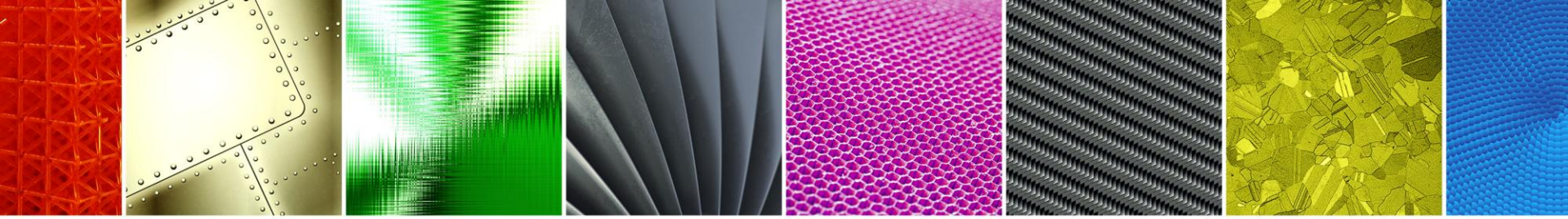


Bauteilkostenoptimierung in einer frühen Entwicklungsphase

Sebastian Schwägele

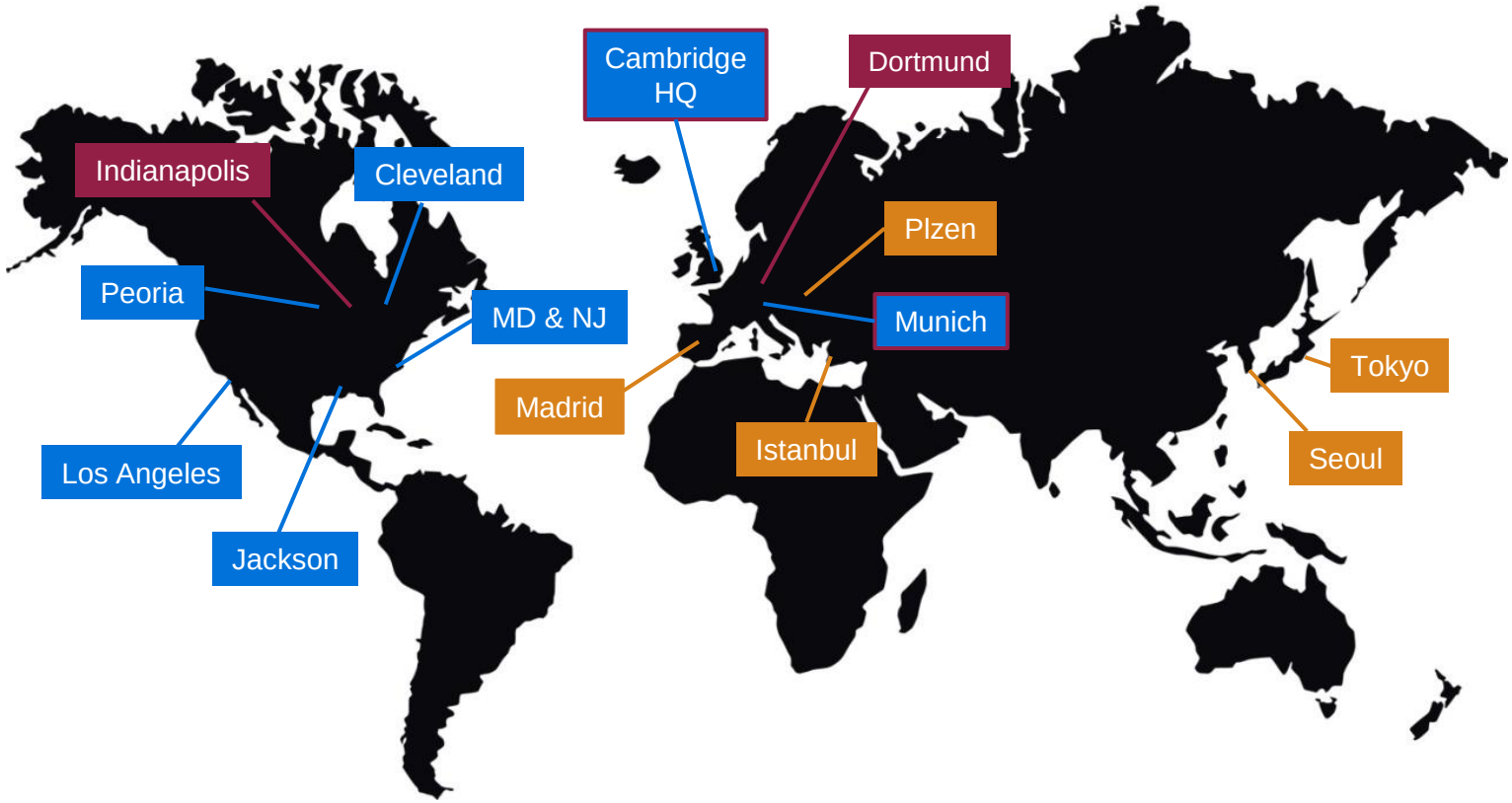
Schladming, 26. Februar 2016

GRANTA
MATERIAL INTELLIGENCE

www.grantadesign.com

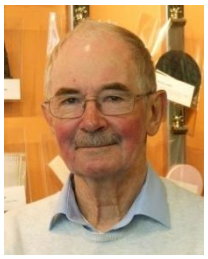
Who is Granta Design?

Granta Design is the world's largest company exclusively dedicated to Materials Information Technology.



