Track 1 Meeting

Relating to STC C, E, F & G

Track coordinator: Fritz Klocke

Paris, January 23, 2013

Agenda

1	**Opening, welcome**	
2	**Approval of the agenda / minutes**	14:00 – 14:02
3	**Ideas for Future Collaboration**	14:02 – 14:32
4	**Report on running CWGs**	14:32 – 14:44
5	**Track Keynotes**	14:44 – 14:56
6	**Open discussion on the future of Tracks within CIRP**	14:56 – 15:24
7	**Administrative issues, conferences, and seminars relating to this Track**	15:24 – 15:26
8	**Miscellaneous**	15:26 – 15:28
9	**Closure**	

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Ideas for future collaboration

Prof. Davies: On the measurement of temperature in material removal processes: revisited

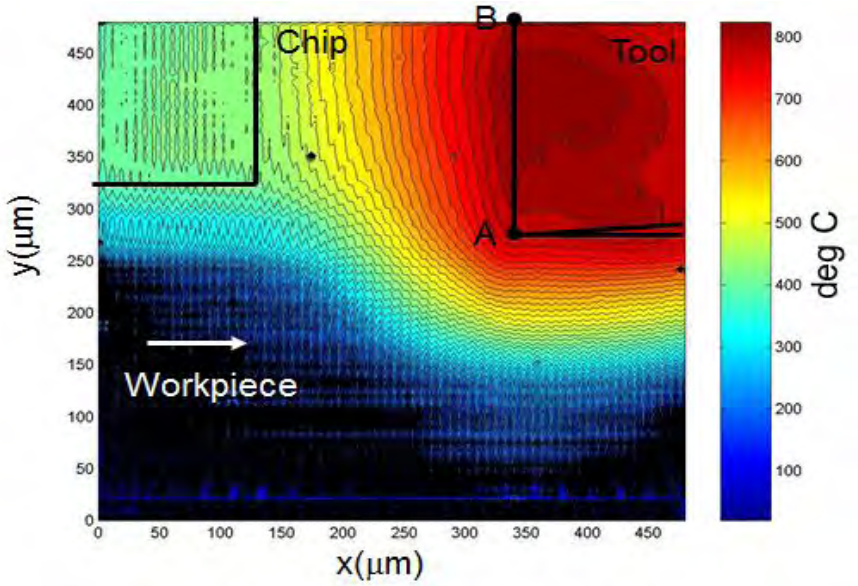
On the measurement of temperature in material removal processes: revisited

M. A. Davies(2), T. Ueda(2), R. M'Saoubi(2), B. Mullany(3), A. L. Cooke

Contributors: P-J Arrazola, H. Altena, K. Bouzakis, E. Brinksmeier, G. Byrne, T. Childs, E. Davies, B. Denkena, T. Estler, C. Evans, W. Grzesik, R. Ivester, F. Klocke, L. Kops, I. S. Jawahir, D. Lung, S. Malkin, T. Moriwaki, Y. Shin, H. Shinno, K. Weinert, A. Zhender.

Organization

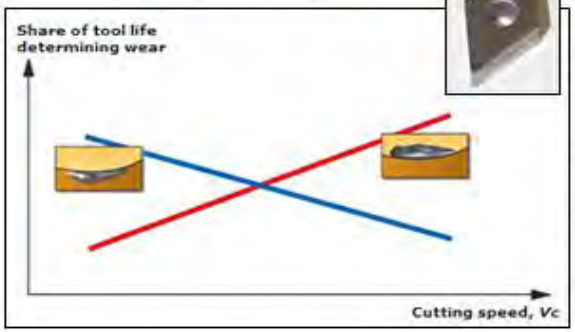
1. Perspective
2. Physical Basis of Measurements
3. Comparison of Methods
4. Some examples
5. Future outlook/Collaboration

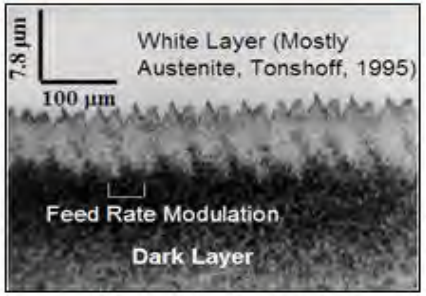


Davies, M. A., Ueda, T., M'Saoubi, R. Mullany, B. Cooke, A. L., On the measurement of temperature in material removal processes, 2007, *CIRP Annals of Manufacturing Technology*, **56**(2): 581-604.

Temperature in manufacturing can have positive/negative effects and “sensitivity” to temperature is high.

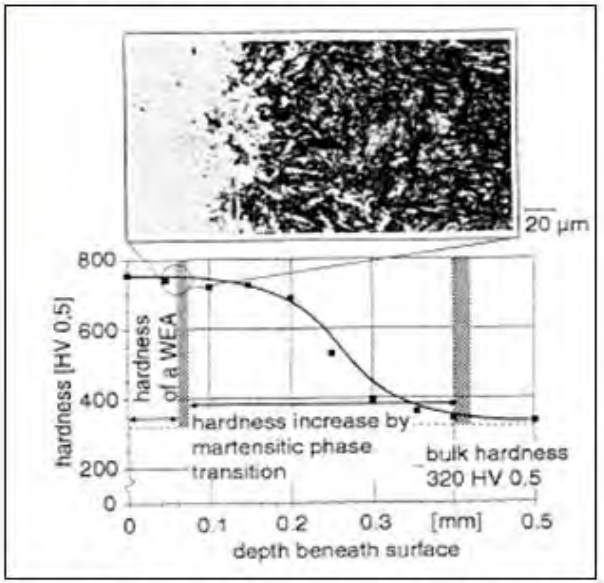
Hard Turning
Bearings, Gears, Shafts etc.





Can cause residual tensile surface stress.

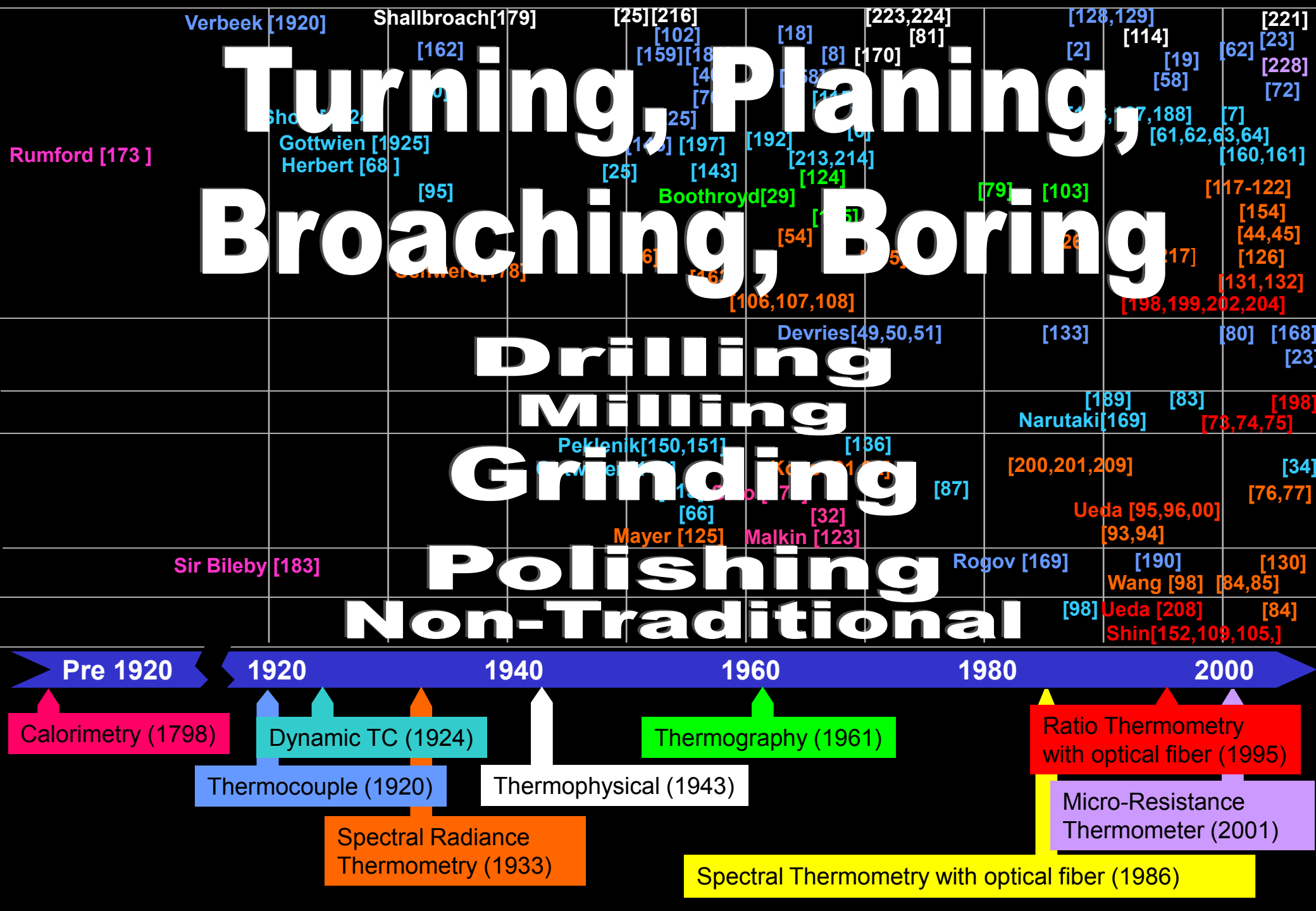
Grind-Hardening
Brinksmeier et al. (1996)



Use the heat from the grinding to create a hardened layer with compressive stress.

I.S. Jawahir (1), E. Brinksmeier (1), R. M'Saoubi (2), D.K. Aspinwall (1), J.C. Outeiro (2), D. Meyer, D. Umbrello, A.D. Jayal, Surface Integrity in Material Removal Processes: Recent Advances, 2011, *CIRP Annals of Manufacturing Technology*, **60**(2): 603

Motivation


Turning, Planing, Broaching, Boring
Drilling
Milling
Grinding
Polishing
Non-Traditional
Verbeek [1920]
Shallbroach[179]
[25][216]
[223,224]
[128,129]
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Gottwien [1925]
Herbert [68]
Rumford [173]
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Boothroyd[29]
[79]
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[117-122]
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Devries[49,50,51]
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Narutaki[169]
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Peklenik[150,151]
[136]
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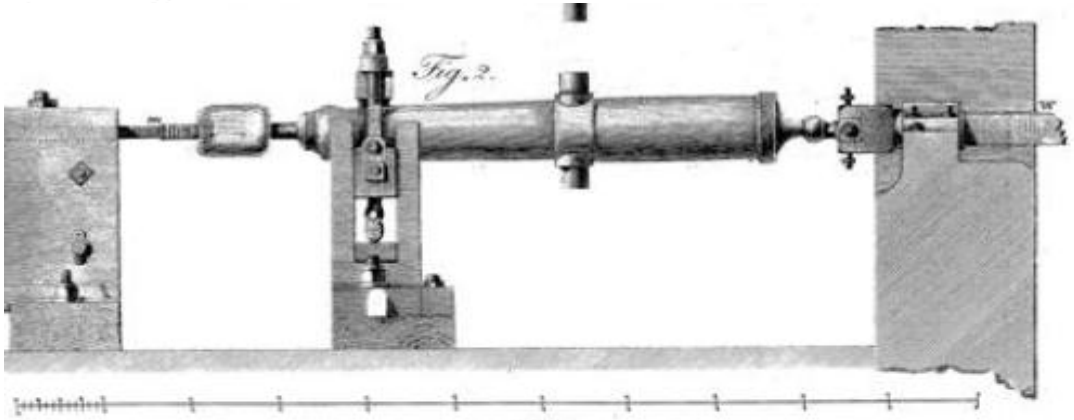
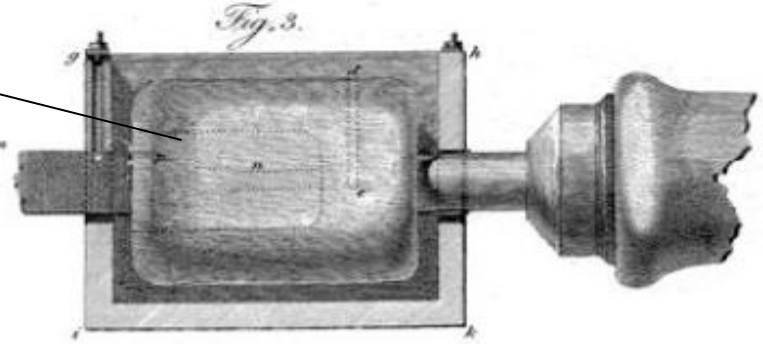
[76,77]
[66]
[32]
Ueda [95,96,00]
[93,94]
Mayer [125]
Malkin [123]
Sir Bileby [183]
Rogov [169]
[190]
[130]
Wang [98]
[84,85]
[98]
Ueda [208]
[84]
Shin[152,109,105,]
Pre 1920
1920
1940
1960
1980
2000
Calorimetry (1798)
Dynamic TC (1924)
Thermocouple (1920)
Spectral Radiance Thermometry (1933)
Thermophysical (1943)
Thermography (1961)
Ratio Thermometry with optical fiber (1995)
Micro-Resistance Thermometer (2001)
Spectral Thermometry with optical fiber (1986)

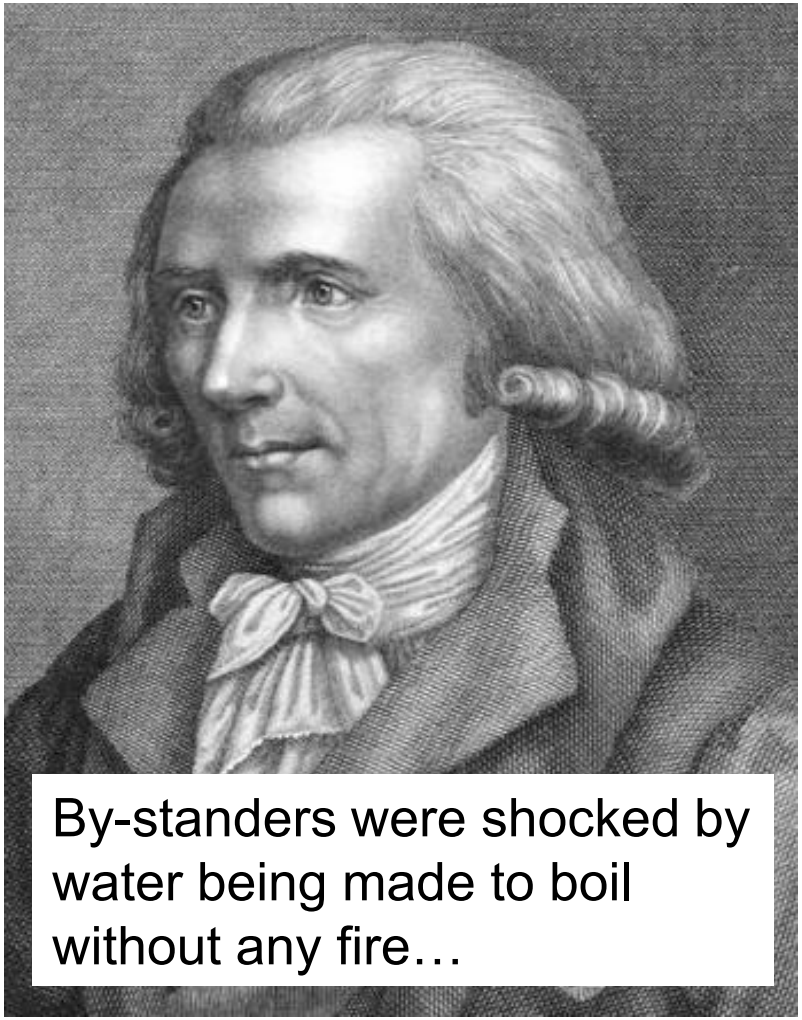
"It frequently happens that in the ordinary affairs and occupations of life, opportunities present themselves for contemplating some of the most curious operations of nature"

IV. *An Inquiry concerning the Source of the Heat which is excited by Friction.* By Benjamin *Count of* Rumford, *F. R. S. M. R. I. A.*





