# The Transfer of Ideas from Research to Industry - The Case of Germany

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Agrartechnik Hohenheim

Club of Bologna, 18th Meeting, 11.-13.10.2007 Moscow

*„Ideas are mostly results from a long joint effort of a team!“*

- The Involved
  - Industry
  - Agriculture
  - Research
  - Administration
- Their Associations and Organisations
- The Network
- Challenges Today

6315 Students
3 Faculties: Agricultural Sciences
Nature Sciences
Economie and Social Sciences

4 Departments / Chairs
Landesanstalt, Landwirtschaftmuseum

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Institute of Agricultural Engineering

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# Agricultural Engineering
# University of Hohenheim

Agrartechnik Hohenheim

Competence in Education, Research and Technology Transfer

## Institute for Agricultural Engineering

Managing Director: Prof. Dr.-Ing. Stefan Böttinger
Assistent Director: Prof. Dr. Joachim Müller

| Basics of Agricultural Engineering | Lifestock Systems Engineering | Process Engineering in Plant Production | Ag. Eng. in the Tropics and Subtropics |
|---|---|---|---|
| Prof. Dr.-Ing. Stefan Böttinger<br>Prof. em. Dr.-Ing. Kutzbach | Prof. Dr. Thomas Jungbluth | Prof. Dr. K. Köller | Prof. Dr. Joachim Müller |

## Applied Research and Technology Transfer

| Landesanstalt für landw. Maschinen- und Bauwesen | Steinbeis-Transferzentrum für Agrar-, Umwelt- u. Energietechnik | Arbeitsgemeinschaft Landtechnik und Ländliches Bauwesen, Baden-Württbg. e.V. |
|---|---|---|
| Leiter: Dr. H. Oechsner<br>Oberleiter: Prof. Dr. T. Jungbluth | Leiter: Prof. Dr. K. Köller<br>Stellv. Leiter: Dr. h.c. J. Gieraths | Vorsitzender: Prof. Dr. T. Jungbluth<br>Geschäftsführer: Dr. H. Oechsner |

## University of Hohenheim

- B.Sc. Agricultural Sciences
  - Basics of Ag. Engineering
  - Development and Design of Agricultural Machines
- M.Sc. Agricultural Engineering
  - Automation of Ag. Machines
  - Thermodynamics
  - Fluid dynamics
  - Structural and stress analysis
  - Material properties
  - Measurement techniques
  - Agricultural tractors and self propelled agricultural machines

## University of Stuttgart

- Mechanical Engineering, Major Agricultural Machines
  - Agricultural Tractors
  - Oil Hydraulics
  - Ag. Machines I, II

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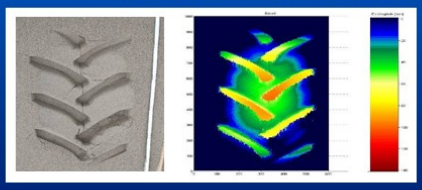
Institute of Agricultural Engineering
Basics of Agricultural Engineering

Flat belt test stand


Single wheel measurement unit

- Hohenheim Tyre Model
- Driving Dynamics
- Driving Comfort
- Wheel Forces / Load Spectra

Measurement tractor



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Institute of Agricultural Engineering, Basics of Ag. Eng.
Research Area Tractor / Tyres

Research Combine Lexion

Research Combine MAGDA, Electric Drive

Threshing Test Stand

- Basic Research
  Threshing, Separation, Cleaning
- Tests of Components
- Field Tests
- Operation and Control Systems
- Automation

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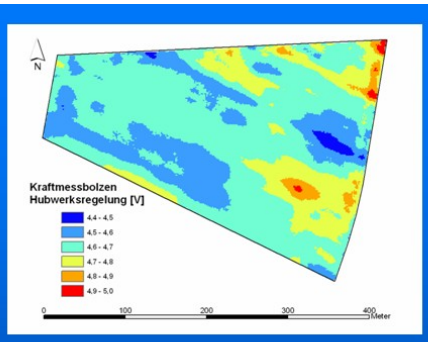
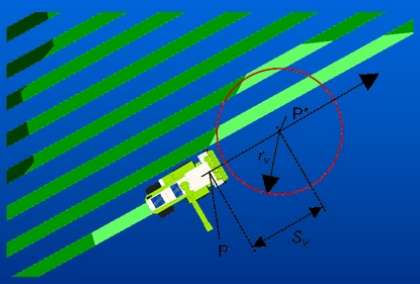
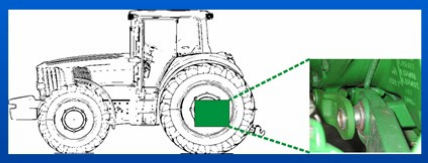
Institute of Agricultural Engineering, Basics of Ag. Eng.
Research Area Combine Harvesters