GRANTA MATERIAL INTELLIGENCE

Granta Design—innovating since 1994



UNIVERSITY OF CAMBRIDGE

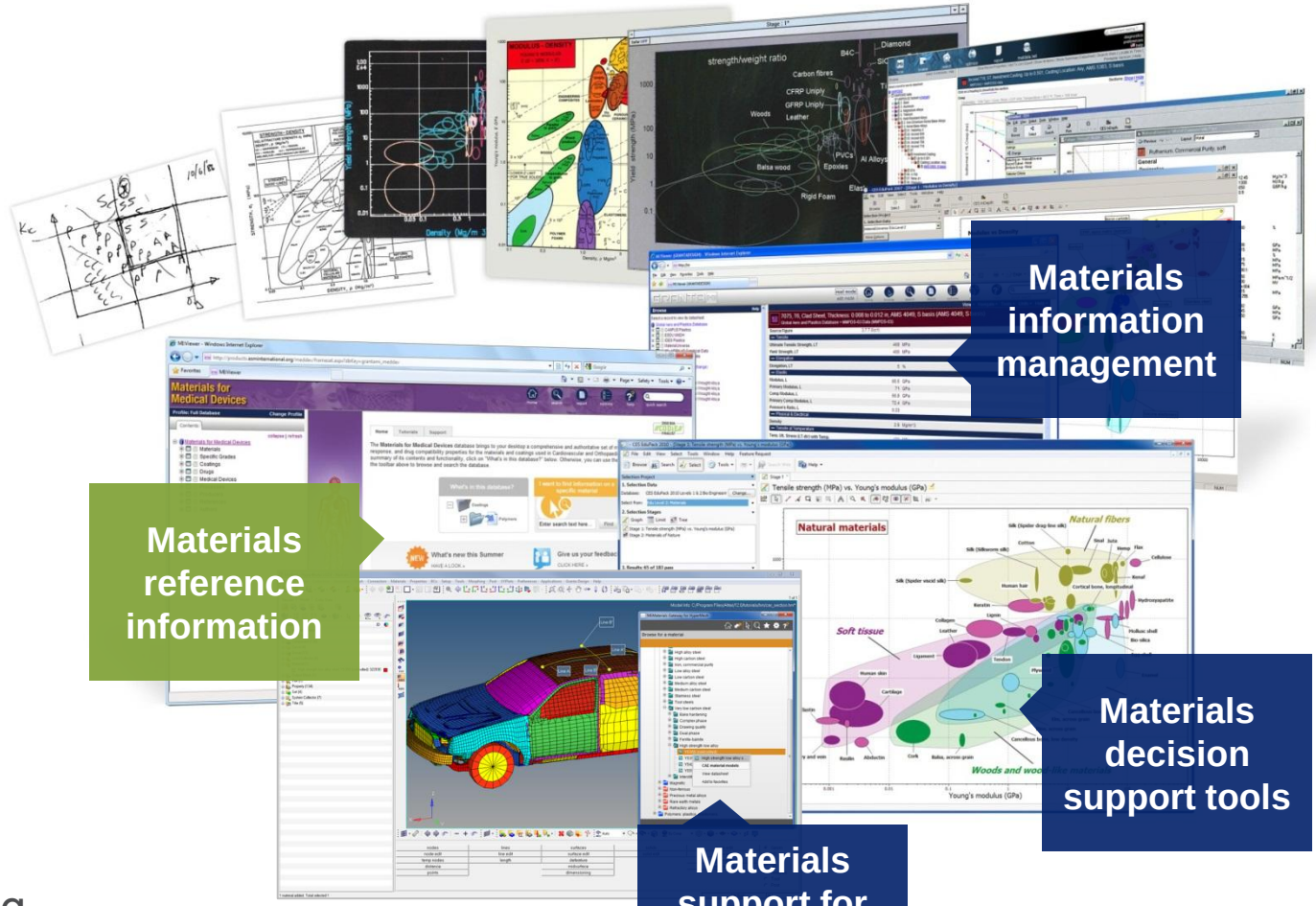
ASM INTERNATIONAL

Materials information technology is…

Software +

Information

…related to engineering materials and their properties

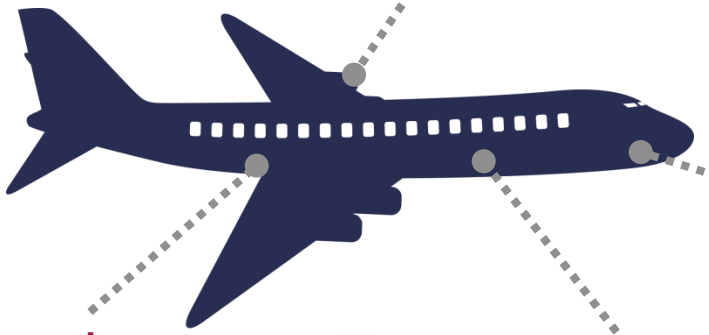