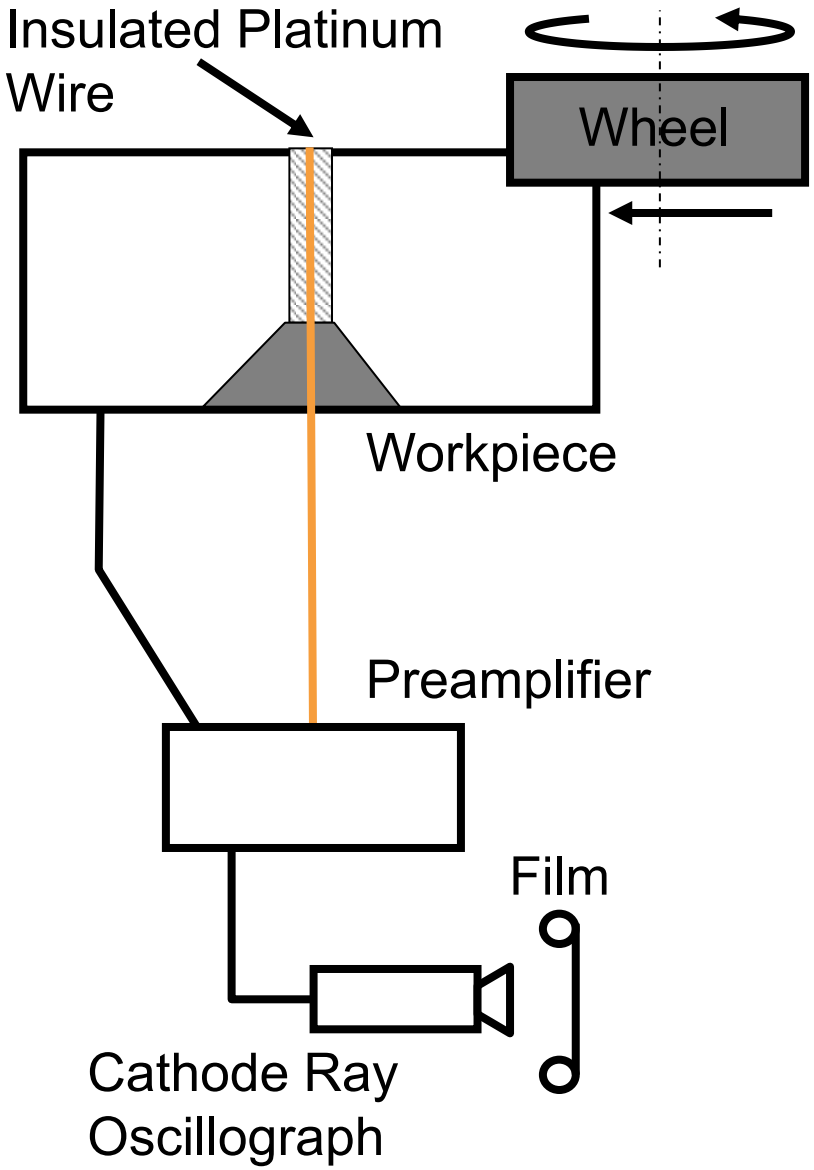
Dull tool generated heat by friction: 10,000 lbs, horse driven at 32 rpm.



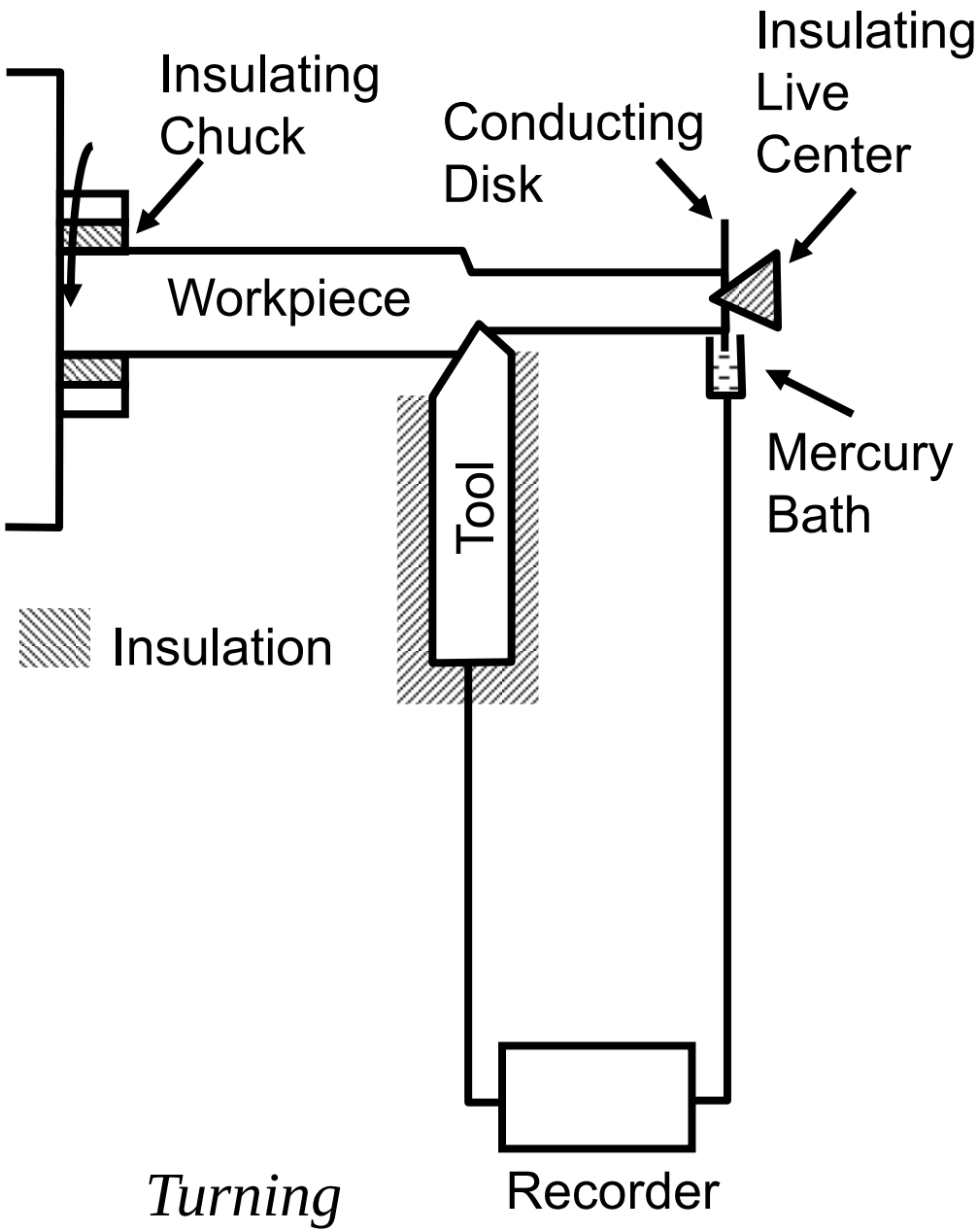
By-standers were shocked by water being made to boil without any fire…

Rumford 1798

50 years prior to the seminal work of Joule!



Grinding

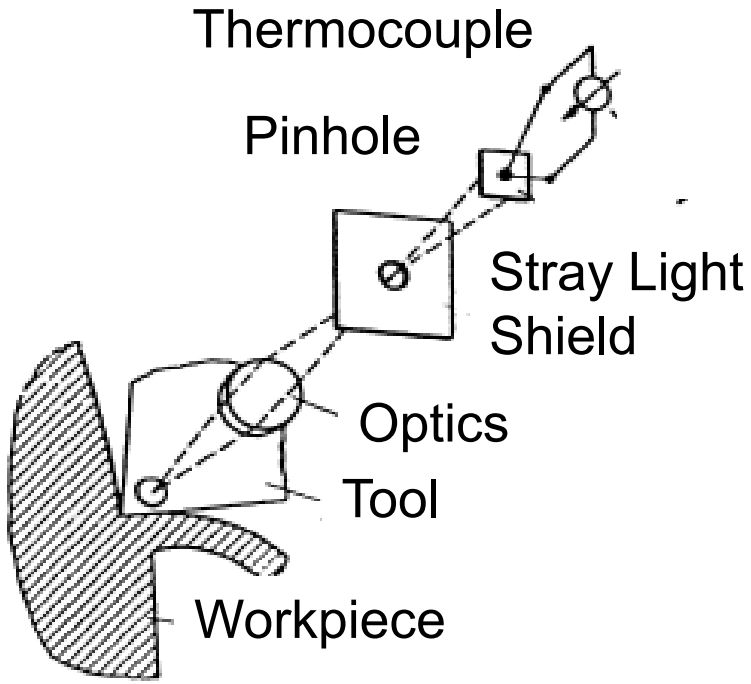


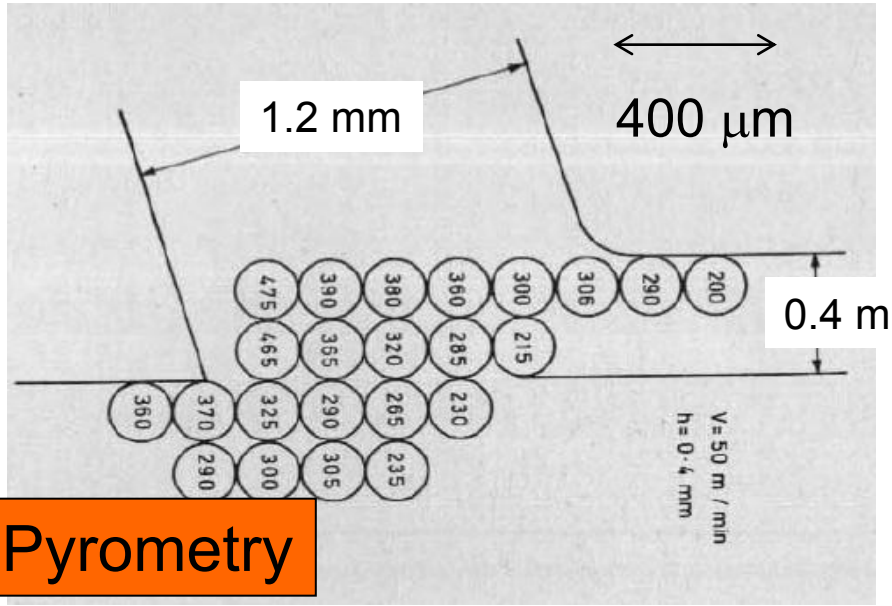
Turning

Peklenik (1957,58)

Dynamic Thermocouple

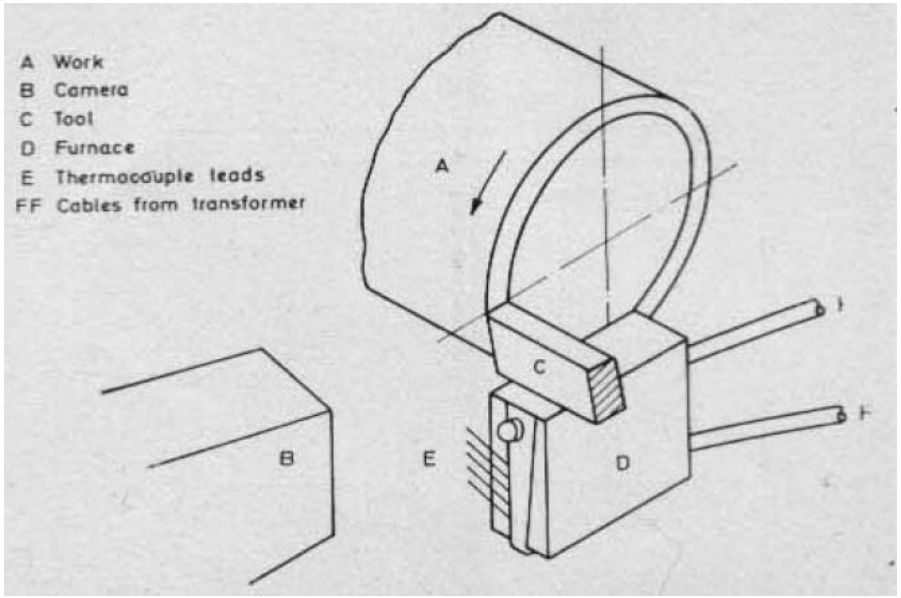
Shore…(1924..)

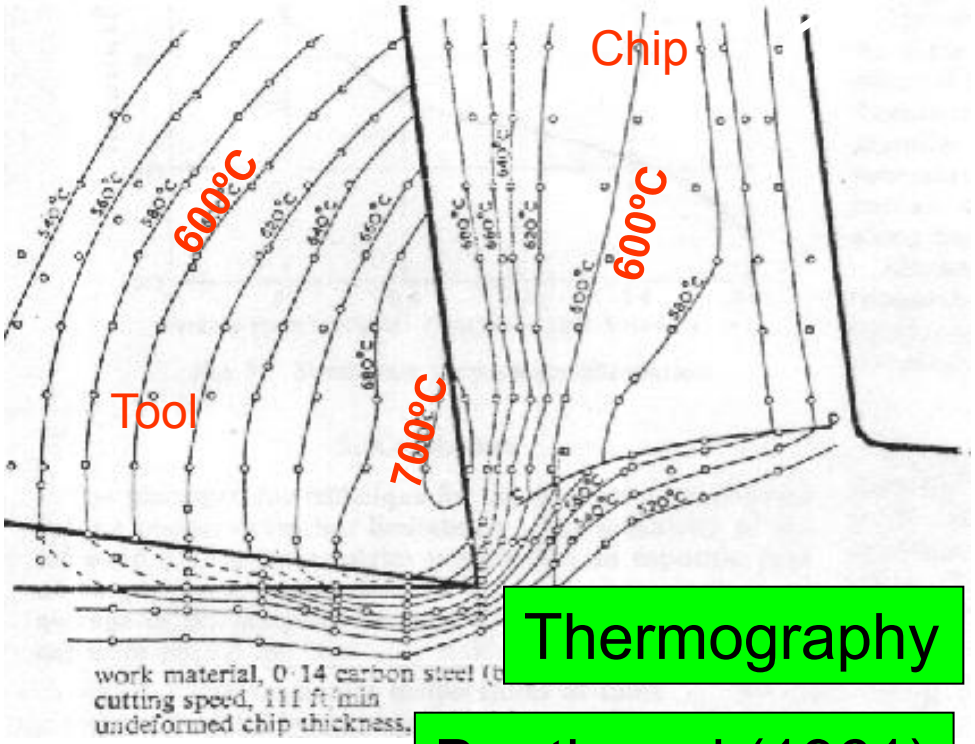




Pyrometry

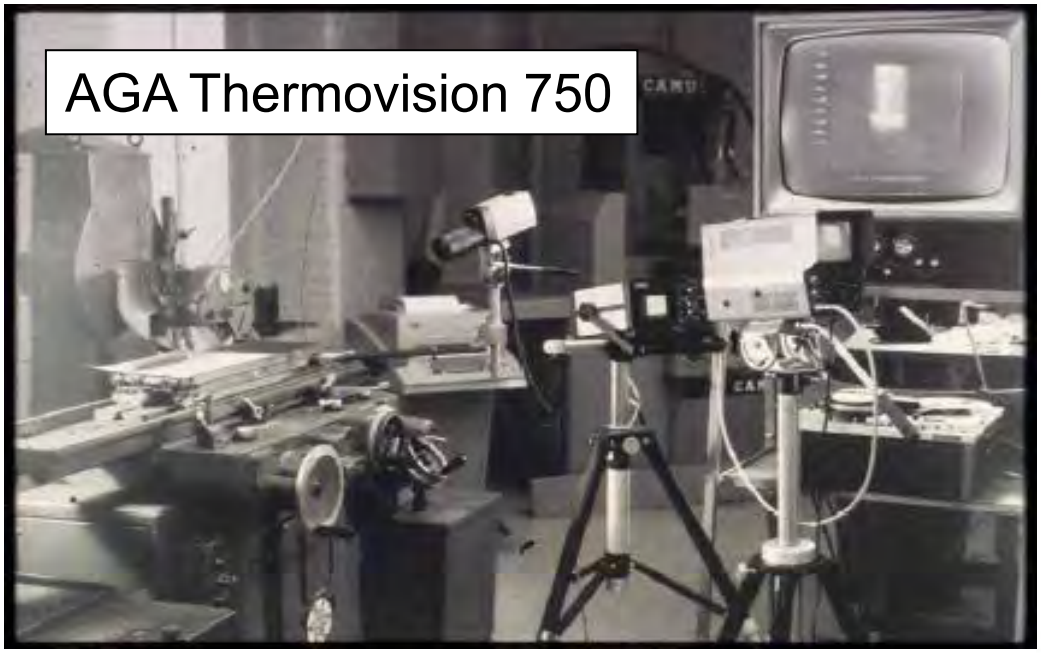
Schwerd(1933)