- Autonomous Vehicle Functions
- Measurement and Control Techniques
- Sensors and Actuators

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Institute of Agricultural Engineering, Basics of Ag. Eng.
Research Area Automation / Precision Farming

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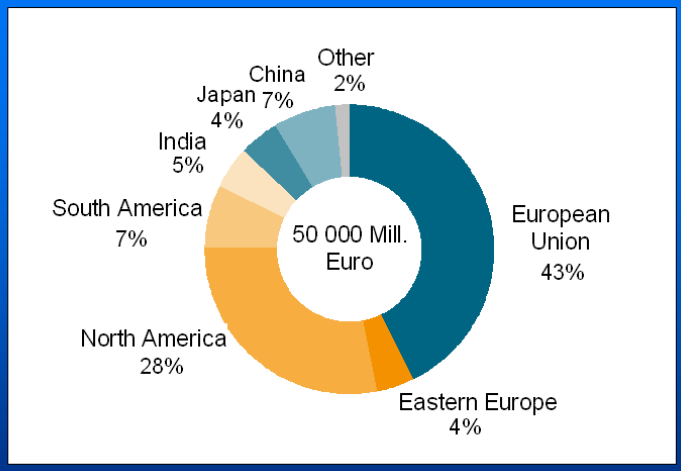


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## Agricultural Machinery Production Worldwide
(2006, VDMA)

- Production volume
  - World: 50 000 Mill. €
  - EU 15: 19 800 Mill. € (EU 27: 21 300 Mill. €)
  - D: 5 200 Mill. €
- Employees
  - D: 25 500 employees in 200 producing companies
  - EU: 135 000 employees
- Market volume
  - EU 15: 16 600 Mill. € (EU 27: 19 100 Mill. €)
  - D: 3 290 Mill. €
- Export volume
  - EU 27: export quota 21%, import quota 10%
  - D: export quota 73%

Source: VDMA

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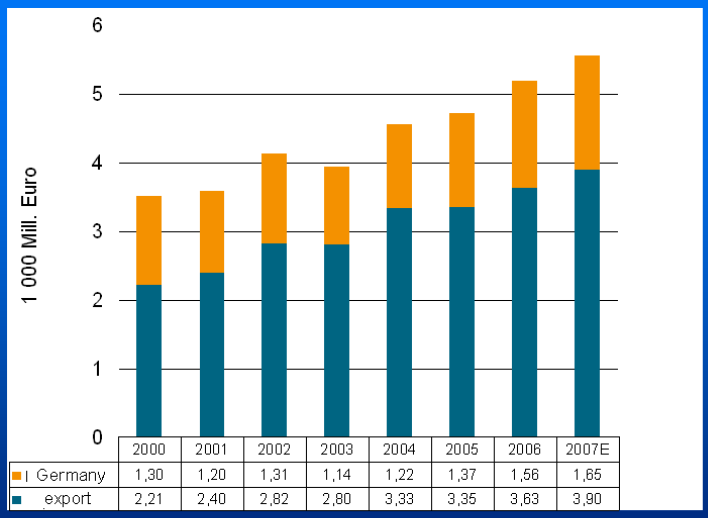
## Economic Relevance of Agricultural Machinery Industry in Germany, 2006

2006 ≈ 1.28 USD/€




| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007E |
|---|---|---|---|---|---|---|---|---|
| Germany | 1,30 | 1,20 | 1,31 | 1,14 | 1,22 | 1,37 | 1,56 | 1,65 |
| export | 2,21 | 2,40 | 2,82 | 2,80 | 3,33 | 3,35 | 3,63 | 3,90 |