Where/why does materials information matter?

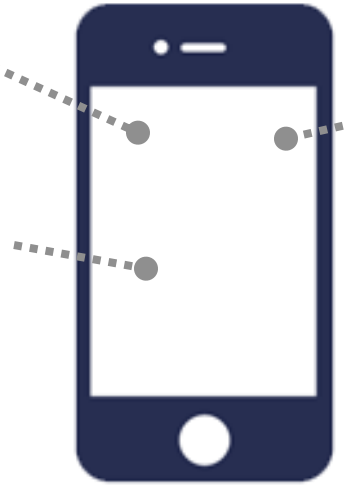
Do I have statistically-validated design data for these conditions?

What's the environmental footprint?

Could I make this at a lower cost?



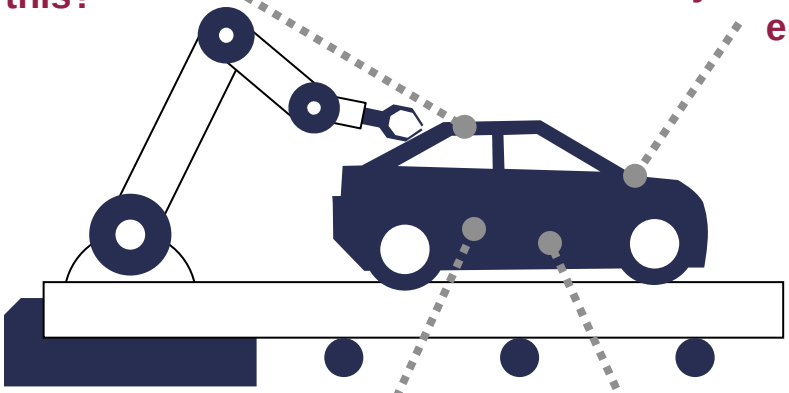
Do the materials inside this use restricted substances or conflict minerals?