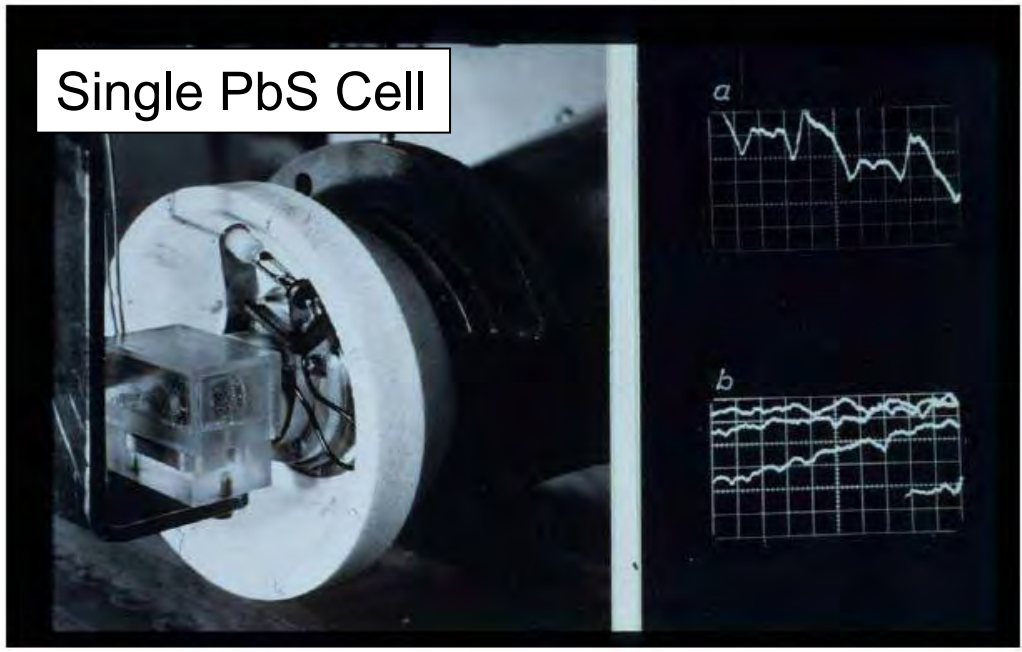


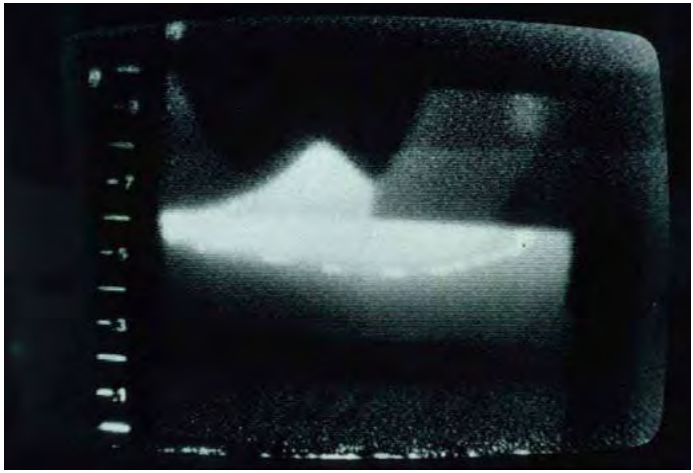


Thermography

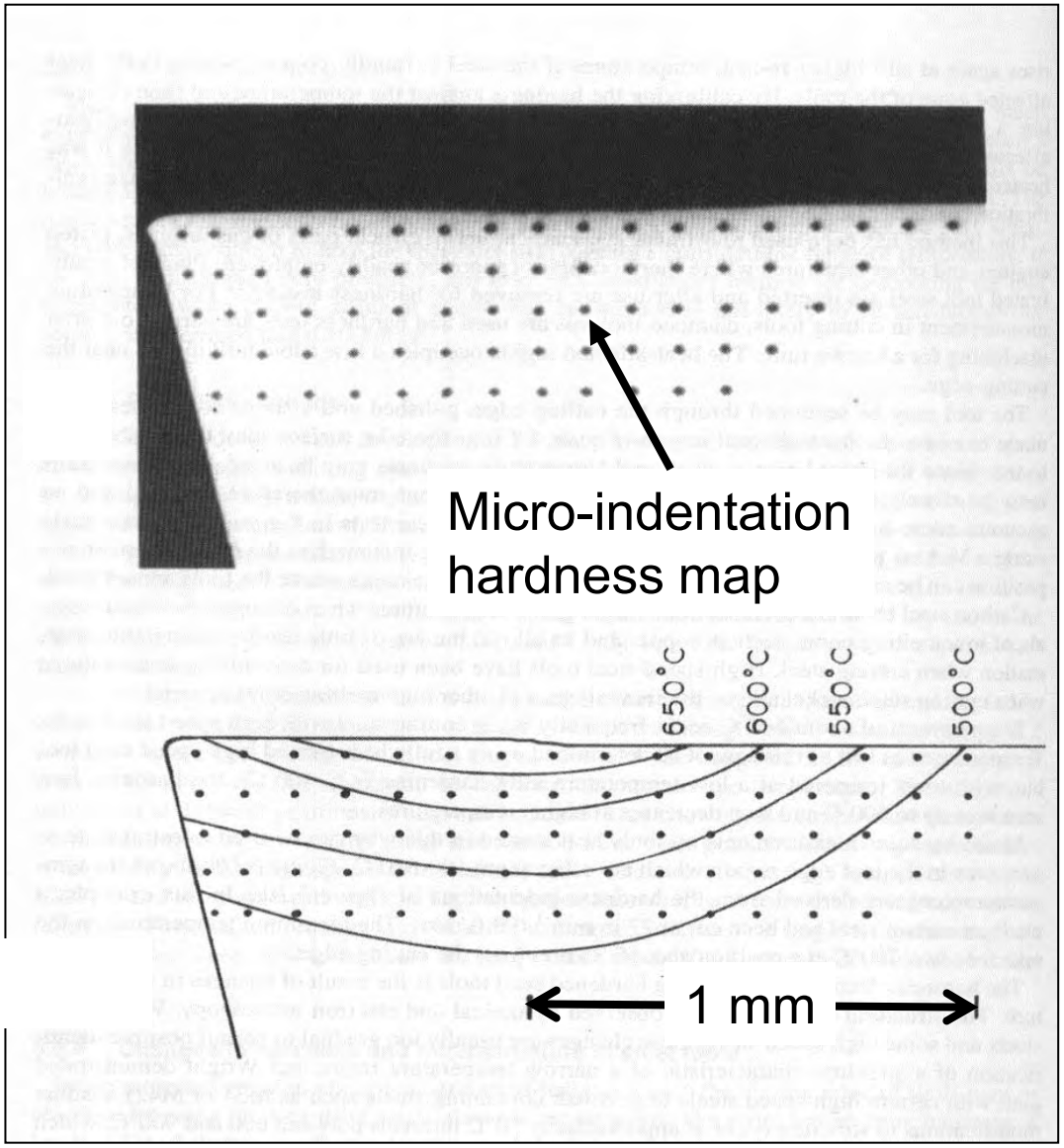
Boothroyd (1961)



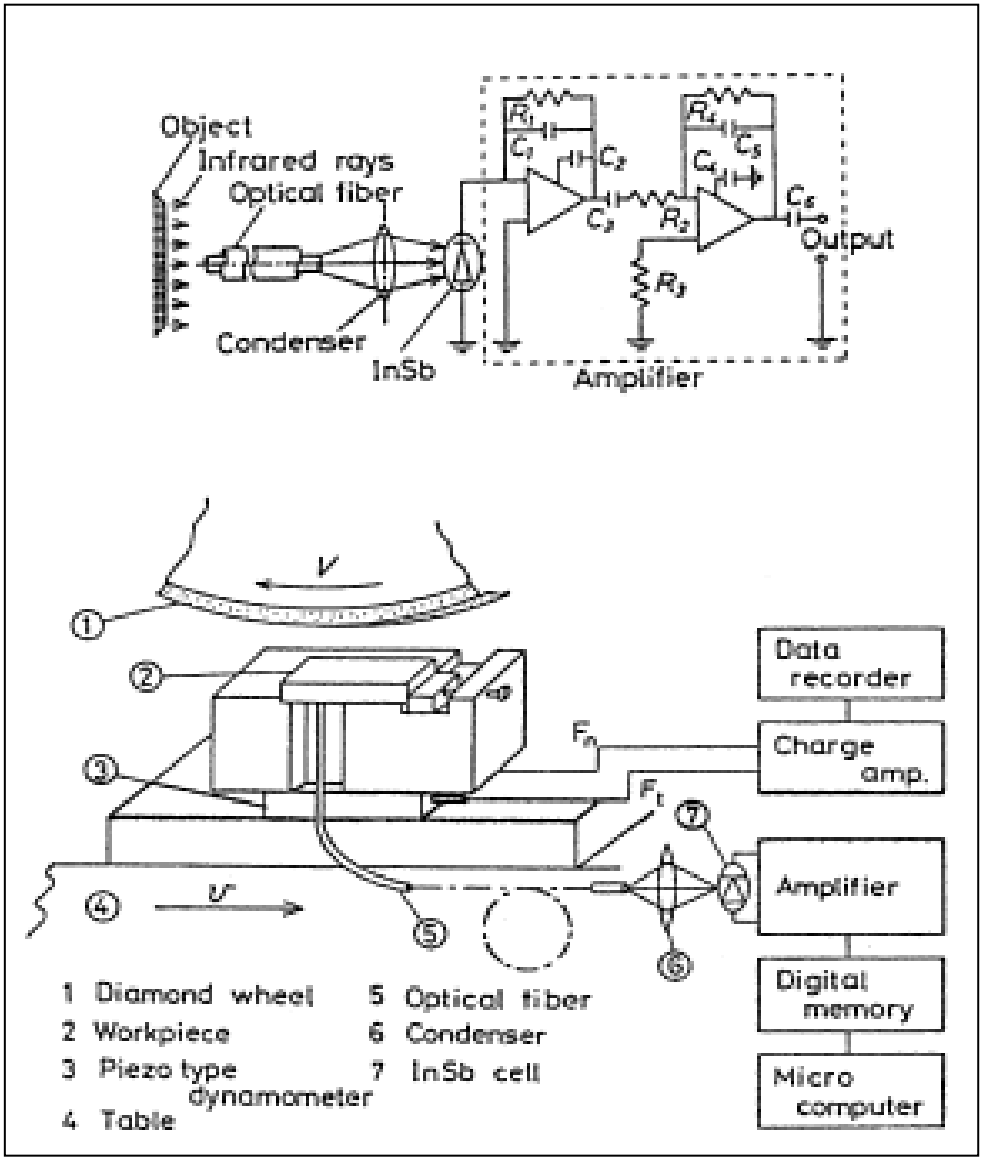




Pyrometry; Infrared Movies of Grinding
Kops and Shaw, Kops et al. (1960-80)

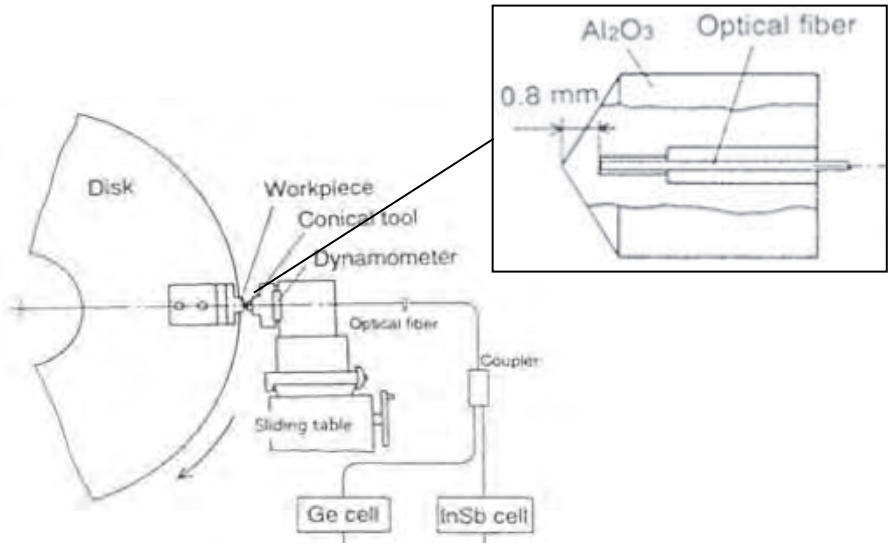


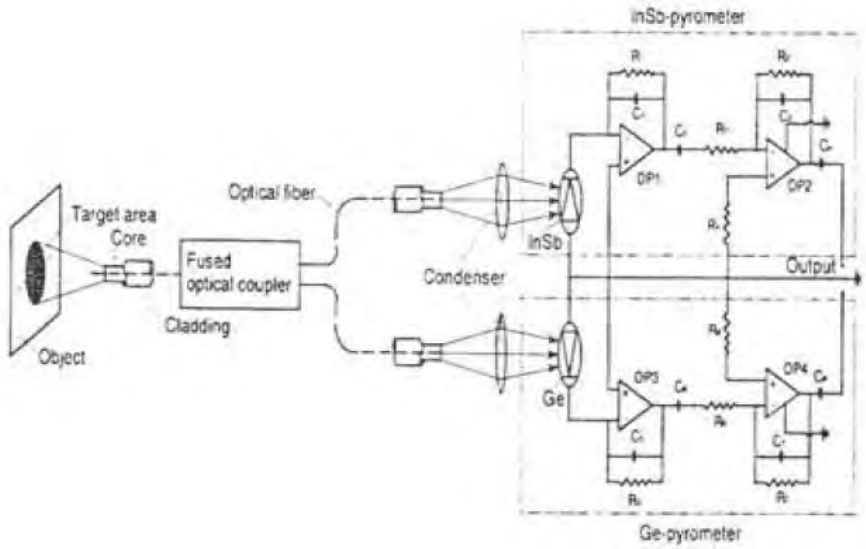
Thermo Physical Transformation
Wright and Trent (1975)



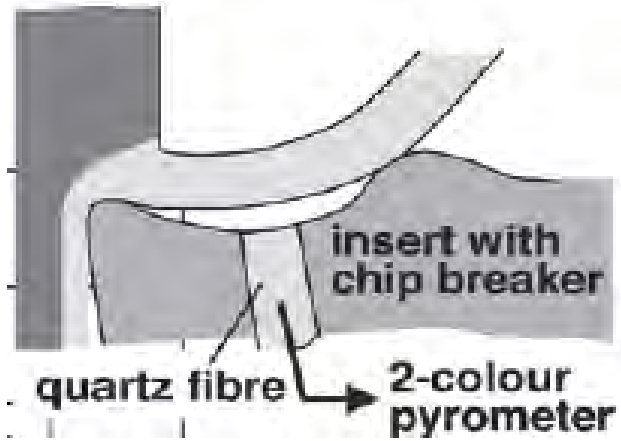
Single Color Pyrometer with *Optical Fiber*, Ueda (1986)

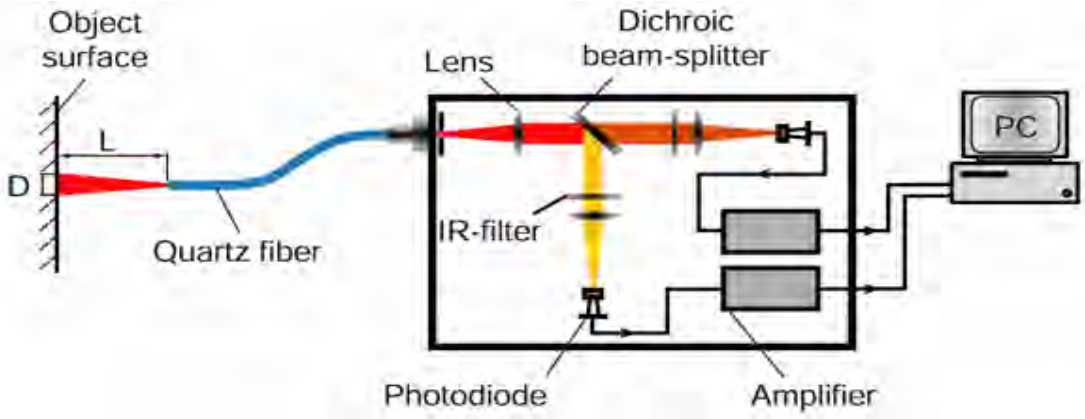
Ueda (1995-present)





