

Manufacturing production engineering institutions in the Netherlands

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**MANUFACTURING PRODUCTION ENGINEERING
INSTITUTIONS
IN THE NETHERLANDS**

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MANUFACTURING PRODUCTION INSTITUTIONS IN THE NETHERLANDS

Prepared for CIRP, Trondheim. august 1989
By P.C. Mulders, Eindhoven University of Technology.

Manufacturing Production Research in the Netherlands is mainly organized under the Ministry of Education and the Ministry of Economical Affairs.

Manufacturing Production Research is mainly carried out by the 3 Technical Universities and the Research Organization TNO i.e. :

- Delft University of Technology (TUD) Effort ~ 30%
- Eindhoven University of Technology (TUE) Effort ~ 45%
- Twente University of Technology (UT) Effort ~ 25%
- Organization for Applied Scientific Research TNO.

Concerning the universities the research is financed via 3 flows:

1. Flow for research related to education, provided by the Ministry of Education.

This research is carried out in Conditionally Financed Programs (VF-programs), which last usually 5 years and which are evaluated every 2 years e.g. by the Royal Institution of Engineers (KIVI).

2. Flow for contract research with national organizations e.g.:

S.T.W. (Foundation for Technical Science)
Z.W.O. (Foundation for Pure Scientific Research)
F.O.M. (Fundamental Research in Materials)

This financed research is usually carried out with young scientists on an temporarily base.

Related to the Ministry of Economical Affairs there exist:

I.O.P (Innovation Projects)
SPIN (Stimulation Plan for Applied Computer Science)

Furthermore the support by the international EEC-programs e.g. ESPRIT.

3. Flow for contract research with others like private industries.

The ratio between these flows is globally 60, 15, 25%.

Notes

- With respect to the Conditionally Financed Programs (VF-flow 1), to complement each other and to avoid the doubling of research there have been made cluster-agreements among the production engineering groups of the 3 universities.
- In 1982 a stimulation commission FLAIR for Flexible Automation and Industrial Robots was formed with support of the Ministry of Economical Affairs. The next projects were pointed to the 3 universities and TNO.
 - Delft (PAIR) : Flexible Assembly Cell
 - Eindhoven (FAIR): -Welding and Cutting
 - : -Managerial Problems in the Introduction of Flexible Automation
 - Twente : Control of the production flow
 - TNO : Multi dimensional sensor systems and their applications

As a follow up in 1987 a new IOP-FLAIR (= Innovative Research Program) was initiated by SPIN (Stimulation Plan for Applied Computer Science of the Ministry of Economical Affairs) with a budget of M Dfl 10 for 4 years. Related to this the projects at the 3 universities are now

Delft	:	DIAC = Delft Intelligent Assembly Cell
Eindhoven	:	FALC = Flexible Assembling and Welding Cell
Twente	:	Manufacturing Systems : Application of information and technology in production
	:	Mechatronics Research Centre

DELFT UNIVERSITY OF TECHNOLOGY

Name	Number of researchers	Budget excl. education/ salaries M Dfl/yr	Research-themes Conditionally Financed Programs (VF)
<u>Manufacturing Systems</u> Prof. L. Reijers	8	0,5	1. PAIR Production Automation and Industrial Robots - Development of automated production equipment - Industrial robots - Computer controlled production systems
Prof. J. v.d. Broek part-time (DAF)			
<u>Design</u> Prof. K. v.d. Werf	4	0,2	2. CAD/CAM in Mechanical Engineering - Design of systems out of discrete components - Design and manufacturing of mechanisms
<u>Mechanisation/Mechanisms</u> vacant → part-time	3		
<u>Industrial Organisation</u> Prof. J. in 't Veld	2		3. Systematic approach of product organisation - Procesfunction analyses - Productdevelopment and pro- duction methods - Practical case studies
<u>Manufacturing Processes</u> Prof. B. v.d. Hoogen part-time C. v. Lutterveldt	3		Procestechology in production automation (cutting, sparkero- sion, grinding) CAPP Structural Ceramics (Innova- tion Project)

These research groups cooperate in the F.P.A.-cluster (Flexibele Production Automation) on these research themes. The research-theme PAIR is in fact supported by 3 faculties (Electrical engineering/Mechanical engineering/ Technical physics.

At the Delft University of Technology the project DIAC = Delft Intelligent Assembly Cell is defined covering 4 years with a budget of M Dfl 10 and 75 man-years, supported by 4 faculties, 8 research groups and 13 doctor thesis students.

The Ministry of Economical Affairs (via SPIN) supports this project with M Dfl 3.7. The project DIAC overlaps partly the theme PAIR. In these projects a number of Dutch firms participate.