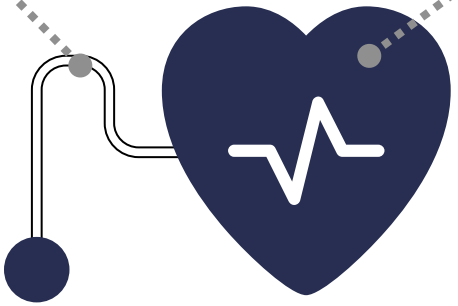


How can I 'lightweight' this?

Is my material strong/stiff enough?

Are there biocompatibility issues?





Can I perform a reliable crash simulation?

What's the equivalent grade for manufacturing in China?

Materials engineering efficiency?

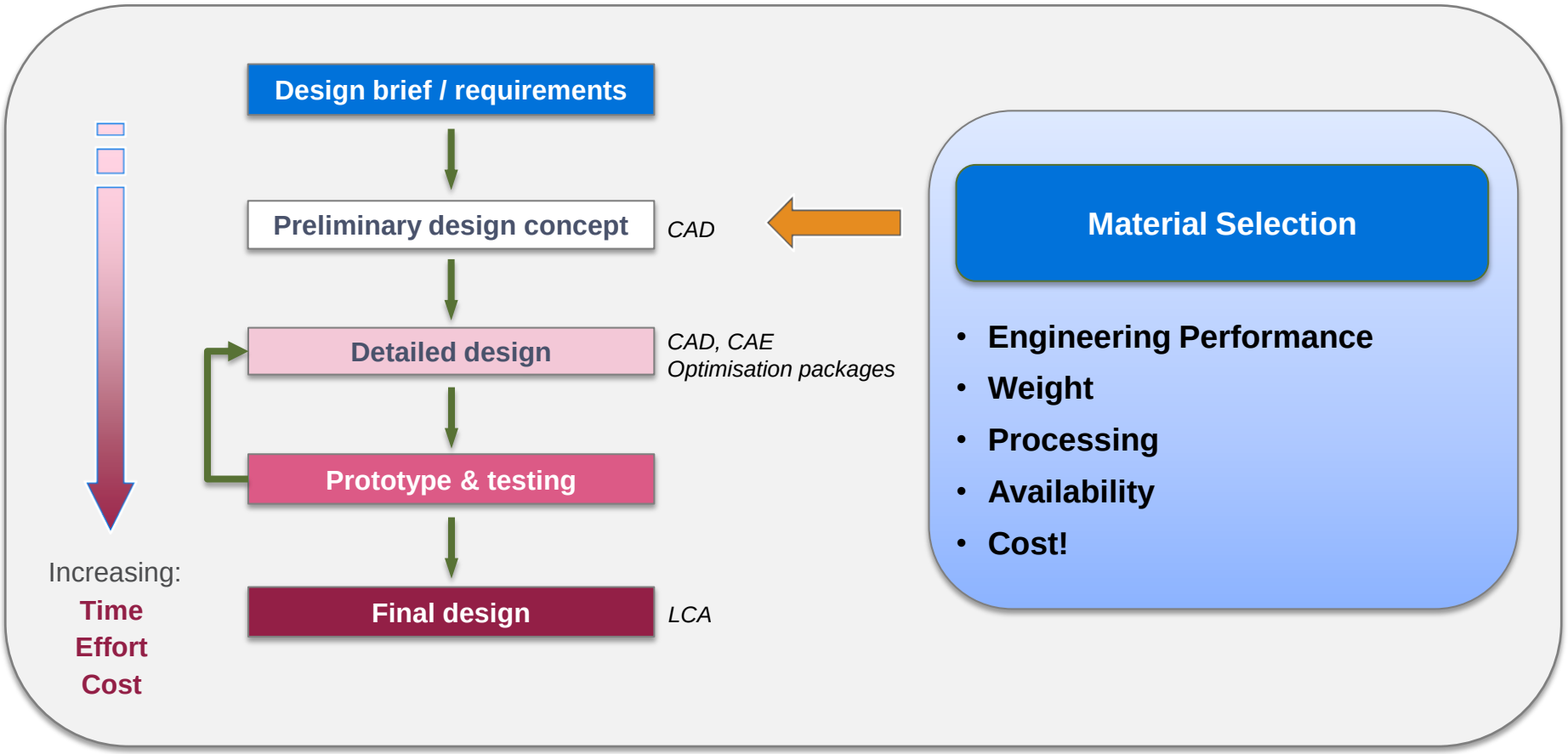
Engineers spend an average **ONE HOUR PER WEEK** looking for materials data.

