Development of metal textile composites with improved adhesion behavior by structuring of metal surfaces with an anodic TIG arc process or a CW laser process

MeTexCom2

Project duration:	**24 months**
German partner	**1st April 2016 - 31st March 2018**
Czech partner	**1st January 2016 - 31st December 2017**
Project number:	**IGF 157 EBR 1**

Consortium MeTexCom2

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CORNET Consortium

Funding Agencies

Ministry of Industry and Trade

ALLIANZ INDUSTRIE FORSCHUNG

Applying Associations

clutex

Forschungskuratorium textil

DVS VERBAND

Executive Research Centers

VUB

SVÚM

stfi SÄCHSISCHES TEXTIL FORSCHUNGS INSTITUT e.V.

LZH LASER ZENTRUM HANNOVER e.V.

TECHNISCHE UNIVERSITÄT DRESDEN

Bilateral Collaboration Agreement

SME User Commitee

SME User Commitee

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Background and goal of the project

- Main objectives of the project:
  - Development of novel polymer metal composites with superior adhesion behavior between a metal sheet with a pretreated surface and a textile surface
  - Creation of extreme lightweight structures with interesting acoustic features (sound absorption) and thermal insulating behavior or armoring behavior for applications in automotive and construction sector

To reach the required properties of the final products the **following methods will be used**:

- TIG arc and CW laser texturing of metal surfaces,
- Preparation of acoustic and thermal insulating nonwovens,
- Preparation of textile composites based on armoring textiles with polymeric interface,
- Joining by heat pressing and lamination methods.

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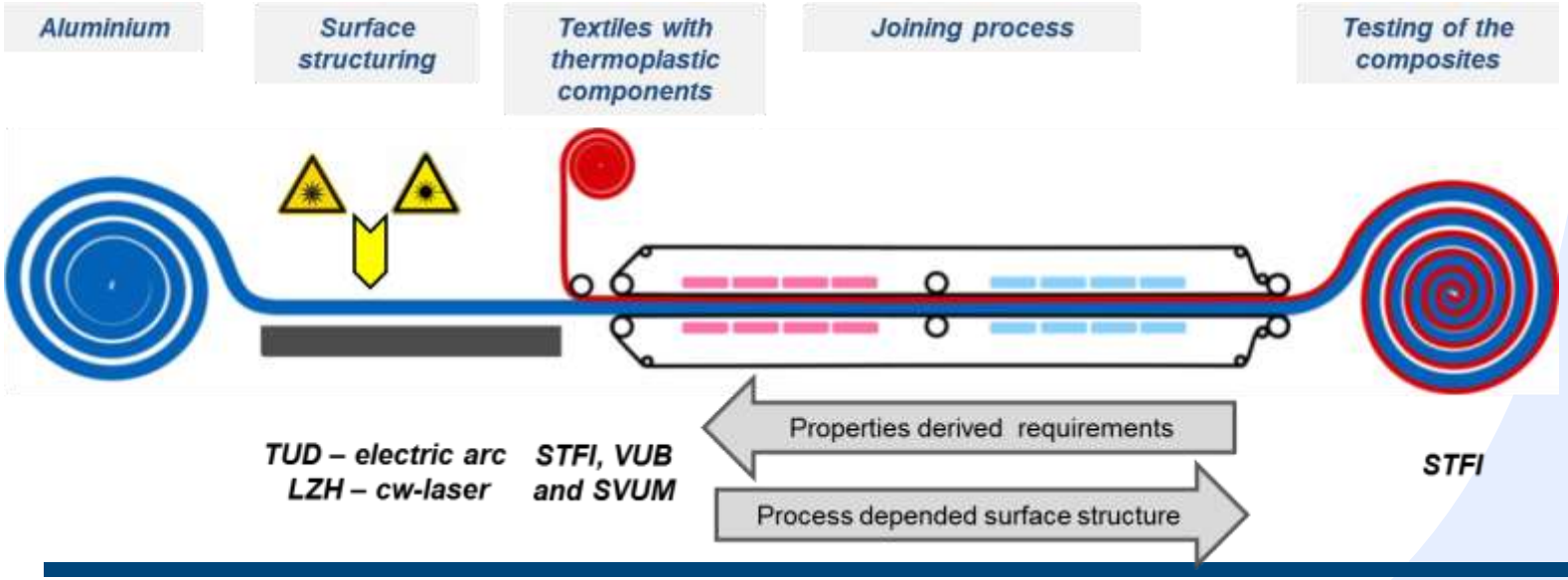
Background and goal of the project