EINDHOVEN UNIVERSITY OF TECHNOLOGY

Name	Number of researchers	Budget excl. education/ salaries M Dfl/yr	Research themes Conditionally Financed Programs (VF)
<u>Forming Technology</u> Prof. J. Kals	8 5 staff 3 Dr. thesis 1 Dr. thesis (Max Planck Düsseldorf)	0.35	Modelling, control and simulation of mechanical working processes - mechanical properties of materials - bending of metals - fine cutting - recycling: melt spinning. Contracts with DAF, VOLVO, Philips, STW. Ministry of Economical Affairs (Innovationproject)
<u>Production Automation</u> Prof. J. Rooda	8 5 staff 3 Dr. thesis		FAIR Flexibele Automation and Industrial Robots 1. Factory Automation Cost, technical organisation, lay-out, planning and scheduling 2. Machine Automation Time discrete machines: -assembling, mounting Time continuously machines: -industrial robots, construction -application of modern control theory Contractresearch 5 FTE in 2 Innovationprojects
<u>Machine Tool Systems & Metrology</u> Prof. A. v.d. Wolf	8 5 staff 3 Dr. thesis	2	1. FAIR Flexibele automation and Industrial Robots - General aspects, handling parts, modelling - Handling parts - Control and Feeddrives - Sensor controlled welding - Production control 2. Control of the absolute measurement accuracy -laser interferometry - Error correction 3D measuring machines - Acceptance tests, quality systems
<u>Mechanisation & Assembly</u> Prof. J. v. Bragt part-time	5 4 staff 1 Dr. thesis		

At the Eindhoven University of Technology the project FALC = Flexibele Assembling and Welding (Las) Cell is defined covering 4 years with a budget of M Dfl 5.6 supplied by the Ministry of Economical Affairs (via SPIN), the University, DAF, Philips en ITP. and supported by the 2 faculties Mechanical- en Electrical engineering. The research theme FAIR is partly covered by the FALC project. This research programme concentrates on the development of means and methods for the realization of flexible automated cells. It focusses the following knowledge areas:

- Technology : Product design with manufacturing technology and building expert systems
- Workstations : Building modular systems (incl. transport systems) with CAD/CAM techniques
- Transducers : Sensor concepts and coupling of sensor information to the manufacturing process
- Controllers : Control modules for hierarchical systems
- Production control: Master systems and optimum cell-lay out. Simulation of proto-type-cells.

The cell is built in cooperation with DAF, Philips and ITP (a TUE-TNO institute at Eindhoven).

TWENTE UNIVERSITY OF TECHNOLOGY

Name	Number of researchers	Budget excl. education/ salaries M Dfl/yr	Research-themes Conditionally Financed Programs (VF)
<u>Production Engineering</u>	22	2	Control and Automation of Production and Internal Trans- port Systems (Support by SPIN, STW, ZWO, Esprit, Hoogovens) 1. Manufacturing systems: app- lication of information and technology in production engineering. - Machining Processes, sheet metal in small batches - Control and information networks 2. Manufacturing technology: simulation of thermal and mechanical processes tech- nology of forming and machining processes 3. Automation of (combined) machine tools
Prof. H. Kals	6 staff	} (3.5 incl)	
	6 Dr.thesis		
	10 diverse		
<u>Prod. Organisation</u>	9	0.4	4. Logistics and Production Control Planning and stock control Transport and distribution Discrete simulation of trans- port systems
Prof. W. Bakker	5 staff	} (0,7 incl)	
vacant	2 Dr.thesis		
	2 diverse		
<u>Mechanical Automation</u>	13	0.3	Laser manufacturing systems 1. Design and construction of accurate manipulators 2. Research on lineair actua- tors 3. Modern control systems incl. PLC 4. Vision systems and high power optics (Beckman) 5. Integration of these compo- nents to an advanced laser manufacturing system
Prof. C. Heuvelman	7 staff		
Prof. L. Beckman	6 Dr. thesis		
part-time			

The Ministry of Economical Affairs (via SPIN) supports the research theme: "Manufacturing Systems : Application of information and technology in production engineering".

Since February 1989 there exist "The Mechatronics Research Centre Twente" which coordinates the activities on mechatronics of the department of Mechanical- and Electrical engineering, Applied Mathematics and Computer Science. The Ministry of Economical Affairs supported this research by M Dfl 2,75 for a 4-years project. More than 40 staff-members and postgraduate students are involved in the research of this centre. The group "Mechanical Automation" obtained M Dfl 1 for 4-years.

TNO

ORGANISATION FOR APPLIED SCIENTIFIC RESEARCH

Metal-Institute M.I. - Apeldoorn

Name	Number of researchers	Budget M Dfl/yr
	10	18

Ir. B. Dane

Dr.ir. S. Van de Brink: Head of the Production Technology Department

Ir. J. Remmerswaal

The research of the Production Technology Department covers nearly all aspects of CIRP inclusive welding.

Also a laser-centre for machining processes is available.

Furthermore effort is made in the following areas:

- Sheetmetal processing
- Cutting support by the programming language MITURN
- Group technology

Because of the fact that the Netherlands has no machinetooll industry and nearly all machinetools come from abroad the issue of acceptance-testing and accuracy measurement of machinetools is well available in the Metal-Institute M.I. Apeldoorn.

In this area a.o. the machinetools of industry, schools and military workshops are measured.

In relation with the Eindhoven University of Technology the ITP (Institute Information-Technology for Production Automation TUE-TNO) has been founded.

TNO-M.I. is participating in the EEC-programs BRITE EURAM and ESPRIT.

19 juni 1989



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