Klocke (2001-present)





Two Color (Ratio) Pyrometer with *Optical Fiber*

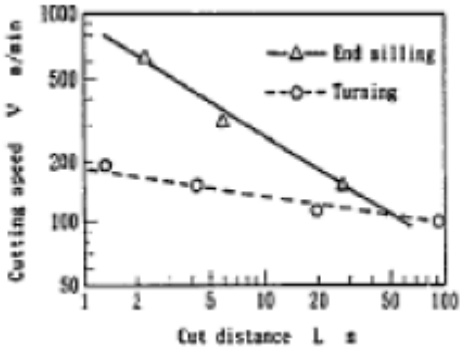
The methods of temperature measurement are numerous and should be weighed carefully based on several criteria. *Uncertainties depend on the active physical phenomena.*

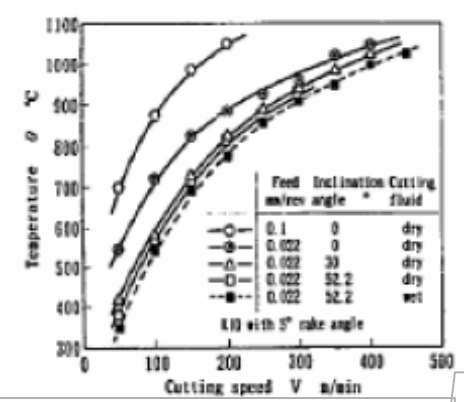
Properties	Method					
	RTD	Thermo-couple	Dynamic Thermo-couple	Single-Color Pyrometer	Two-Color Pyrometer	Thermo-physical
Temperature Range	0ºC-1000ºC	0ºC-3000ºC	Work Melting	20ºC-5000ºC+	0ºC-5000ºC+	T_{trans}
Spatial Resolution	500 μm	>500 μm *10 μm	Poor	5 μm (T dependent)	20 μm (T dependent)	100μm
Temporal Resolution	2 ms	100 ms	-	ms to μs	ms to μs	Poor
Ease of set up	Easy-Medium	Medium	Easy	Difficult	Difficult	Easy-Medium
Dominant Uncertainty	Cycling	Junctions/ Scale	Junction Control	Emissivity	Gray Body Assumption	Particle size
Cost	Medium-High	Low	Low	High	Medium	Low

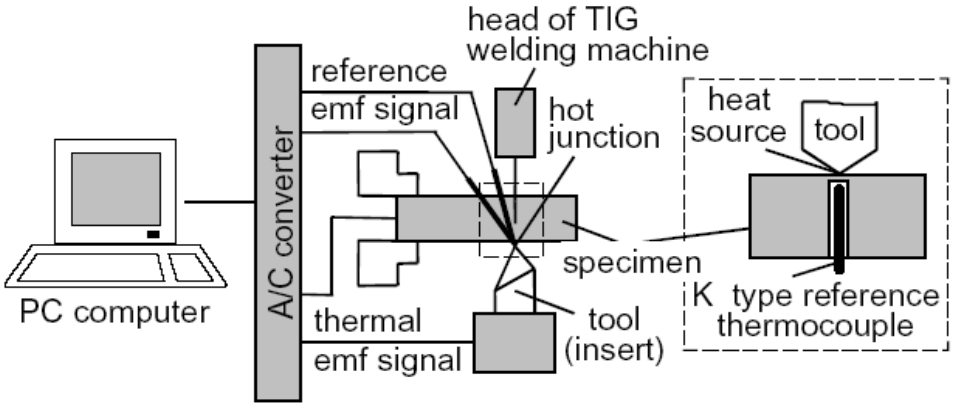
Comparison

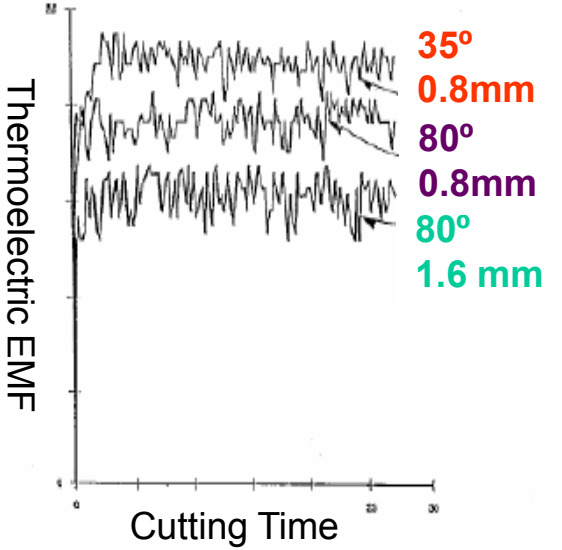
Being inexpensive and useable in difficult conditions, the dynamic thermocouple is a staple of temperature measurement in turning.

Kitagawa (1997) – Compared interrupted and continuous cutting.



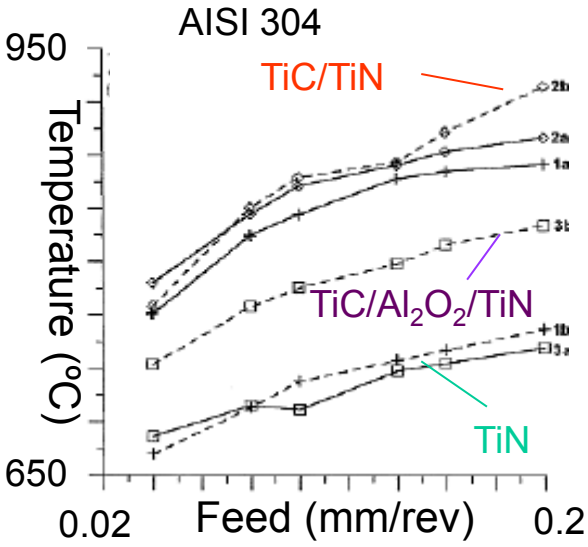






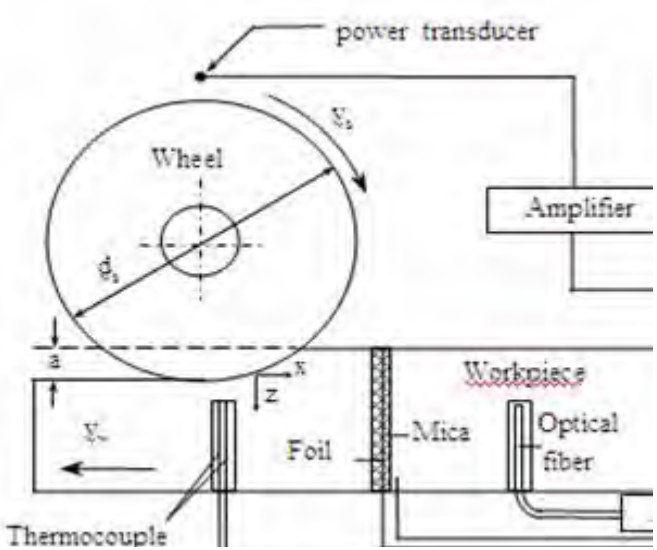
Anagonye and Stephenson (2002) – Temperature versus included angle and nose radius.

Grzesik (1997, 1998, 1999, 2000, 2001, 2005) – Most comprehensive recent tool-work thermocouple studies.

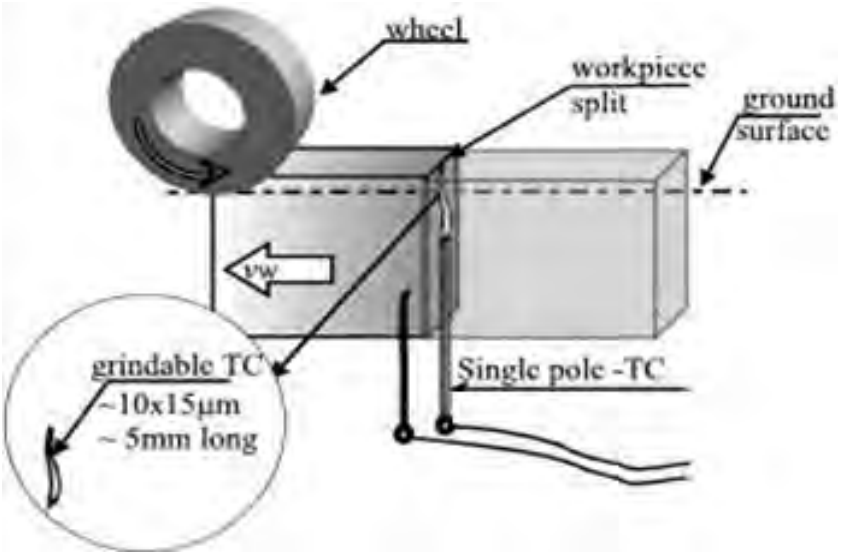


Current Capability

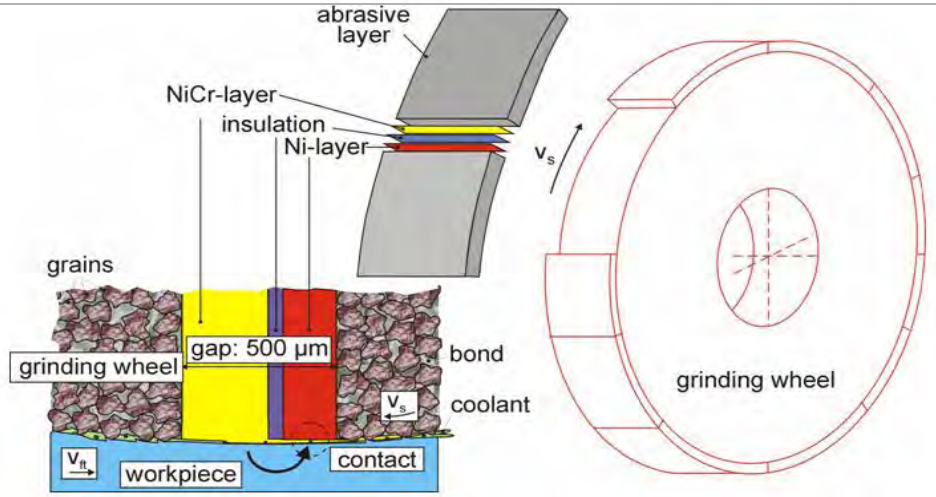
The Peklenik-style dynamic thermocouple combined with new technology provides new insights in grinding.



Malkin et al. (2004) compared the Peklenik thermocouple, standard thermocouple and an optical fiber pyrometer.



Batako et al. (2004) used a split workpiece method to measure HEDG

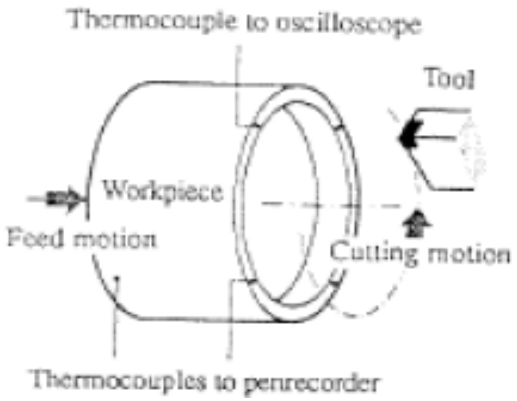


Brinksmeier (2004) inserted thin film Chromel Alumel thermocouples (type K) into the grinding wheel. The response time of the thermocouple is 40ns.

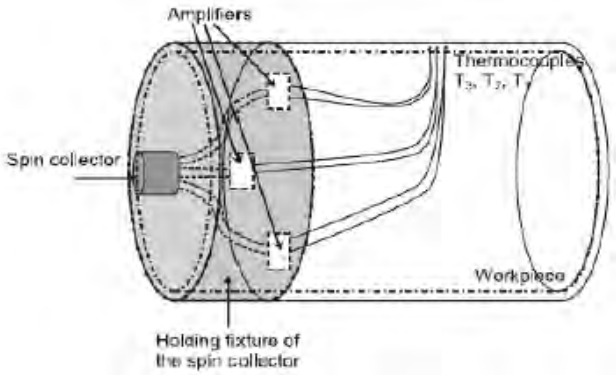
Current Capability

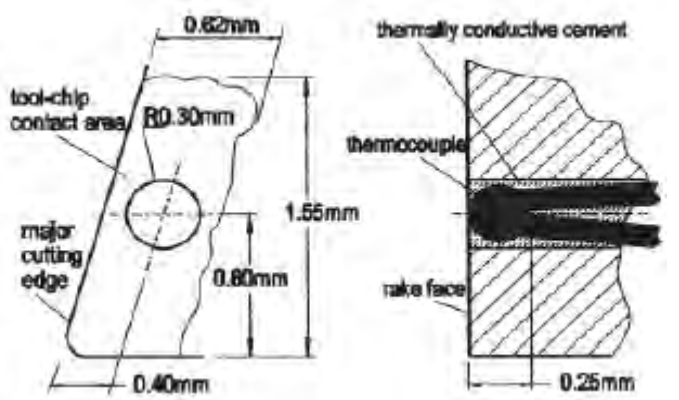
The embedded thermocouple shows increased promise with miniaturization and has been used extensively in turning.

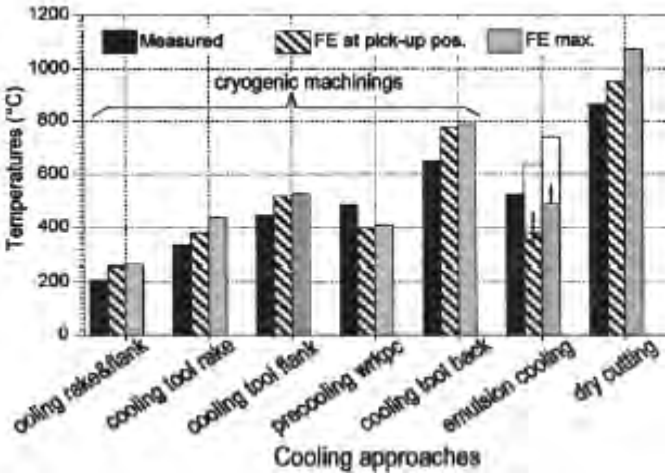
Moriwaki et al. (1993) – Measured tool growth in diamond machining.



Rech and Moisan (2005) – Measure workpiece during hard turning.

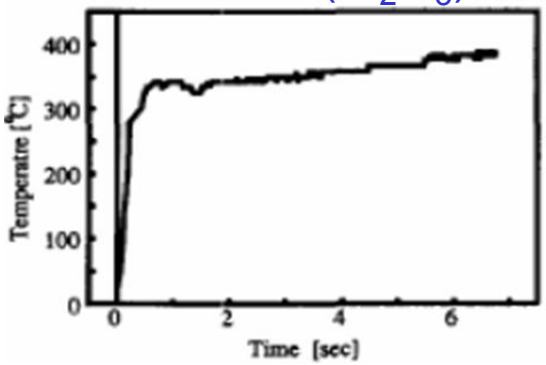


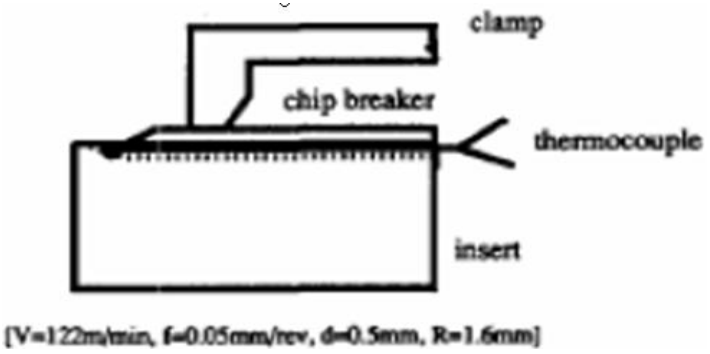




Hong and Ding (2001) – Measured cryogenic machining of titanium.