- Application of the electrical arc or cw laser treatment to create a micro/nano-structure on the metal surface and to improve the adhesion behavior between metal and textile component significantly.
- One important project aim is to eliminate the application of any adhesives and/or connecting materials and at the same time to ensure improved adhesion behavior.
- Composite materials will be composed of nonwovens, woven armouring textiles and thermoplastic polymers.



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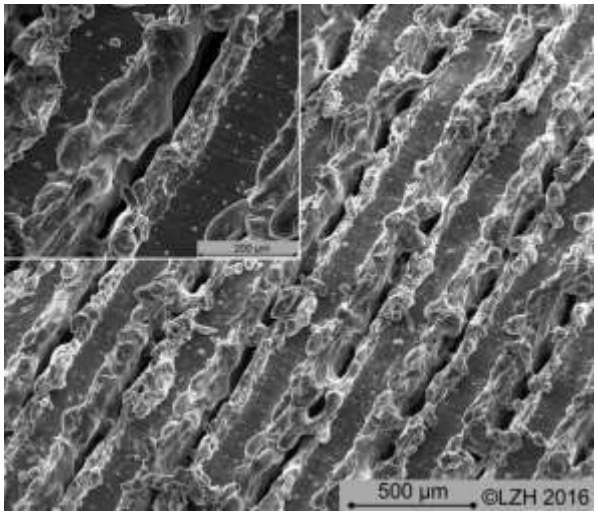
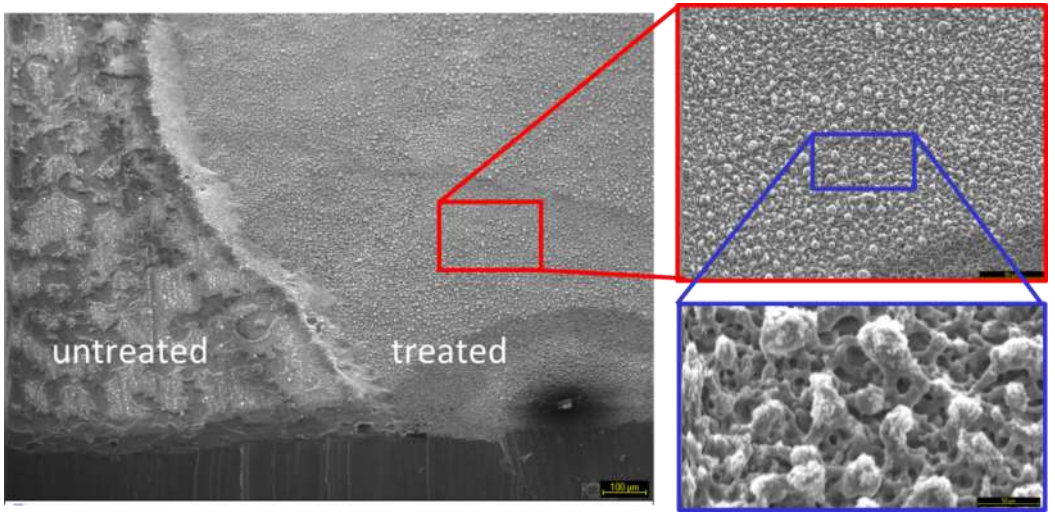
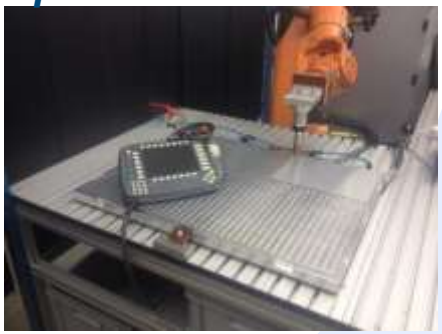
Background and goal of the project