Typically, **20 %** of materials tests **DUPLICATE** existing work.

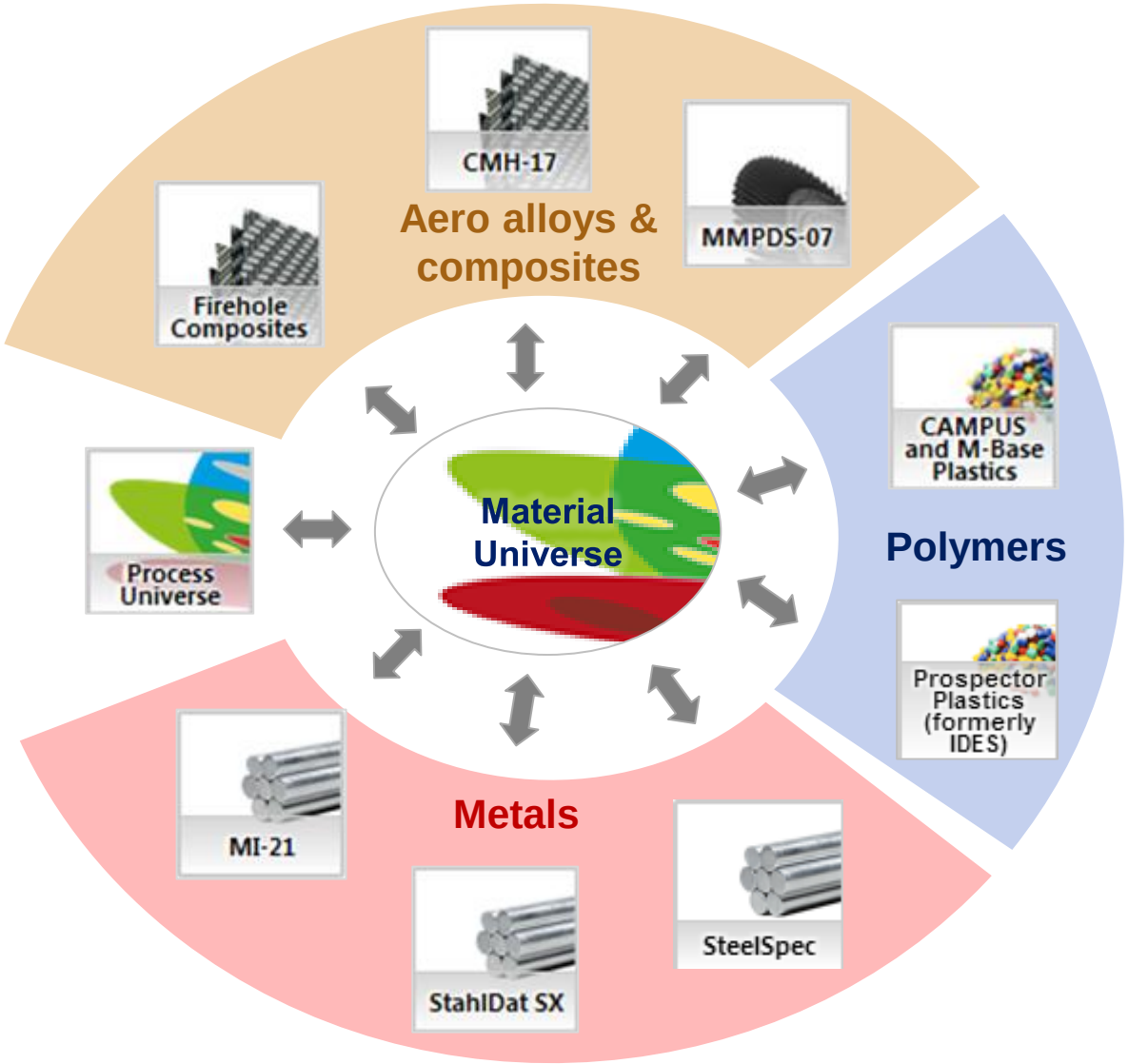
50 % of this expensively-acquired data was **USED ONCE** and **NEVER RE-USED.**

