Joint-Partner Project
Potentials and Challenges of Thermoplastic Tapes for SME Injection Molders

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Kickoff: October 2018

[Picture sources: Covestro]
AZL and IKV Partner Networks

AZL Partner Network

IKV Partner Network
Introduction
Innovations by Thermoplastic Tapes for Injection-Molded Parts

Injection molding compound

+ Thermoplastic composite tape

High-quality folding ruler

Casings for electronics

Cross section

High-performance sports shoe

Nut cracker

Tape inlay

Bathtub

Benefits:
- Local reinforcements / stiffening / optics
- Cost savings, by reduced wall thickness
- Higher surface hardness
- Prohibited crack propagation
- etc. (!)

[Picture sources: Wiha, Covestro, Neue Materialien Fürth, Sumitomo, TenCate]
Introduction

Innovations by Thermoplastic Tapes for Injection-Molded Parts

Injection molding compound

Thermoplastic composite tape

Door module with local reinforcement

UD tape

UD tapes

Demonstrator for roof bar

[Picture sources: Covestro, Fraunhofer ICT, DExWin-Profile, MAI Multiskelett]
Motivation

2nd Object of Investigation: Small and Medium-Sized Injection Molders

> 2300 Injection Molders in Germany alone

…however, only few of them utilize the strengths of thermoplastic tapes

[Sources: AMI, https://www.etmm-online.com]
Why Focus on SME Injection Molders?
Unique Position in the Economy

Injection molders are **MULTIPLIERS**. When the group of SME injection molders understand the advantages of tapes (and the demands of OEMs) and have mastered the technology, **bottom-up market growth** is inevitable.

[Picture sources: Covestro, SGL, ENGEL, Siebenwurst, Dupont]
Objectives of the Study 1
Application Identification WITH the SMEs

1. Reaching out and understanding the SME injection molders base

2. Systematic identification of potentials for thermoplastic tapes in injection molding

SME: Small and Medium-sized Enterprises
Objectives of the Study 2
Answering the Following Questions

1. Reaching out and understanding the SME injection molders base.

- Which barriers exist in SMEs and how to overcome them?
- How can the SME injection molder base be empowered for thermoplastic composite tapes? …via teaching, networking, etc.
- How can we enable a wide bottom-up innovation growth?

2. Systematic identification of potentials for thermoplastic tapes in injection molding

- How to find new – technically valid – application potentials for thermoplastic composite tape inlays in injection molding parts
- Finding ways to „invert the Ashby material selection procedure“
- …from material capabilities – of compound + tapes – to applications
Project Plan
6-Months Work Program

Kickoff: 18th of Oct.  
1st Phase  
1.5 months

1st Review

2nd Phase  
3.5 months

2nd Review

3rd Phase  
1 months

Final Meeting

Status at Typical Injection Molders:
- Know-how about thermoplastic composites? (Especially tapes / inlays)
- Barriers, chances & risks?
- Standard procedures in innovation projects; facility setups and material flows
- Expert interviews at injection molders / visitations
- Classification of SME injection molders (tool technology, dimensioning capabilities, company sizes, competences, value chain position Tier4 … OEM)

Identification of Application Potentials and Development of a Systematic Methodology:
- Pros and cons of hybrid thermoplastics compared to conventional plastics (in parts and manufacturing)
- Derivation of application clusters (Where does it makes sense?)
- Economical benchmarking (classification of parts)
- Material substitution approaches
  - Substitution of thermoplastics
  - Substitution of composites (thermoset-based)
  - Substitution of metal inlays

Deriving Recommendations for Action:
- Documentation of the systematic procedure to find business cases for hybrid thermoplastic parts
- Barriers and how to overcome them in SMEs for thermoplastic composites
  - Technical barriers
  - Organizational barriers
- Practical guiding principles
  - How to initiate projects
  - Easy-to-use design guidelines
  - Manufacturing guidelines
  - Planning guidelines
- Best practices in „fast & easy cost calculation“

Additionally: Workshops at injection molders with technology providers
Project Plan
Kickoff Meeting

- The kickoff meeting will take place:
  - on October 18th, 2018
  - at Fakuma fair
  - In Friedrichshafen

- Detailed information on the meeting will prior to the meeting.

- This will be our first action in bridging the gap between thermoplastic composite and injection molding industry.
Team & Investment

Project Team:
- 1 scientist of IKV (injection molding, FRP design, processing)
- 1 scientist of AZL (process chains, cost modelling)
- 1 coordinator of AZL (organization, management, documentation)

Investment:
- Small companies (< 10 employees): 5,000.00 €
- Medium-sized (< 50 employees): 7,500.00 €
- Large (< 500 employees): 10,000.00 €
- Very large (> 500 employees): 12,500.00 €

Targeted number of participants:
20 companies (at least 10 SME injection molders)
Your Benefits

- **SME injection molder**
  - Becoming capable of the technology
  - Contact to new OEMs and suppliers (machines / materials)
  - Learning a methodology to find technically valid application potentials
  - Novel applications / business cases

- **Tape manufacturer / compounder**
  - Contact to potentially novel customers
  - Understanding (& empowering) your customers, their barriers and pain points
  - Novel applications / business cases

- **Machine and tool builder / Engineering provider**
  - Contact to potentially novel customers
  - Understanding (& empowering) your customers, their barriers and pain points

- **OEMs/Tier1s**
  - Contact to suppliers (injection molders)
  - Development of supplier chains and empowering them (Tiers1s, 2s, …)
  - Communication of requirements and demands (quality, cost, delivery time)
  - Gaining important knowledge for the quality management & business cases

→ **Win-win-win** situation, where every participant gains from the work plan

[Picture sources: Covestro, Siebenwurst, M.TEC, KraussMaffei]
Contact

Let us know your feedback, questions and proposals...

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