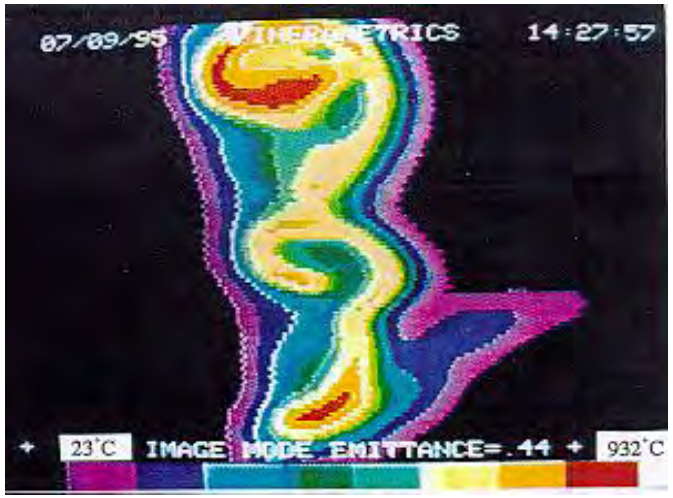
El-Wardany, Mohammed, Elbestawi (1996) – Measured ceramic tool (Al_2O_3) during hard turning.



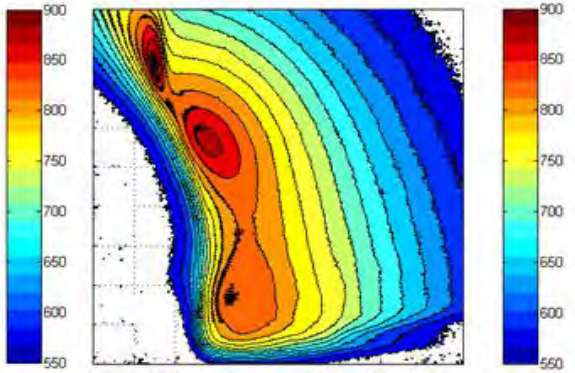


Current Capability

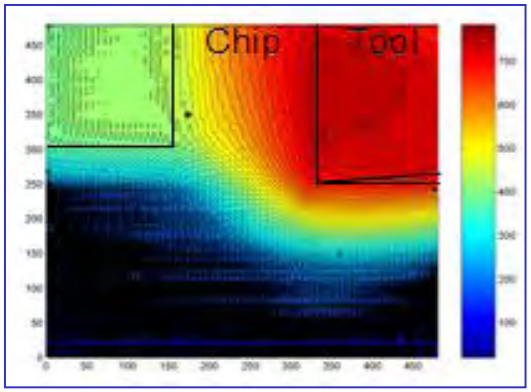
Detector arrays continue to increase in size (more than 10,000 pixels), have nanosecond response times and high resolution.



Wang, Saito and Jawahir (1996) - first simultaneous visible and infrared images of chip formation, used on the cover of the CIRP modeling workshop proceedings.

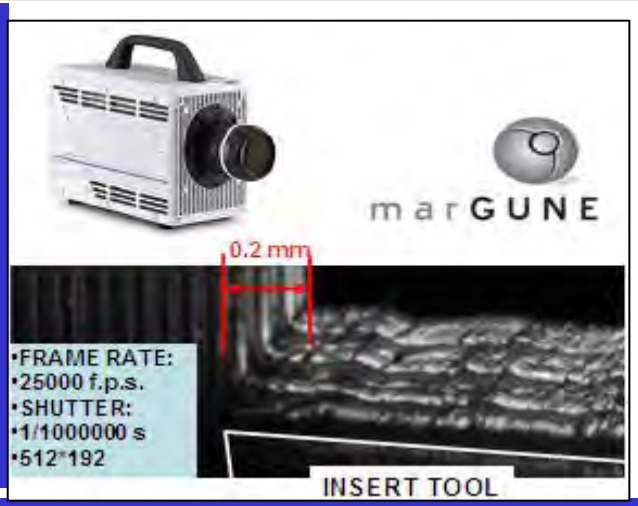


M'Saoubi(2003,2005) – IR/CCD temperature measurements.



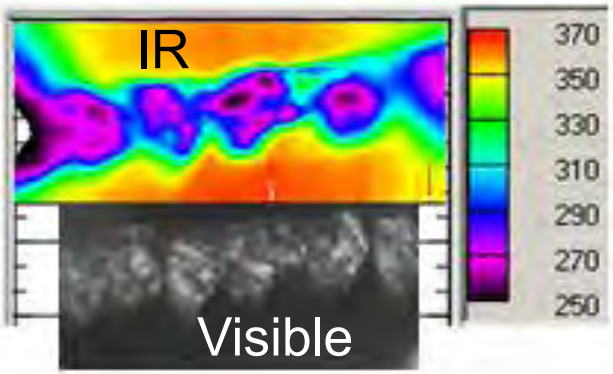
Davies et al. (2000, 2003, 2005) - Measured AISI 1045 steel with 5 micron resolution.

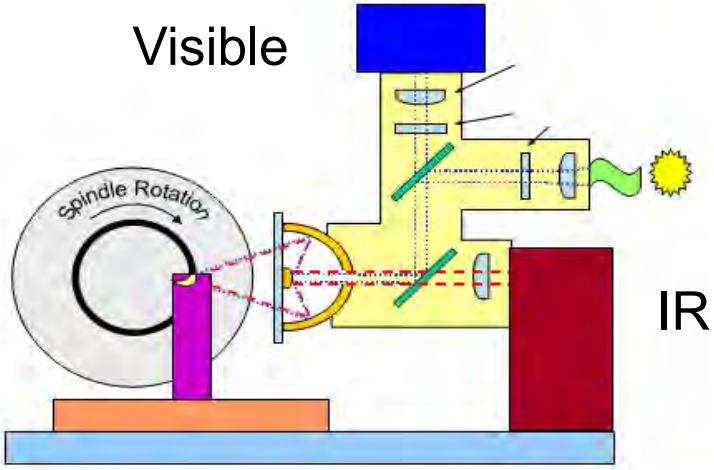
Arrazola et al. (2006, 2007, 2008, 2009) - simultaneous radiation thermometry & high-speed photography.



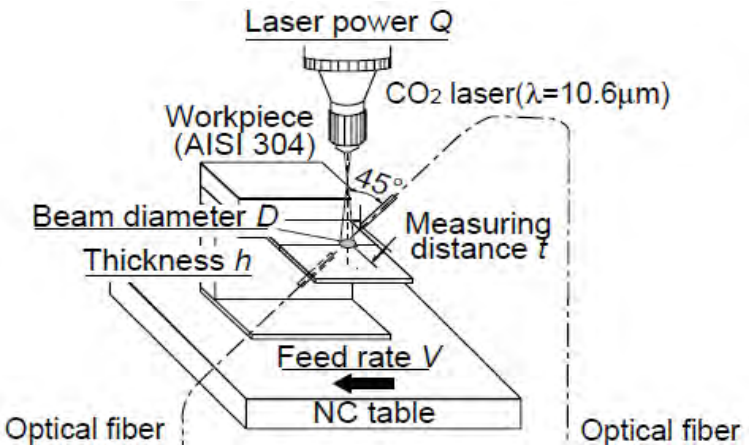
Current Capability

Ratio radiation thermometry can eliminate emissivity uncertainty and can be used to various processes from turning to forming.

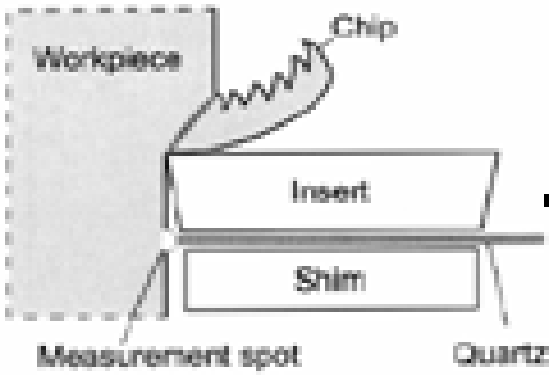


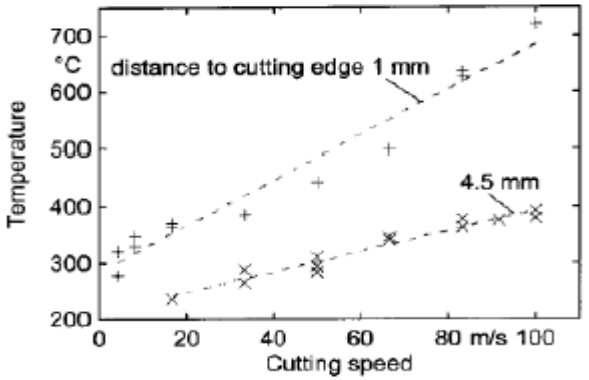


Ivester et al. (2007) - high speed machining of aluminum using IR & visible high-speed cameras.



Ueda, et al.(2005) measured the temperature in laser forming of sheet metal and used temperature to monitor bend angle.



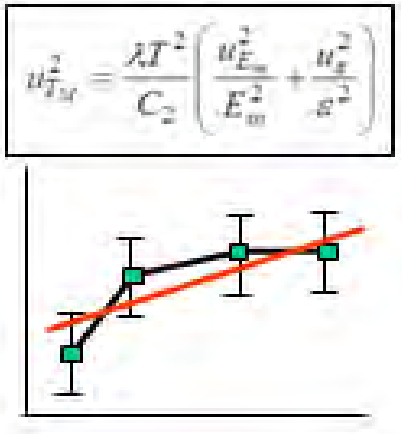


Klocke et al. (2001, 2006) – custom, two-color pyrometer to measure workpiece and tool temperatures.

Current Capability

Measurement of temperature in material removal is a mature but rapidly accelerating area of research and development in which the CIRP has, and continues to play, a major role.

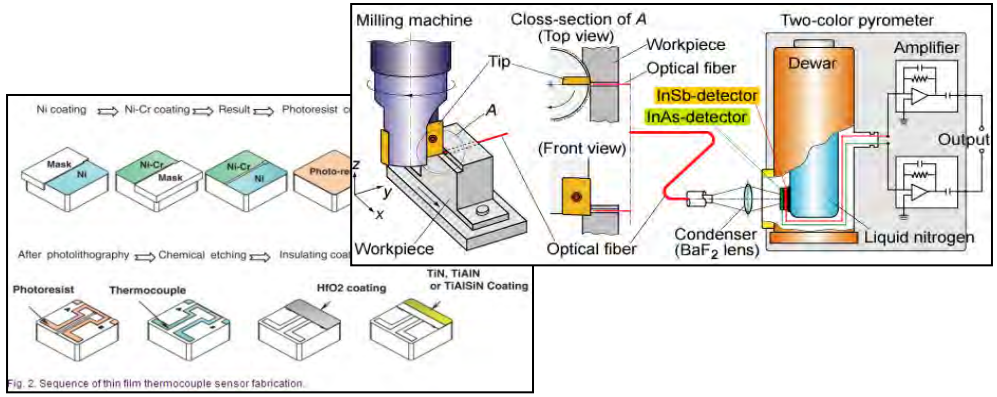
Rich History back to at least 1798!



Techniques & results abound, but results are difficult to interpret. **Collaboration is needed to validate measurements and models (C,F,G).**

	Method					
	Ther-mister	Thermo-couple	Dynamic Thermo-couple	Single-Color Pyrometer	Two-Color Pyrometer	Thermo-physical
Properties: Temperature Range	0°C-1000°C	0°C-3000°C	Work T_m	20°C-5000°C+	0°C-5000°C+	T_{trans}
Spatial Resolution	500 μm	>500 μm *10 μm	Poor	5 μm (T dependent)	20 μm (T dependent)	100μm
Temporal Resolution	2 ms	100 ms	-	ms to μs	ms to μs	N/A
Ease of set up	Easy-Medium	Medium	Easy	Difficult	Difficult	Easy-Medium
Dominant Uncertainty	Cycling	Junctions	Junction Control	Emissivity	Gray Body Assumption	Particle size
Cost	Medium-High	Low	Low	High	Medium	Low

Choice of technique is as difficult as the measurement.



New processes, new technology and better modeling drive the future.

Summary

Ideas for future collaboration

Dr. Sölter: Calibration setups for temperature measurements

CIRP Paris meeting 2013 – Track 1

DFG Priority Programme 1480,
Working Group "Experiments and Measurement Techniques"
Calibration Setups for Temperature Measurements

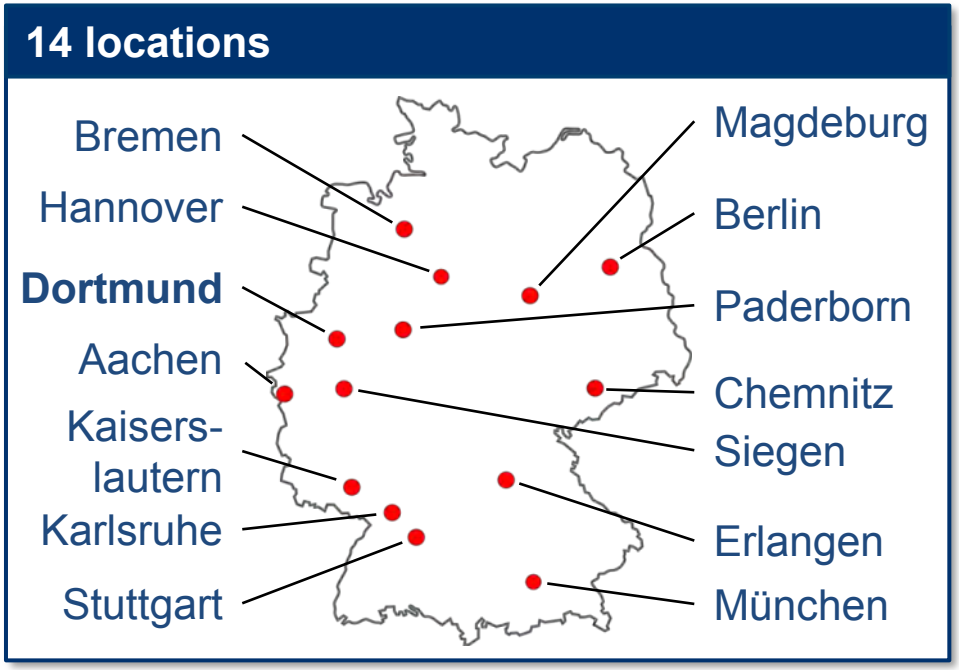
- Coordinator of the SPP 1480:
  Prof. Dr.-Ing. D. Biermann
- Coordinators of the working group:
  Prof. Dr.-Ing. habil. Dr.-Ing. E.h. E. Brinksmeier
  Dr.-Ing. Dipl.-Phys. J. Sölter

Objective and Procedure of the Working Group

- Objective:
  Comparability of temperature measurements at different institutes

- Procedure:
  Unification of sensor calibration by using the same experimental setups and by applying the same procedures

- Survey on applied temperature sensors



Temperature Measurement Techniques and Machining Processes

Technique / Process	Hobbing	Drilling	Turning	Miling	Grinding
Thermocouple		IFW, wbk, ISF, IFW	wbk, FBK, WSA, WZL	ISF, IFW, iwb	ISF
Resistance temp. detectors (RTD)	ifq				
Calorimetry (RTD)		IFW, ISF		IFW	
Pyrometer	ifq	IFW, wbk	wbk, WSA, WZL	iwb	
Thermography	ifq	IFW, wbk, ISF, IFW	iNF, wbk, WSA, WZL	IFW, iwb	

Temperature Measurement Techniques and Machining Processes

Technique / Process	Hobbing	Drilling	Turning	Miling	Grinding
Thermocouple					
Resistance temp. detectors (RTD)					
Calorimetry (RTD)					
Pyrometer					
Thermography					

Contacting sensors

Temperature Measurement Techniques and Machining Processes

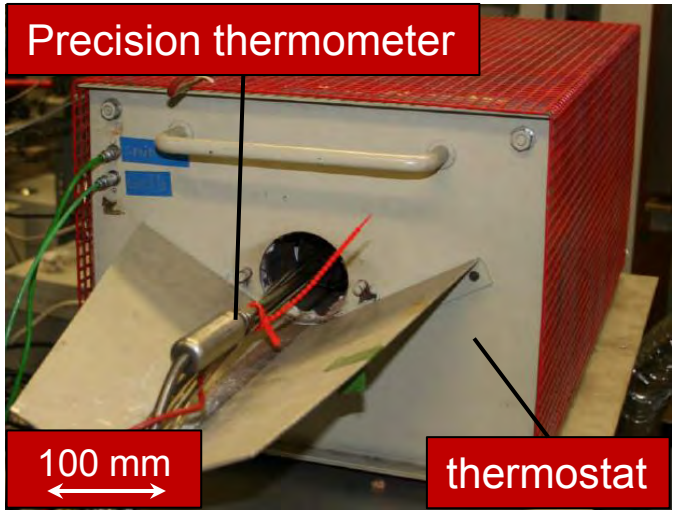
Technique / Process	Hobbing	Drilling	Turning	Miling	Grinding
Thermocouple					
Resistance temp. detectors (RTD)					
Calorimetry (RTD)					
Pyrometer					
Thermography					