Survey data:
Granta Business Case White Paper, 2012
www.grantadesign.com/papers/

Typical product development workflow



Access to materials data



MaterialUniverse

- All engineering materials
- Complete & comparable dataset
- Price & eco data
- Datasheet for generic grade
- 4,000 materials
- Pre-screening of materials

Specialist data modules

- One material family
- Data for individual grades
- Dataset varies grade-to-grade
- Linked to MaterialUniverse

Motivation - lightweighting in automotive

Scenario

- Lightweighting exterior body panels
- In order to meet stringent environmental requirements

- Currently using pressed, cold rolled Steel YS140
- Should we be considering plastics?

Smart Fortwo

- *PP-20 % mineral filled*
- *15 % saving in vehicle weight*

Part Cost Estimation During Early Stage Design

Considerations

- Are polymers the best alternative?
- What level of weightsaving can I expect to achieve?
- What is the likely cost?
- How will changing material impact the final design?

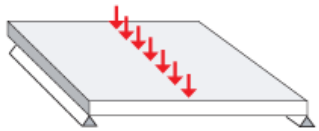
Challenges

- Limited knowledge on alternative materials
- Accessing data for all appropriate alternatives
- Which materials to focus on - before committing to detailed, design, modelling, characterization, testing …
- How to evaluate part cost, before knowing the details of the design?

Exterior door panel

Design requirements

Function: Exterior skin for a car door panel



- Panel loaded in bending
- Stiffness-limited design
- Length, width specified
- Thickness free

Constraints:

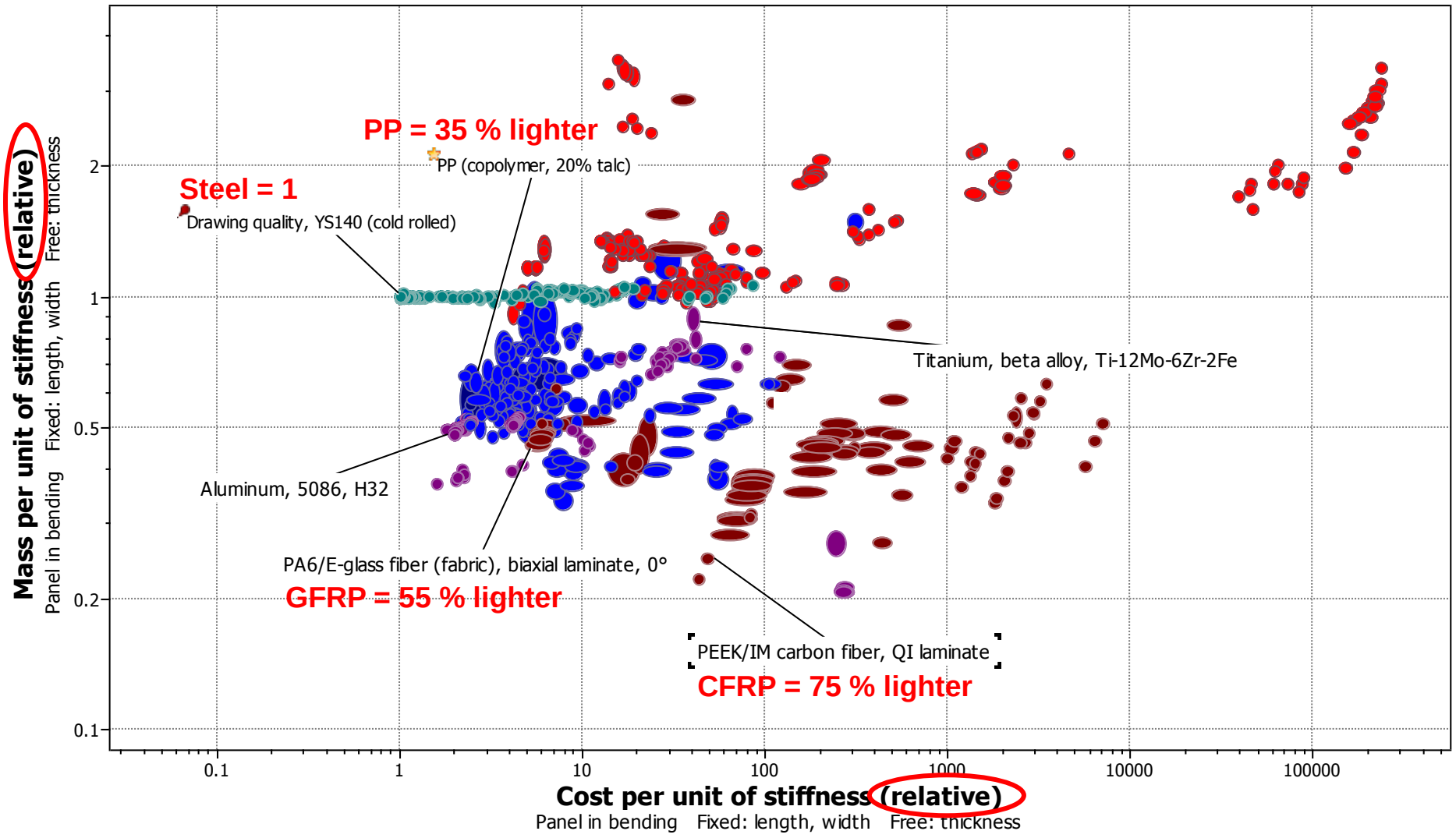
- Temperature resistance (-20 °C to +90 °C)
- Adequate strength / toughness
- Good dimensional stability (thermal load)
- Resistant to: rain, salt water, petrol
- Processed from flat sheet or molding processes