Micro structure on metal sheet surfaces after treatment with a cw single mode laser



Micro structure on metal sheet surfaces after treatment with an anodic poled TIG process



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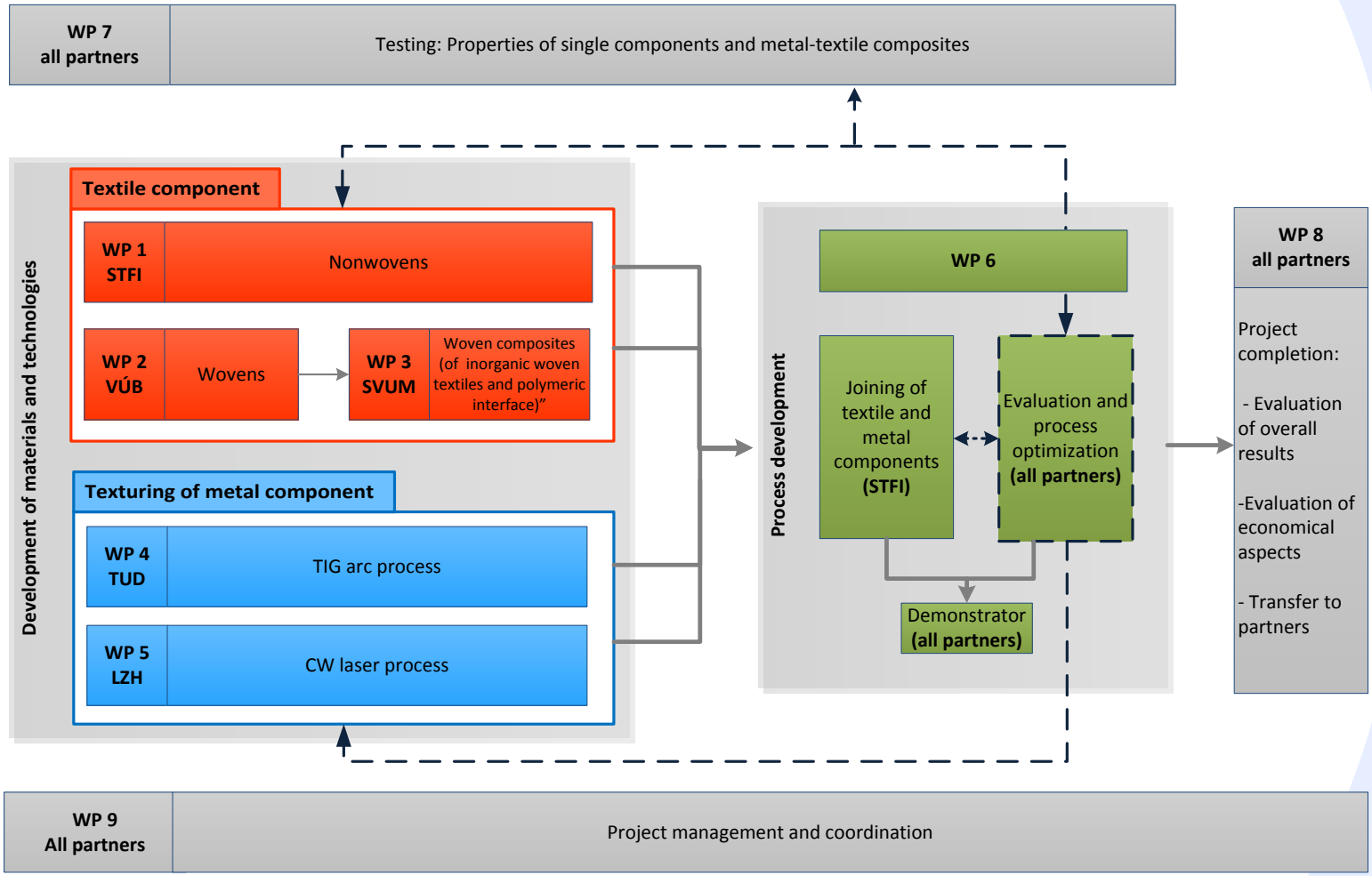
Task Overview - Work plan