Contacting sensors

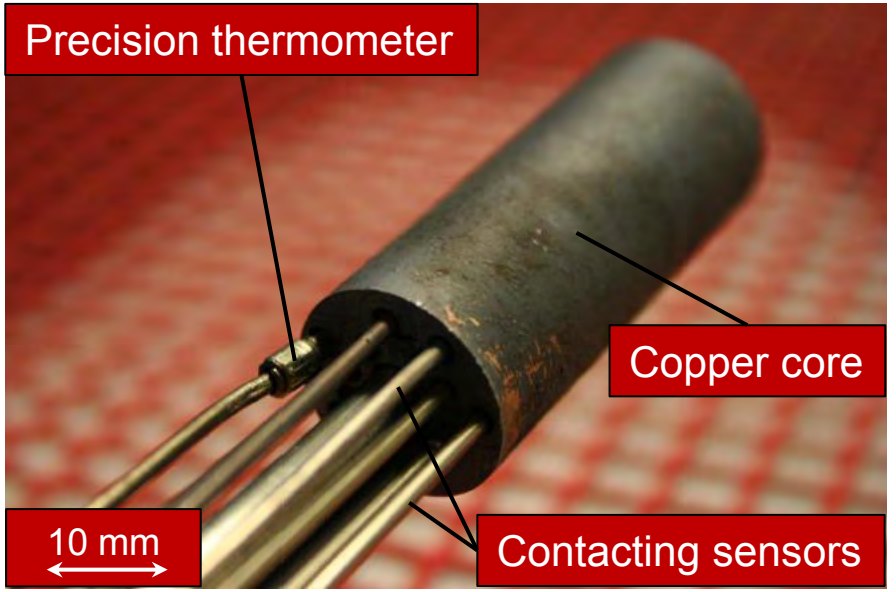
Radiation detectors

Calibration Setup for Contacting Sensors

Thermocouples and Resistance Temperature Detectors



© H. Wirbser, ITT Karlsruhe



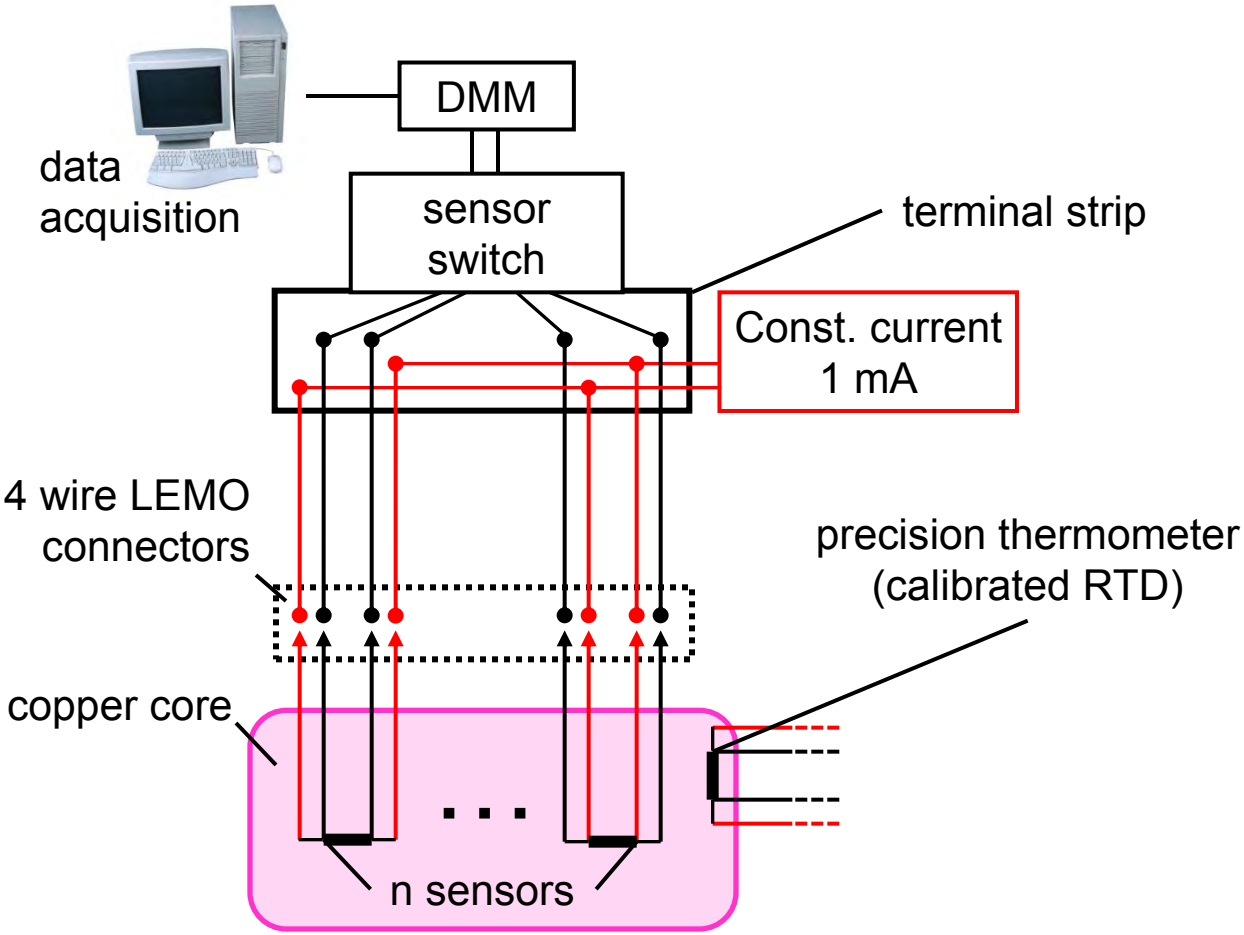
© H. Wirbser, ITT Karlsruhe

- Temperature range: RT – 1000 °C
- Precision thermometer: RTD (100 Ohms @ 0 °C)
- Calibration of each sensor including
  the whole measurement chain

Calibration Procedure for Contacting Sensors

Circuit diagrams

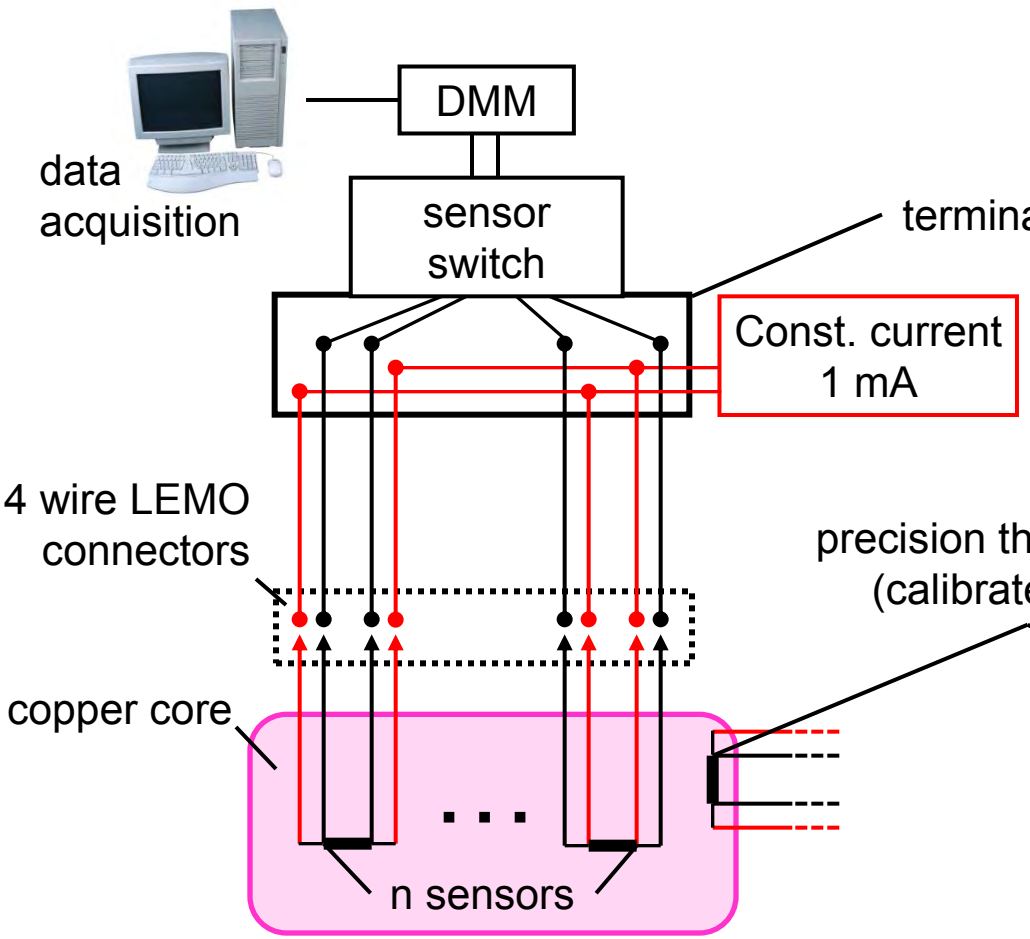
Resistance temperature detectors



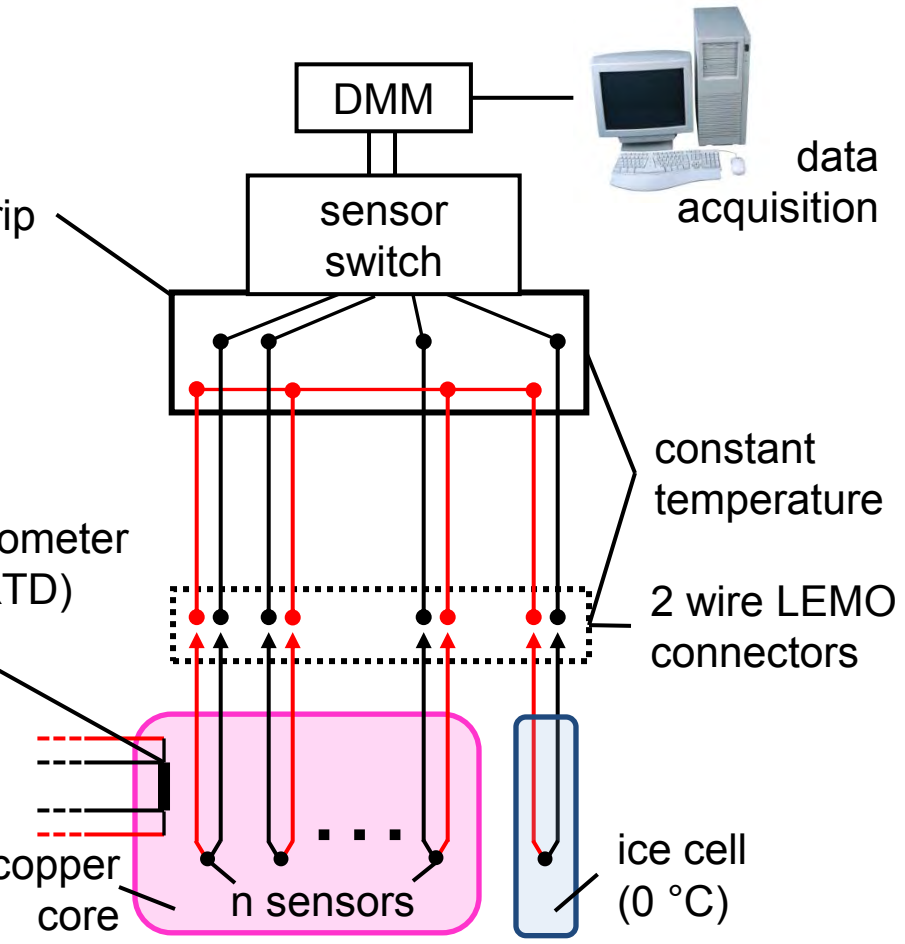
Calibration Procedure for Contacting Sensors

Circuit diagrams

Resistance temperature detectors



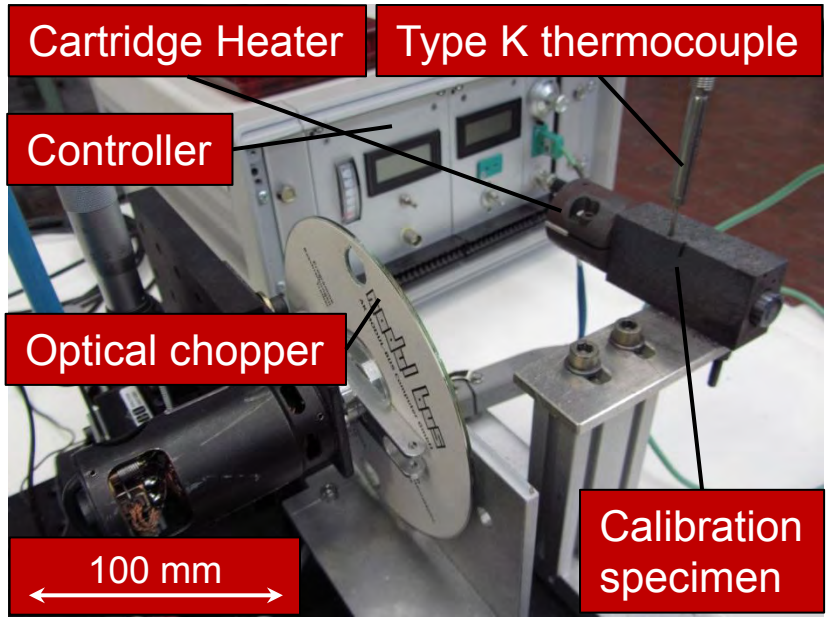
Thermocouples



Calibration Setup for Radiation Detectors

Pyrometers and IR Cameras

© R. Frohmüller, IfQ Magdeburg

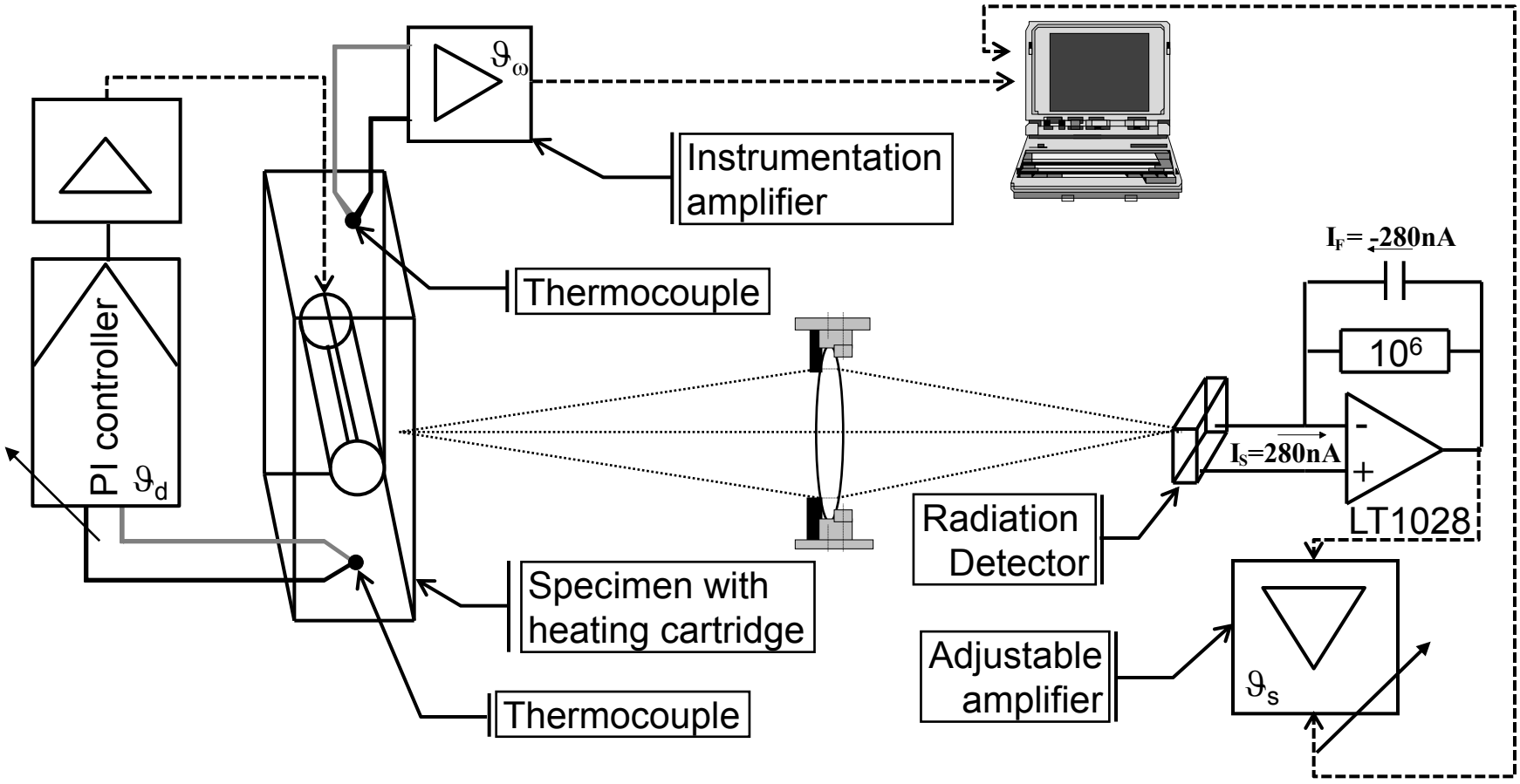


© R. Frohmüller, IfQ Magdeburg

- Temperature range: 500 °C – 1100 °C
- Reference temperature: Type K thermocouple (class 1: +/- 0.4 %)
- Determination of emissivity for different temperatures
- Dynamical performance