Objectives:

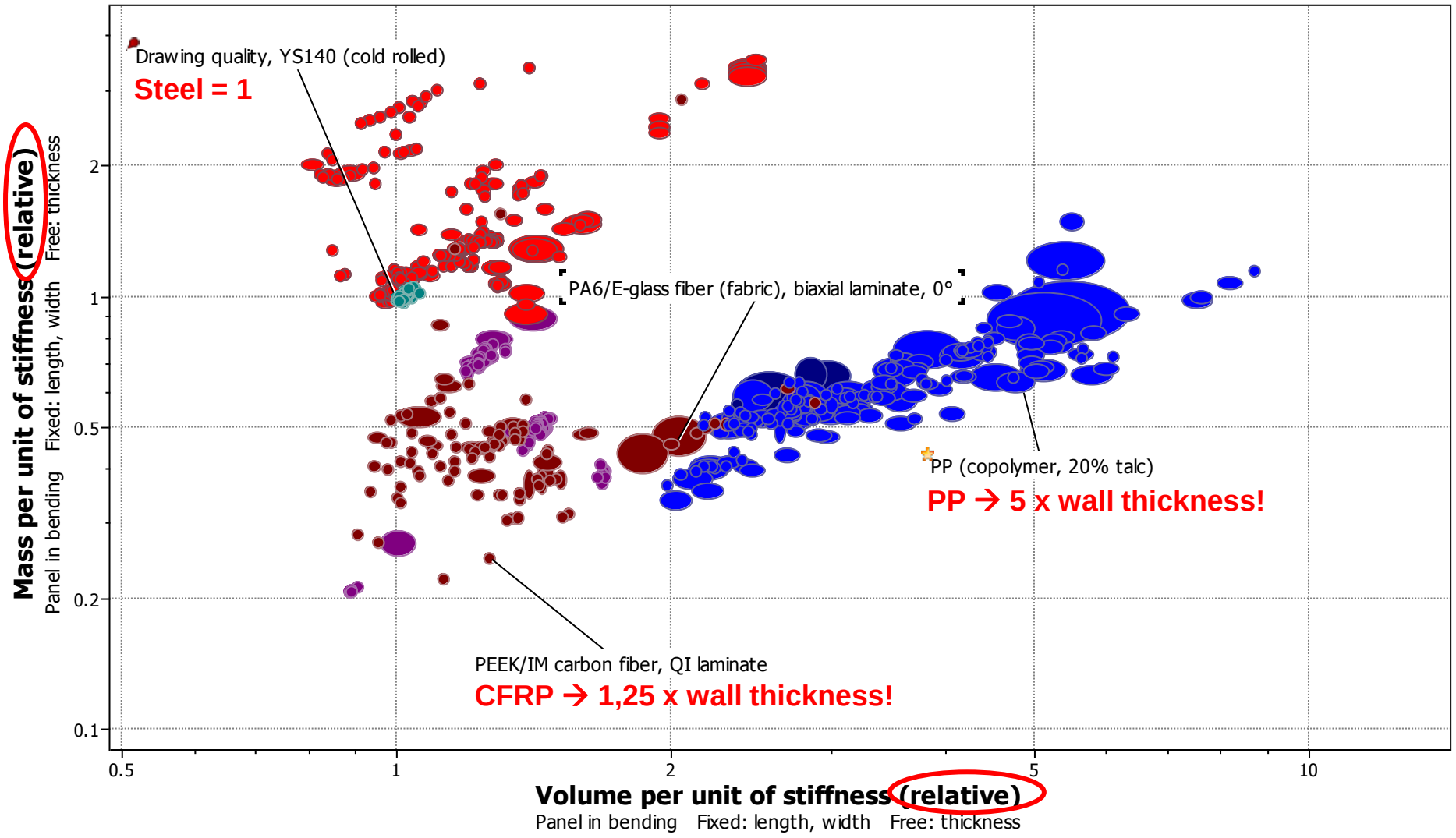
1) Minimize mass
2) Panel thickness
3) Part cost