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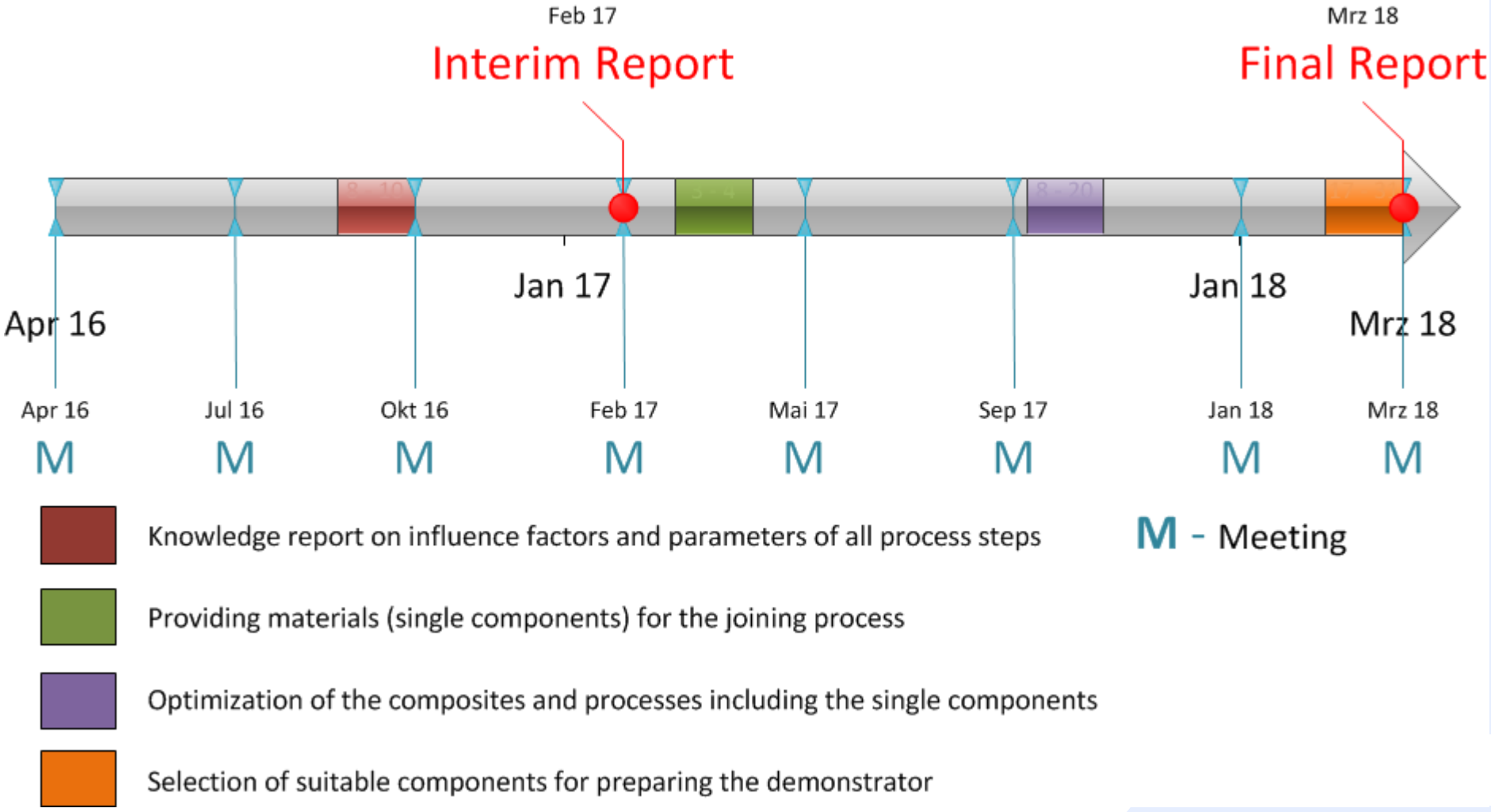
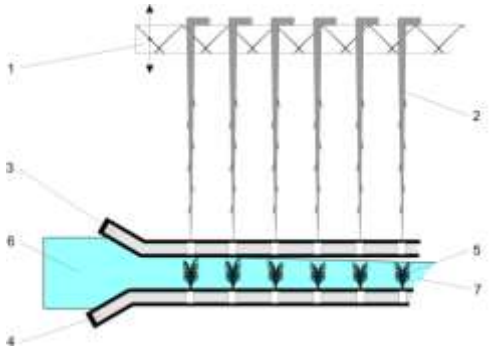
Summary of deliverables and milestones