Calibration Procedure for Radiation Detectors

Circuit Diagram



CIRP Paris meeting 2013 – Track 1

DFG Priority Programme 1480, Modelling, Simulation and Compensation of Thermal Effects for Complex Machining Processes

Acknowledgements

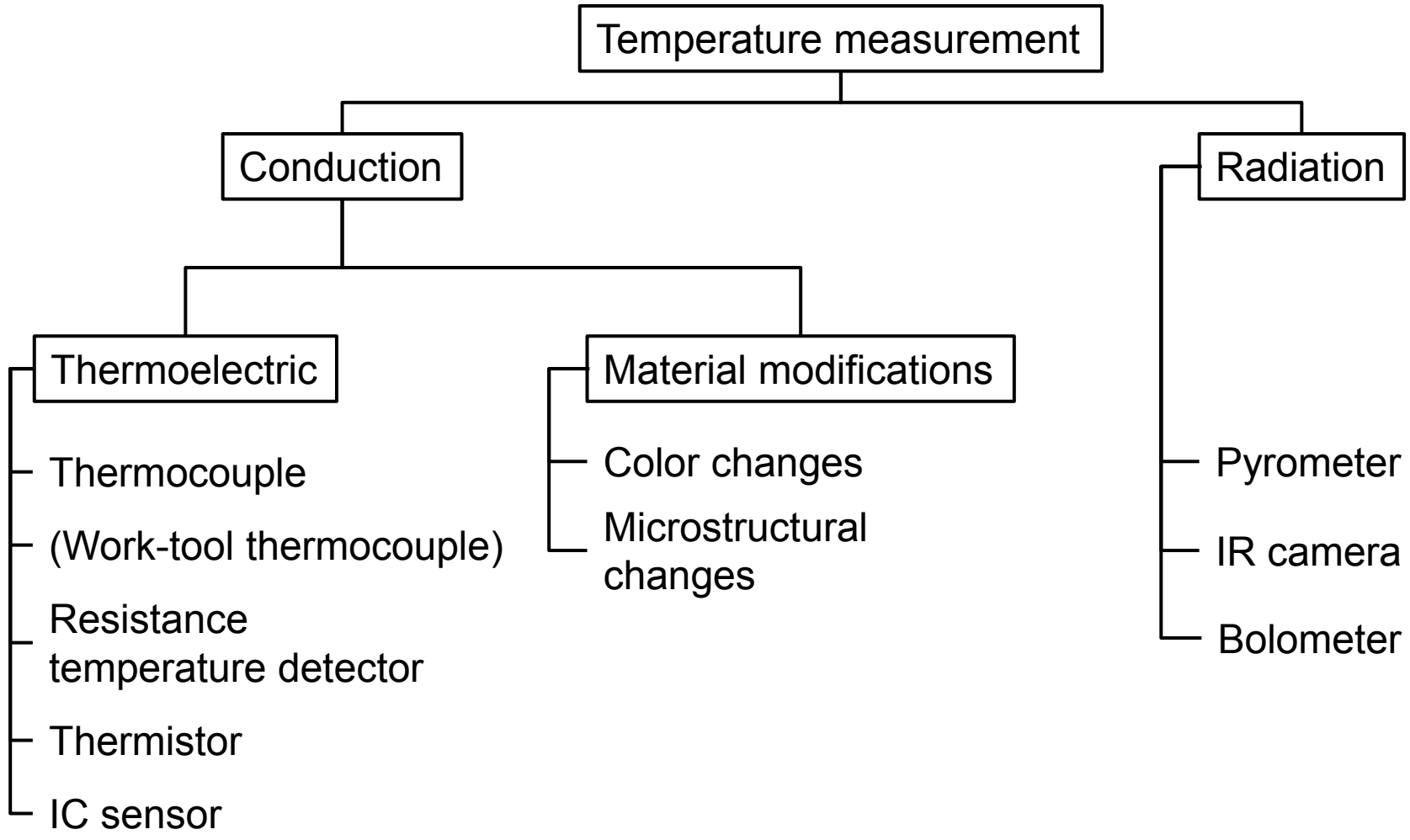
This Priority Program has been supported by the Deutsche Forschungsgemeinschaft

DFG

Discussion

- Comments / Questions?
- Interest of STCs (other than C and G)?
- Should this topic be addressed further within CIRP?

Temperature measurement techniques



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Report on running CWGs

Prof. Schmidt: Laser in production

Lasers in Production

1st meeting CWG Lasers in Production

103 Attendees;

35 responses to questionnaire received

Agenda

8:30 – 8:40	Welcome address
8:40 – 8:50	Laser direct processing – Prof. M. Schmidt
8:50 – 9:00	Laser indirect processing – Prof. M. Merklein
9:00 – 9:15	Discussion of scope
9:15 – 9:30	Results of the online Survey
9:30 – 10:00	Discussing the next steps

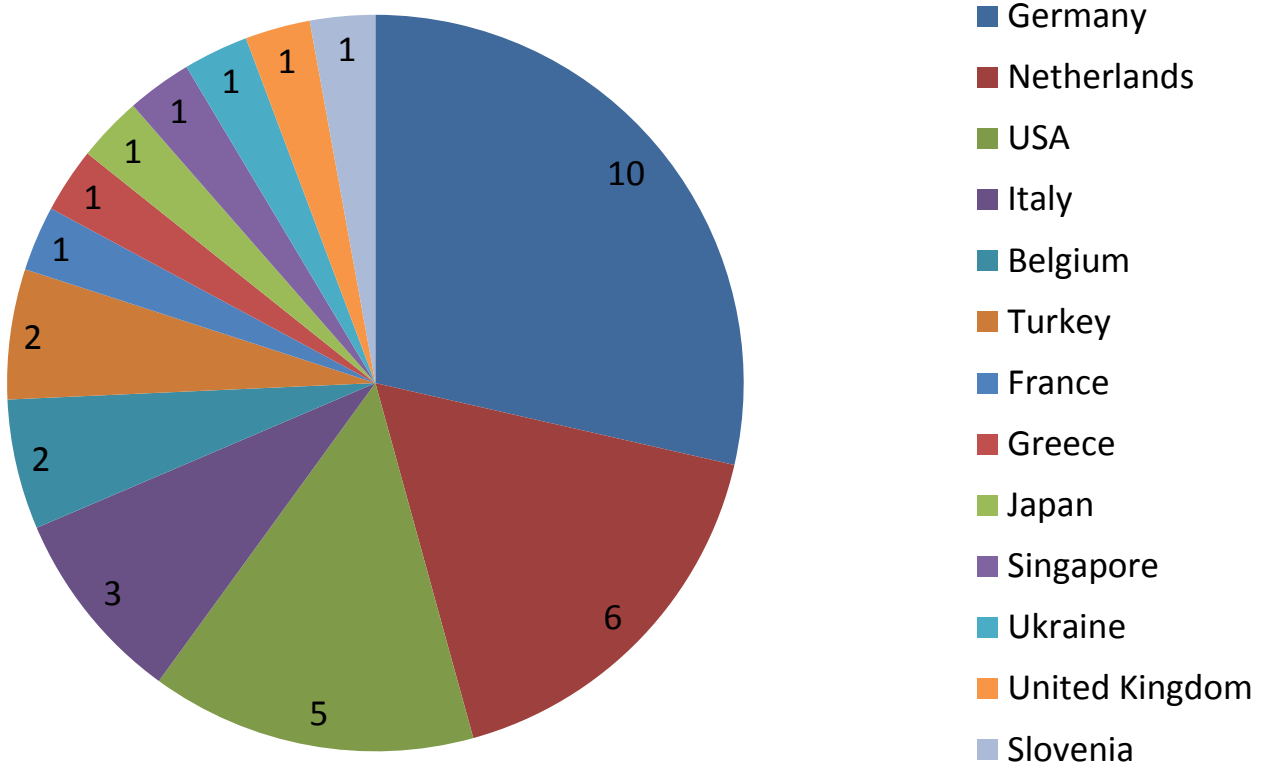
Conclusions from presentations - theses

- Direct processing with laser is underrepresented compared to industrial use
- Distribution of research scope is not reflecting distribution in laser community
- Not many publications about assisted processes
- The laser assists as heat source mainly

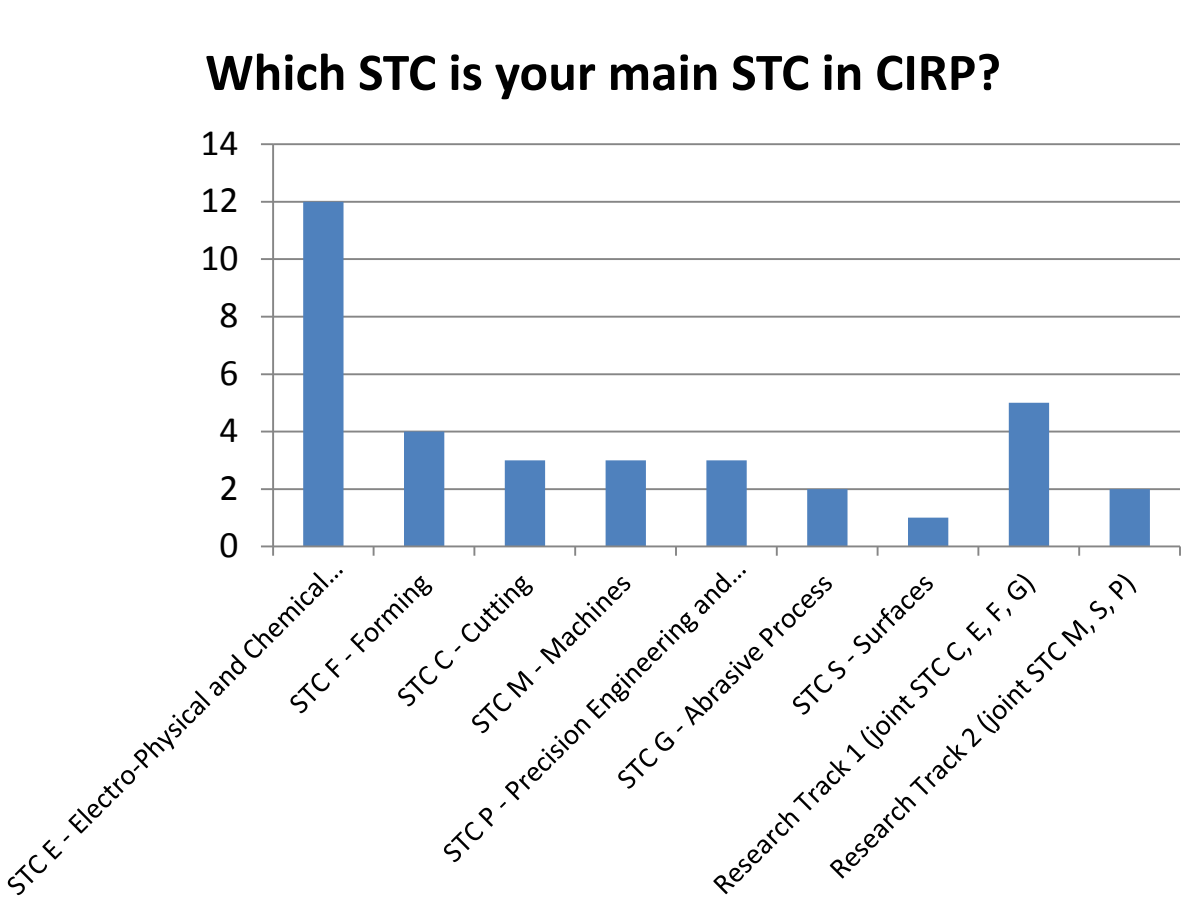
General numbers

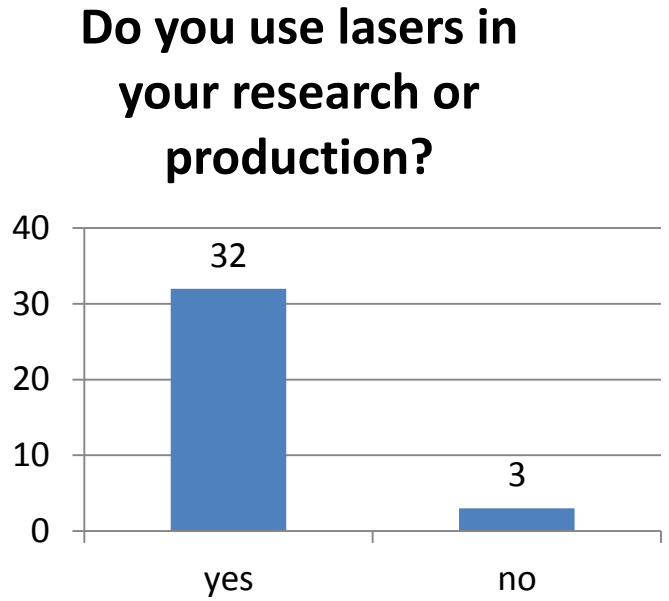
Total number of participants: 35 (of 521 Track 1 & 2 members)

Which country do you represent within CIRP?



General numbers





91 % of the participants use lasers in their research or production

Preliminary Conclusions from Survey

- Good response from almost all STCs (STC/E 12; Total 28)
- Low percentage of laser users inside CIRP
- Lasers are up to date (high percentage of fiber laser etc.)
- Mostly used for research (basic, applied)
- Contradiction between research on direct processes and publications (cutting, welding)
  → process research/knowledge underrepresented or not up to date?
- → results not published inside CIRP? – no platform
- …

Outcome after discussion

- Promote understanding of LASER as a tool with influences of all parameters (including. simulation, sensing, different materials, energy efficiency)
  - invite guest presenters
  - compose booklet
  - keynote paper
  - …
- Subgroups on:
  - Additive Manufacturing, preparing keynote paper based on round robin experiment (coordinator: n.n.)
  - ultra short pulse laser processes preparing keynote (coordinator: Bert Huis in ‘t Veld)
- Lasers in Metrology?