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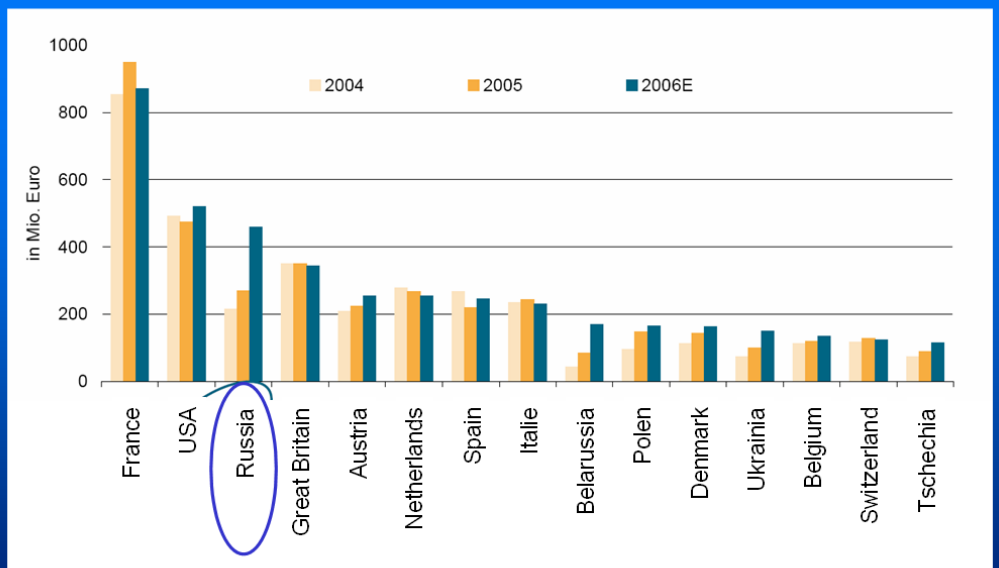
## Turn Over from German Production

2006, VDMA

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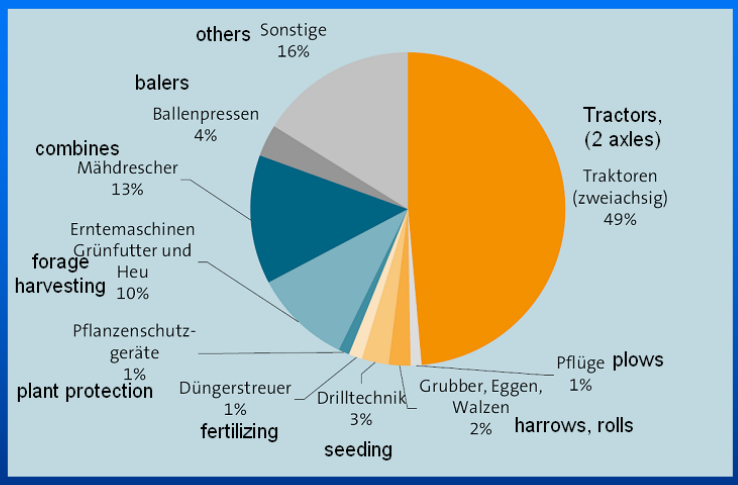
## Exports from Germany to ….

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## Agricultural Machinery Production in Germany

2006, related to turn over, total value 5 200 Mill. €

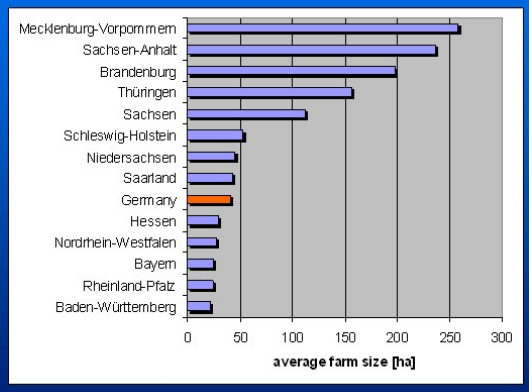

Farming in Germany:

420 697 farms

17 mill. ha

40.4 ha / farm

Census Bureau Germany, 2003

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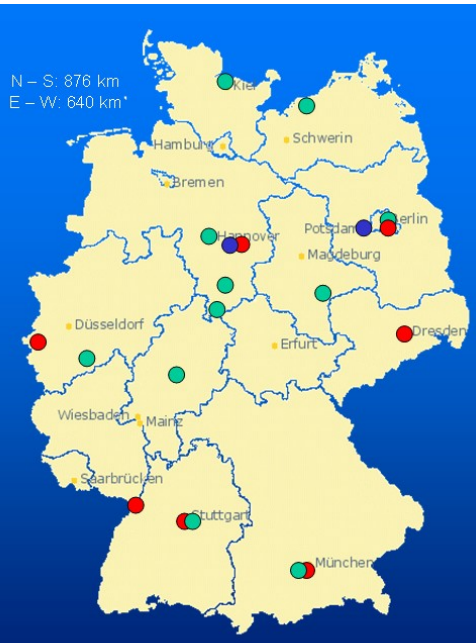
## Farm Sizes in Germany, 2003