- Time line of the project



Project execution - STFI

Fibers / Nonwovens / Textile Composites



Fibers	Length	Fineness	T_m
PES Fibers, Grisuten®	60 mm, 80 mm, 100 mm	0,9 dtex	260 °C
Co-PES Grilon® KE 170	60 mm	5,5 dtex	170 °C

→ Different fibers in different mixing ratios
→ Development of multilayered nonwoven structures by using production technologies for needle punched and stichbonded nonwovens (Typ Kunit and Multiknit)

Joining Process (Metal and Textile)

Testing

- Textile physical properties
- Adhesion strength
- Sound adsorption behavior
- Thermal insulation behavior
- Flammability
- Fogging
- …

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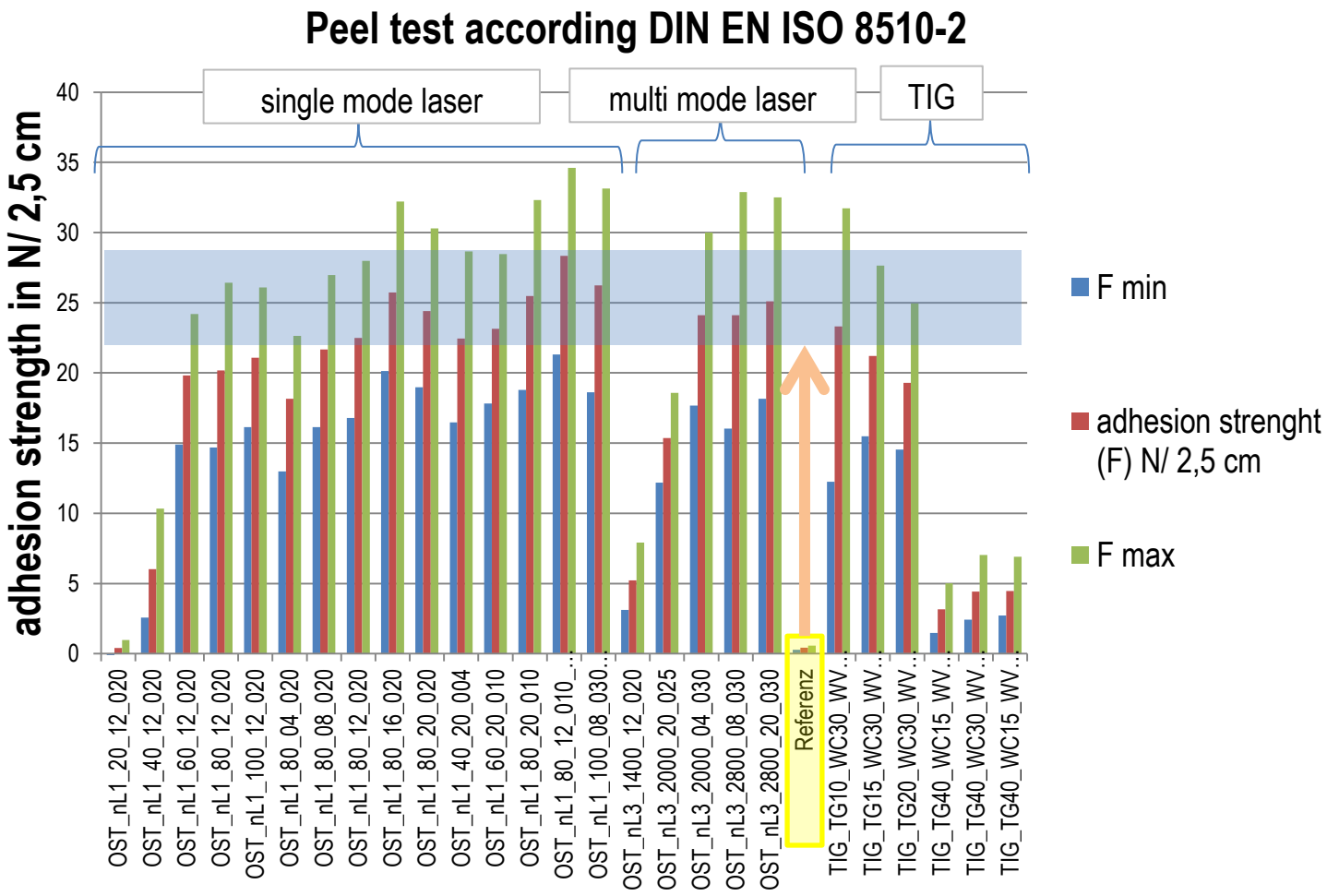
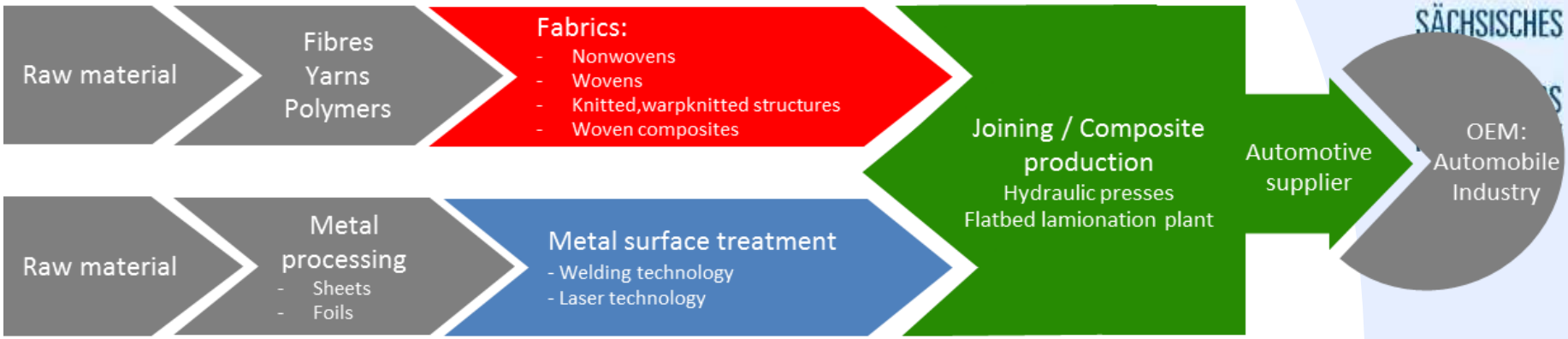
Results and Testing Equipment



Zwick BZ 2.5 / TN1S by Zwick GmbH

Companies & SME a long the value chain



Linde AG

Rökona-Textilwerk GmbH,
Textilwerk St. Micheln GmbH & Co.KG
Spengler & Fürst GmbH & Co. KG
Pinkert Machines GmbH
Schmietex Engineering GmbH
Technitex-Sachsen GmbH
TENOWO Mittweida GmbH
Borgers AG