Thank you for your participation

1st meeting CWG Lasers in Production

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Track keynotes

Prof. Brinksmeier: Metalworking fluids (KN 2015)

International Academy for Production Engineering

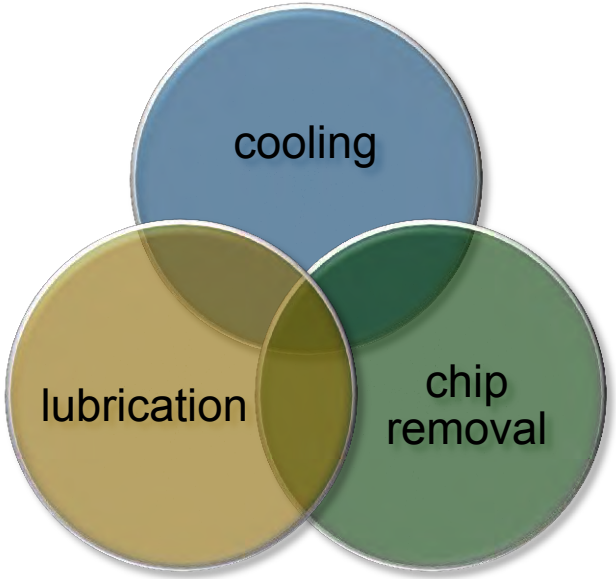
January Meeting – Paris - France, January 23 -25 2013

Proposed Track 1 Keynote Paper

Metalworking Fluids
- Mechanisms and Performance

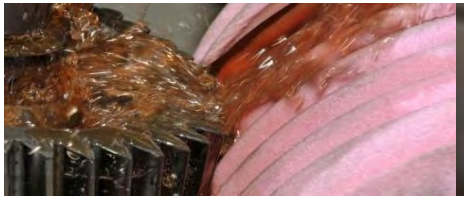
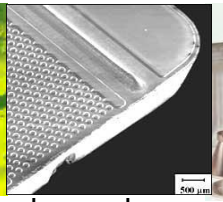
Prof. E. Brinksmeier, Foundation Institute of Materials Science, Bremen, Germany
Email: brinksmeier@iwt.uni-bremen.de

Main functions of metalworking fluids



- Reduction of tool wear
- Avoidance of (thermal) workpiece damage
- Corrosion inibitation

-> Metalworking fluids are highly relevant to the following STC's

STC G	STC C	STC E		STC F
				
grinding fluids	cutting lubricants	dielectric fluids	laser chem. etching fluids	forming lubricants

Pictures: IWT Bremen, itwfpg.com, BIAS Bremen, langhagel.com

DMey 1055

Current situation

- MWF are discussed in different STCs (C, G, E, F, S, M) separately

- Aspects having been addressed in published CIRP papers:
  - MWF-supply strategies
  - Impact on forces and topography
  - Comparison of MWF-concepts (dry, MQL, oil, emulsion)

- The relevance of MWF as a system component is often underestimated
  - Papers lack of information on the MWF-composition
  - Mainly the type of MWF is given (e.g. “emulsion”)

- The influence of MWF on surface properties and workpiece-tool-interactions is basically known but yet not substantially discussed in a CIRP Keynote Paper

→ Demand for a cross STC Keynote Paper addressing the shared aspects of MWF including chemical reactions with the surface

DMey 1056

What will be addressed?

- Interactions between technical fluids, the tool, and the workpiece surface
  - Influence on process quantities, e.g. forces, temperature…
  - Chemical reactions influencing the production process
  - Surface modifications and their impact on the functional performance
  - Tribological mechanisms
- Influence of metalworking fluids on the achievable productivity
- Multifunctional Fluids and their potential
- Discussion on the working mechanisms in selected processes
- CIRP guideline for the description of MWF in CIRP papers

What will not be addressed?

- Cryogenic processes -> Proposed Keynote Paper 2016
- MWF-supply (nozzle-design, flow-rates,..) -> Specific STC topic
- MWF-monitoring and maintenance -> Worth another Keynote Paper

Draft Outline

1. Introduction
   - History and demand for MWF in manufacturing technologies
   - MWF and their functions
   - General MWF-concepts
2. Working mechanisms of metalworking fluids
   - Basic physical and chemical phenomena
   - Specific MWF-composition for selected processes
   - Characteristics of workpiece- and tool-surfaces
   - Tribology in MWF-application
3. Effects on the productivity of selected processes
   - Case studies from research and industry (including MWF-producers)
4. Future applications
   - Multifunctional MWF
   - MWF based on green chemistry
5. Conclusions
6. References

DMey 1058

Further steps

- Discussion of the contents and the concept
- Approval of the track
- If approved:
    - Call for contributions
    - Identification of co-authors
        - Experts from relevant STCs
        - MWF-producers and/or -users?
    - Begin of literature research

Please send contributions to:

brinksmeier@iwt.uni-bremen.de
dmeyer@iwt.uni-bremen.de

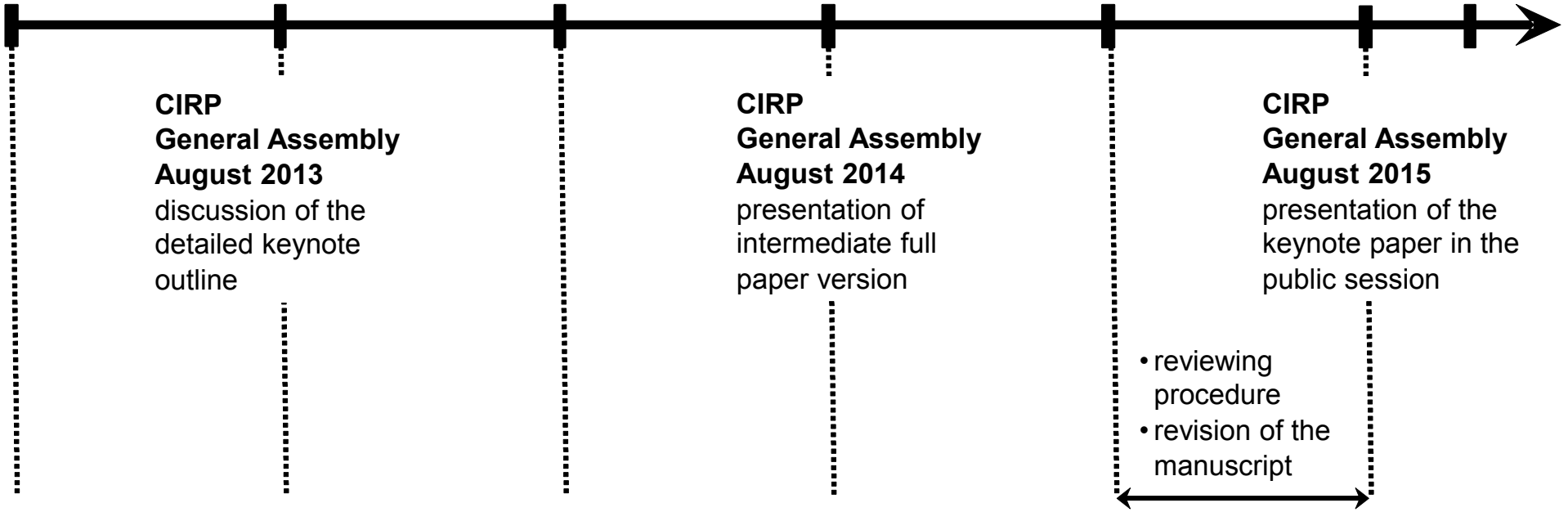
Time schedule

January 2013
presentation of the concept and approval of the track

January 2014
presentation of the final outline and intermediate paper version

January 2015
presentation of the final version

June 2015
before June 1 st, submission to the CIRP Secretariat



DMey 1060

„MWF are magic“

Fukuo Hashimoto, Track 1 Meeting, CIRP General Assembly, August 23, 2012, Hong Kong, China

Thank you for your kind attention!

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Initial Motivation of Tracks

Why Tracks?

- To provide a platform to CIRP members to interdisciplinary discussions of global trends such as
  - energy supply of the future,
  - resource efficiency,
  - internet and communication in manufacturing,
  - engineering meets medicine,
  - aging society and engineering,
  - factories of the future…
- To publish papers and statements which relate to global engineering issues.
- To increase the visibility of CIRP in public and within the research community.
- To take influence on designing transnational research programs in production engineering.

Boundary Conditions

- STCs are the solid base for discussion of fundamental research in specific fields. STC work remains the foundation of CIRP.
- Work in Tracks should not substitute STC work. Track work will be complementary to STC activities.
- Administrative issues of STCs which are also relevant to other STCs are shifted to Track meetings. This provides more time for the core business of STCs.
- Tracks will provide a forum for discussion and information on collaborative research work to CIRP members.

Did Tracks accomplish the desired goals?

Voices from the floor

"The idea of Tracks is generally good, but the three Tracks should be consolidated into one single Track."

"Track chairman seem to fear that there is going to be silence, so they let people give many presentations which are little communicative."

"A significant number of CWGs were successfully launched through Tracks: e.g. Biomanufacturing, Micromachining, ERUU, Laser in Production, etc. But there is still room for improvement: talks are sometimes to narrow and duplicate STCs."

"I have a counter argument: The CWG on white layers in the 90s was very successful - without the Track system. I would strongly argue for more collegial discussion of fundamentals, but fewer presentations".

Voices from the floor

"My experience shows: Interdisciplinary topics are lost in STCs and in tiny CWGs but Tracks provide a fixed forum to them. As we are an international academy, Tracks should be looking out into the world. And if there are STCs that rather like to avoid such discussions, they may do so. The CIRP structure is large and strong enough to cope with that."

"The problem is not the Track idea in general but the format; maybe a poster session would be better to stimulate discussion."

"In general, Tracks are a good idea but the chairmen need to select the topics very carefully."

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Past Events

Reference date: 13th January 2013

- CIRP Conferences:
  - Prof. E. Brinksmeier: 1st CIRP Conference on Surface Integrity – CSI (30.1. - 1.2.2012) **FEE** ✓ **REPORT** ✓
  - Prof. K. Wegener: 5th CIRP Conference on High Performance Cutting – HPC 2012 (4. - 7.6.2012) **FEE** ✓ **REPORT** ✓
  - Dr. W. Wits: 1st CIRP Global Web Conference on Interdisciplinary Research In Production Engineering (11. - 13.6.2012) **FEE** ✓ **REPORT** ✓
- Sponsored Conferences:
  - Prof. R. Neugebauer, Priv.-Doz. Dr. Drossel: ICMC 2012/ 2nd ENIPROD - Colloquium (17. - 18.4.2012) **FEE** ✓ **REPORT** ✓
  - Prof. E. Ceretti: PROMED - 1st International Conference on Design And Manufacturing PROcesses for MEdical Devices (2. - 4.5.2012) **FEE** ✓ **REPORT** ✓
  - Prof. B. Denkena: 1st Joint International Symposium on System-Integrated Intelligence: New Challenges for Product & Production Eng. (27. – 29.6.2012) **FEE** ✓ **REPORT** ✓
  - Prof. Schmidt: LANE 2012 – Laser Assisted Net Shape Engineering (12.-15.11.2012) **FEE** ✓ **REPORT** ✓
  - Prof. Neugebauer: ICAFT 2012 (13.-14.11.2012) **FEE**✓ **REPORT**✓

Future Events
Reference Date: 22nd January 2013

- Sponsorship requests received:
  - Dr. Makris: 2nd CIRP Global Web Conference (11.-12.6.2013) TO BE APPROVED
  - Prof. Ceretti: Promed – Design and Manufacturing processes for medical devices, Monterrey, Mexico (12.-14.3.2014) TO BE APPROVED
  - Prof. Axinte: 2nd CIRP Conference on Surface Integrity Conference, University of Nottingham, UK (28.-30.5.2014) TO BE APPROVED
  - Prof. Dornfeld: 6th CIRP Conference on High Performance Cutting University of California at Berkeley, USA (22.-25.6.2014) TO BE APPROVED
  - Prof. Denkena: 2nd International Conference on System-Integrated Intelligence SysInt, Hannover, Germany (25.-27.06.2014) TO BE APPROVED
  - Prof. Schulze: 15th CIRP Conference on Modelling of Machining Operations, Karlsruhe, Germany (11.-12.6.2015) TO BE APPROVED

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CIRPe 2013

2nd CIRP Global Web Conference on
Beyond Modern Manufacturing:
Technology for the factories of the future

- Organised by the – CIRP Research Affiliates
- **Dates: JUNE 11-12, 2013**

- **ORGANISING COMMITTEE**
  - Dr. Sotiris Makris *(Conference chair)*, University of Patras, Greece
  - Dr. Aydin Nassehi, University of Bath, United Kingdom
  - Dr. Anna Valente, ITIA-CNR, Italy

- Conference web site: http://lms.mech.upatras.gr/cirpe2013/
- Contact: cirpe2013@lms.mech.upatras.gr

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irebid

The 2nd International Conference on Design and PROcesses for MEdical Devices - PROMED

12 – 14 March 2014
Monterrey - MEXICO

Universitat de Girona
Università degli Studi di Brescia
IPL Instituto politécnico de leiria
TECNOLÓGICO DE MONTERREY
Centro de Tecnologia da Informação Renato Archer
RUTGERS

PROMED Venue

- The 2nd International Conference on Design and PROcesses for MEdical Devices (PROMED) sponsored by CIRP will be held in Monterrey, Mexico in 2014. Monterrey, with a population over 4 million, is the industrial hub in northern Mexico.

Join us in this stimulating meeting about biomaterials, medical devices design and manufacturing, and more.

Researchers in engineering and medical fields are all welcome.

PROMED Organizing Committee

Chair

- Prof. Ciro A. Rodriguez
  - *Tecnológico de Monterrey, Mexico*

Co – chairs

- Prof. Joaquim de Ciurana
  - *Universitat de Girona, Spain*
- Prof. Paulo Bártolo
  - *Instituto Politécnico de Leiria, Portugal*
- Prof. Elisabetta Ceretti
  - *Universitatà degli Studi di Brescia, Italy*
- Prof. Jorge Vicente Lopes da Silva
  - *Centro de Tecnologia da Informação Renato Archer, Brazil*
- Prof. Tugrul Özel
  - *Rutgers The State University of New Jersey, USA*

Future Events
Reference Date: 22nd January 2013

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International Academy for Production Engineering

Paris – Jan. 2014

2nd International Conference on Surface Integrity

28th-30th May 2014

University of Nottingham, UK

CIRP office: 9 rue Mayran, 75009 PARIS – France, E mail: cirp@cirp.net, http://www.cirp.net

2nd International Conference on Surface Integrity

Nottingham, UK

28th-30th May 2014

Conference Themes

- Manufacturing Processes
- Machining and Surface Integrity
- Surface and Subsurface Properties
- Surface Metrology
- Simulation and Modelling
- Fatigue Life
- Wear Resistance
- Distortion

CIRP Fellows responsible for the report

Prof. E. Brinksmeier
Prof. I. S. Jawahir

Local organising committee:

Prof. D. Axinte, Univ. of Nottingham
Dragos.Axinte@nottingham.ac.uk
Dr. A. Clare, Univ. of Nottingham
Dr. C. Kong, Univ. of Liverpool

Venue

University of Nottingham Conference Centre
3* hotel and conference facilities included.

Access from airport:

East Midlands (30min); Birmingham (1 hour); London (3 hour); Manchester (2 ½ hour)

Sponsorship:

Rolls-Royce plc, UK (confirmed)
EPSRC
IMechE

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6th CIRP Conference on High Performance Cutting
June 22-25, 2014

Important Dates:

September 30, 2013	Abstract submission
October 28, 2013	Notification of abstract acceptance
December 16, 2013	Full paper submission
March 3, 2014	Notification of paper acceptance
March 31, 2014	Camera-ready paper submission

Tentative Schedule:

June 22 (Evening)	Welcome reception
June 23-25	Technical Sessions
June 24 (Evening)	Conference Banquet

Optional Industry Tours

More information @ http://hpc2014.berkeley.edu/

Image source: Wikipedia

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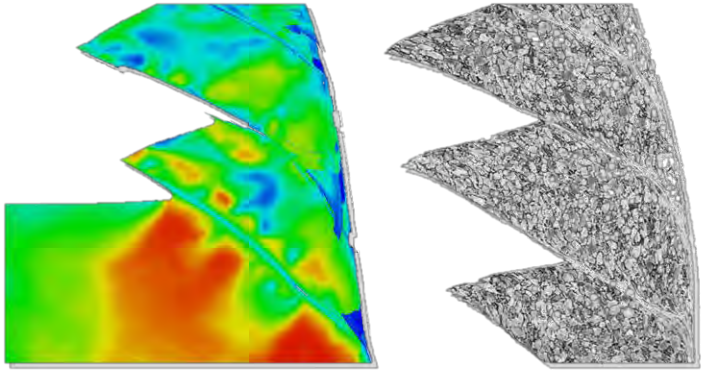
15th CIRP Conference On Modelling Of Machining Operations

- Coordinator
  - Volker Schulze
    Karlsruhe Institute of Technology
- Fellows
  - Yussuf Altintas
    University of British Columbia, Canada
  - Berend Denkena
    Leibniz University Hannover, Germany



Agenda

1	**Opening, welcome**	
2	**Approval of the agenda / minutes**	14:00 – 14:02
3	**Ideas for Future Collaboration**	14:02 – 14:32
4	**Report on running CWGs**	14:32 – 14:44
5	**Track Keynotes**	14:44 – 14:56
6	**Open discussion on the future of Tracks within CIRP**	14:56 – 15:24
7	**Administrative issues, conferences, and seminars relating to this Track**	15:24 – 15:26
8	**Miscellaneous**	15:26 – 15:28
9	**Closure**	

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