**Institutes at Universities**

| | mech. engineering | ag. |
|---|---|---|
| Aachen | x | |
| Berlin | X | |
| Bonn | | X |
| Braunschweig | X | |
| Dresden | X | |
| Gießen | | X |
| Göttingen | | X |
| Halle/Saale | | X |
| Hannover | | X |
| Karlsruhe | X | |
| Kassel Witzenhausen | | X |
| Kiel | | X |
| München | (X) | X |
| Rostock | | X |
| Stuttgart Hohenheim | x | X |

x: Teaching Assignment

**Research Facilities**

Braunschweig: FAL
Potsdam: ATB

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## Agricultural Research in Germany

WR WISSENSCHAFTSRAT

- Main scientific council for federal government and countries of Germany
- Evaluation of the Agricultural Sciences at the Universities:
  - Far reaching structural reforms are necessary
  - Uncoordinated reduction has to be stopped, the capacities have to be concentrated
  - New forms of cooperation between institutions are necessary
  - Combining of various institutions
- Specific statements for agricultural engineering:
  - Uncoordinated cut downs has to be stopped
  - Cluster together with the industry has to be established
  - Agricultural sciences have a system approach: all important subjects have be represented

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## Wissenschaftsrat - Scientific Council: Evaluation of Agricultural Sciences

- Supporting the manufacturing industry
- approx. 3000 member companies
- mainly SME
- Main tasks:
  - supporting, lobbying, service providing
  - National level
  - European and worldwide level
- Subdivision for agricultural machinery companies
  - Technical Committees: members from industry and research
  - Standardization
    - DIN German Industry Standards
    - Secretariat of ISO TC 23 SC 19
  - ….

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## VDMA - Association of the German Manufacturing Industry

- DLG represents the agricultural practice
  - Supporting the farmer
    - Market survey, testing and awarding of products
    - Transfer of knowledge and of scientific findings into practice
  - Founded 1885 by Max Eyth, > 18 000 members
  - > 3 000 voluntary experts in more than 80 working groups / committees
  - Trade fairs: agritechnica, Eurotier, Anuga Food Tec, Field days
  - Test and inspection center, quality labels

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## DLG – German Society for Agriculture

- KTBL: Board of trustees for technique and construction in agriculture
  - Mainly financed by federal government
  - 400 members from agriculture, science, industry, administration and advisory services
  - Providing data and Information for practice
  - Describing state of the art, GAP (good agricultural practice)
  - Transfer to practice: publications, workshops, seminars …
- FAL: Federal Research Institute for Agricultural Engineering, Braunschweig
- Federal and regional ministries for agriculture and for research

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## Associations and Organisations of Administration

- VDI – German Association of Engineers
  - Spokesman and service provider
    - for engineers and
    - for technique
  - Continuing education, exchange of views
  - Technical-scientific work
  - 22 special fields -> "VDI-MEG Landtechnik" Max-Eyth Society for Agricultural Engineering in the VDI
  - 132 000 members, VDI-MEG 1 420 members
  - Very strong regional structure
  - VDI-MEG: main public tasks:
    - Conferences
    - Publications
    - Position papers
    - Lobbying

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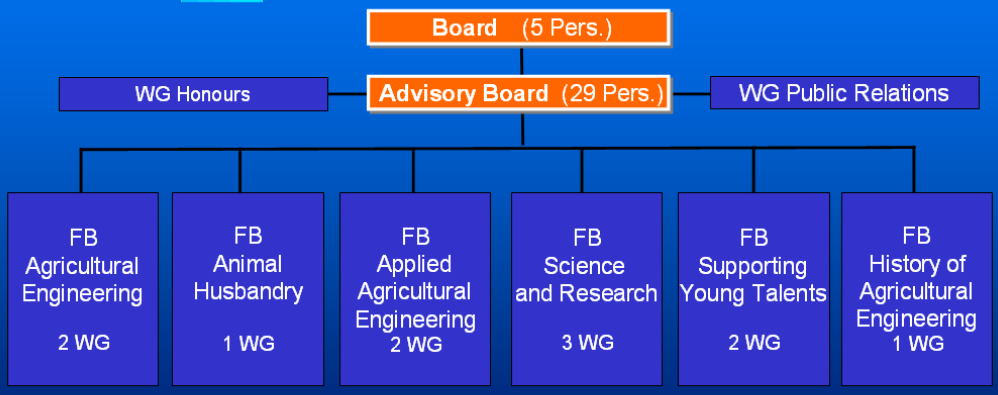
## VDI – German Association of Engineers