Audi AG,
Volkswagen AG

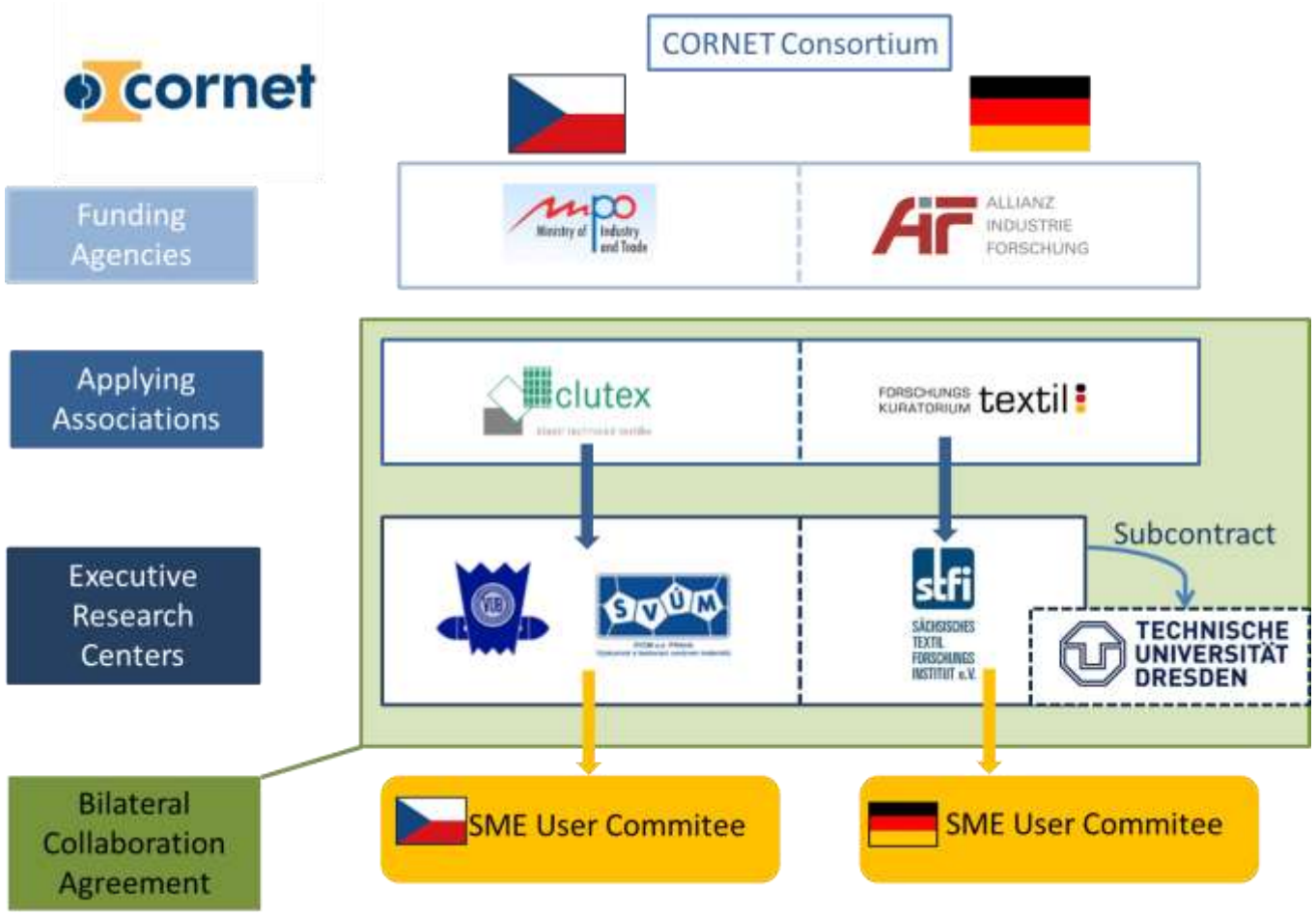
EuWe GmbH & Co. KG

E.J. Kluth GmbH & Co. KG
SCHOTT & MEISSNER, Maschinen- und Anlagenbau GmbH

Kjellberg Finsterwalde Plasma und Maschinen GmbH,
Alexander Binzel Schweißtechnik GmbH & Co. KG,
EWM AG, INOCON Technologie GmbH,
OSCAR PLT GmbH,
IPG Laser GmbH, LASER on demand GmbH

