of the decoring machines of the company Frölich & Klüpfel might be improved at economically justifiable expenditure effectively.

Large cost saving potentials, as well as a substantial improvement of the servicequalitaet opposite the customers in relation to the competition are to be expected.



Figure 6. Experimental setup at the pilot plant in the company Frölich & Klüpfel Drucklufttechnik GmbH

	Zone_A	Zone_B	Zone_C
Nr.	t[s]	t[s]	t[s]
1	14,98	23,10	21,65
2	16,26	22,98	25,00
3	15,20	22,50	21,39
4	17,03	22,51	21,50
5	16,76	19,73	24,10
6	17,10	18,32	22,70
7	16,96	18,75	20,71
8	16,45	18,53	22,10
9	16,20	19,20	22,20
10	16,25	18,76	22,80
11	16,29	20,00	19,95
12	16,80	23,00	22,95
13	18,00	19,31	20,31
14	17,50	18,07	22,56
15	18,30	18,12	21,60
Mittelwert \bar{x}	16,67	20,19	22,12

Figure 7. Deceleration time measured values from the web-based test (with analog modem46 Kbit/s) of the developed video-client from Cape Town (South Africa)

IV. MECHANICAL MODEL OF A DECORING MACHINE

For the testing of a first practice-oriented concept on the part of the company F & K a mechanical model (see illustration) was provided. At this model the first steps of the research were realized. The won realizations/ know how are transferred now to the material decoring machine (Figure 8).

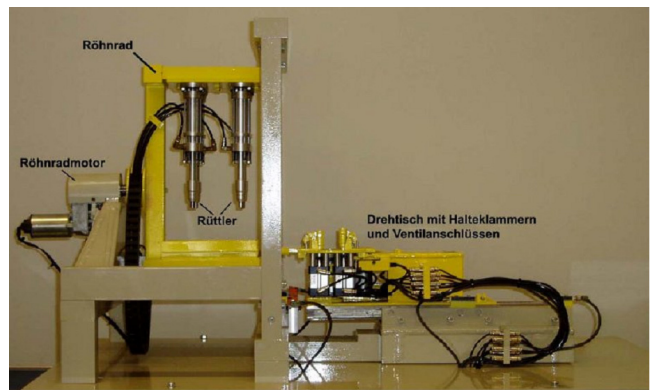


Figure 8. Mechanical model 1:16 of a decoring machine of the company Frölich & Klüpfel Compressed Air Engineering GmbH

REFERENCES

- [1] Langmann /Haehnel, "Taschenbuch der Automatisierung", Abschnitt 6: „Kommunikation“, Fachbuchverlag Leipzig, 2003, ISBN 3-446-21793-2
- [2] H.-E. Haehnel, "Grobkonzept für F+K", Machbarkeitsstudie für die Firma Froelich und Klüpfel, Wuppertal, December 2001, Duesseldorf, Germany
- [3] H.-E. Haehnel, "Videoconference Systems in the Automation Industrie", Research Project in the University of Applied Sciences in Duesseldorf, Labor for Computers and Robotics, 2000, Duesseldorf, Germany