International Commission of Agricultural Engineering (CIGR)

European Society of Agricultural Engineers (EurAgEng)

Max-Eyth Society for Agricultural Engineering in the VDI

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## The International Scientific Network Structure of VDI-MEG

- "Land Technik – International Conference on Agricultural Engineering"
  - annually, strong participation of industry
- "Tier Technik" Conference on Animal Husbandry
- "Land Technik für Profis" Agricultural Engineering for professional farmers and contractors
- "BTU – Bau, Technik, Umwelt" Construction, engineering and environment in livestock farming
- Colloquiums for special topics:
  - Combine Harvesters
  - Mobil Hydraulics


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- Conference proceedings
- Periodicals
  - "Landtechnik" with "landtechnik-net.com"
  - "ATF Agrartechnische Forschung"
- Research reports / Ph.D. thesis
- Yearbook Agricultural Engineering (bi-lin







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## VDI-MEG Publications

- Research Data Base
- Position Papers
  - Joint Position Paper: Innovative Agricultural Engineering – Responsibility for Industry and Institutions of Higher Education
  - Position Paper: Bachelor and Master for Agricultural Engineering. Tasks, Qualifications, Conclusions
- EU FP 7: AET Agricultural Engineering and Technologies


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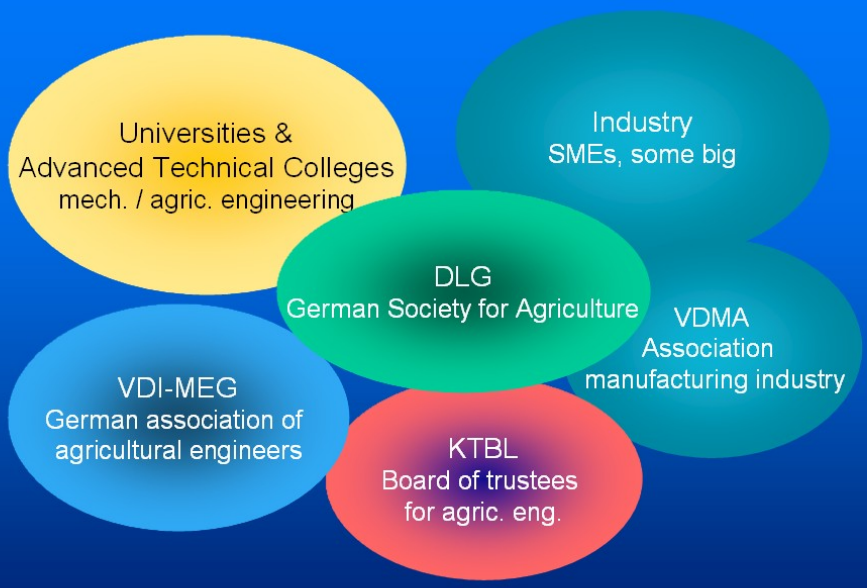
## VDI-MEG Lobbying

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## Network for Agricultural Engineering in Germany

- Education of future employees
  - Bachelor- and Master thesis partly together with industry
  - Supporting of lectures by actual illustrative material
  - Feedback from industry
- Training / Knowledge Transfer
- Consulting
  - Technical questions and comparisons
  - Market survey and sales opportunities
  - Small research projects and examinations
- Ph.D. thesis
- Supporting basic research

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## Cooperation between Universities and Industry

## Internationalization!

- Industry is international
- Standardization on international level
- EU and other international laws
- Universities in Germany:
  - Bachelor and Master are installed / will be installed
  - Exchange of students, teaching staff
  - International mobility is supported
  - Institutes of Ag. Engineering are cooperating on an informal level
  - Universities have to coordinate themselves on a nationwide level
  - International visibility of German ag. Eng. has to be improved
  - Lobbying for agricultural engineering has to be improved
- Universities are participating on an international competition, also as potential partners of the industry



- Grown network for agricultural engineering
- Industry accepts the implication of research and education
- Industry understands the necessity to support research and education
- Universities have to find ways for cooperation and coordination
- International implication of research has to be improved