MeTexCom2 based on MeTexCom project

- Forerunner project (December 2012 to November 2014 - IGF 77 EBR 1)



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Dissemination activities / presentations

- Dissemination activities in MeTexCom:

- Press release and publication in newsletter and on the website of STFI & FKT; CLUTEX - Information of the industry about the project 2012-2013

- Design of project logo, flyer and set-up a specific project website with public and internal part as working/communication tool for all project partners: www.stfi.de/metexcom 2012-2013

- Presentation of project (flyer, poster, booth) on the Fair “Techtextil” 2013 in Frankfurt, “mtex” 2014 in Chemnitz and on the 22th Innovation Day of BMWi in Berlin 2014

- Publication in conference proceedings
  - TEXCHEM conference 17th-18th October 2013,Pardubice (Presentation)
  - 8th Aachen-Dresden International Textile Conference 27th - 28th November 2014, Dresden (Poster, Abstract)
  - Man-made Fibers Congress Dornbirn 2015 (AT), 16th – 18th September 2015 (Presentation)

Dissemination activities / presentations

- Publication of the results on the project website, in newsletters and in textile journals and journals related to Textiles and Material Sciences:
  - Technische Textilien (October 2015) IBP / Deutscher Fachverlag GmbH
  - Technical Textiles (December 2015) IBP / Deutscher Fachverlag GmbH

- Know-how transfer, distribution, dissemination of research results to textile manufacturer, producer or new recruits

  Presentation of the demonstrator on International Events at Techtextil Fair 2015 in Frankfurt
  Students training at the TUL and the TUC referring to lectures for „Technical Textiles“ and „Process Engineering“

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"Cross border cooperation" - MeTexCom

STFI and the Project MeTexCom won the Award of "Cross border cooperation in research and development " (DE and CZ) initiated by Fraunhofer MOEZ on the 27th of March 2014.

- Awarded for Bilateral Research in the field of technical textiles in cooperation with the Czech Partner CLUTEX, the cluster of technical textiles

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General lessons learnt

- For a good interdisciplinary and transnational collaboration:
  - Plan enough time for creation of project idea, proposal preparation, discussion and traveling,
  - Coordinating activities,
  - Meetings,
  - Confidence between the research partners (growing over years),
  - Awareness of cultural differences → open minded approach
  - Clarification of difficulties caused by difference in the national funding rules

  …are necessary.

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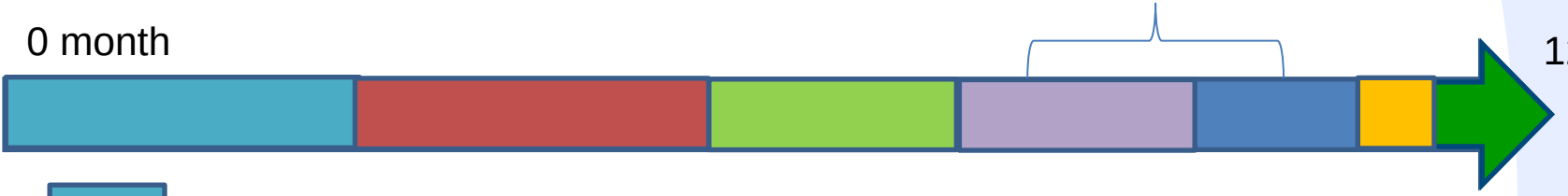
General lessons learnt

The preparation of a good project proposal needs minimum one year preparation:

Publishing of next call (including templates, participation of partner countries and regions)



- Discussion about idea (M1-3)
- Development of a work plan and preparation of implementation options (M4-6)
- Proposal preparation to the national rules (M7-8)
- Submission and waiting of the national evaluation (M9-10)
- Submission the proposals to the applying association (M11)
- Submission of the proposal to the AIF (M12)

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Thank you for your attention!

Supported by:

on the basis of a decision
by the German Bundestag

Acknowledgement
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