Change with material?

Mass/stiffness vs. cost/stiffness

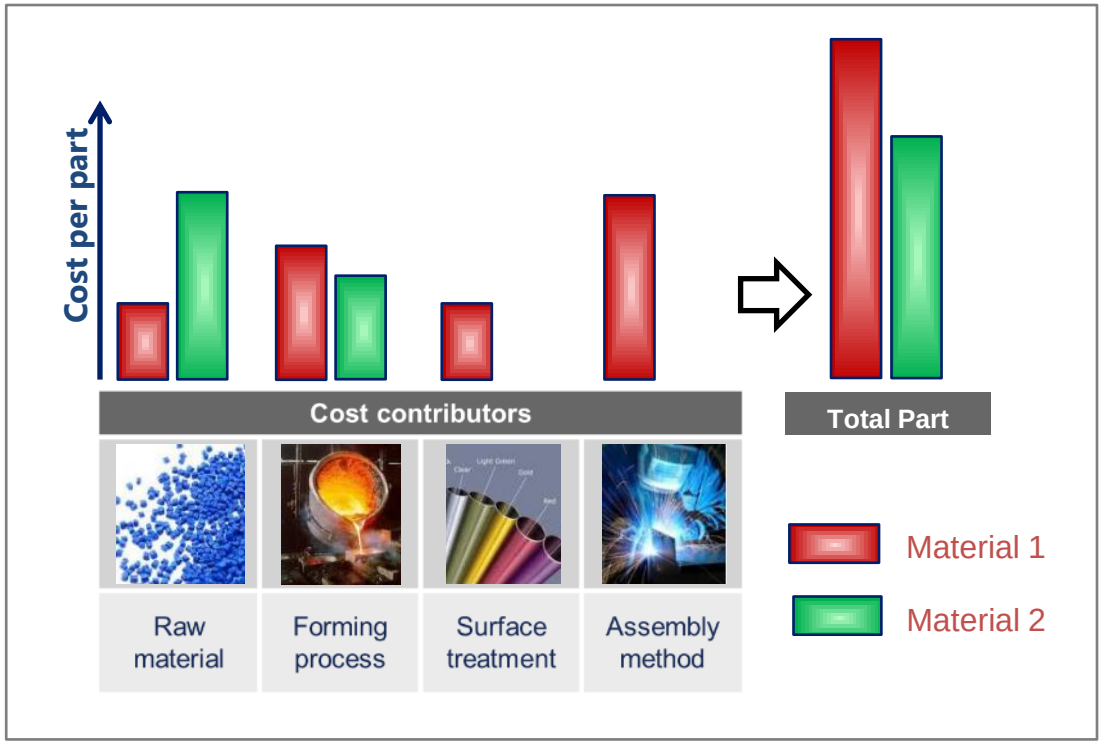


Mass/stiffness vs. volume/stiffness

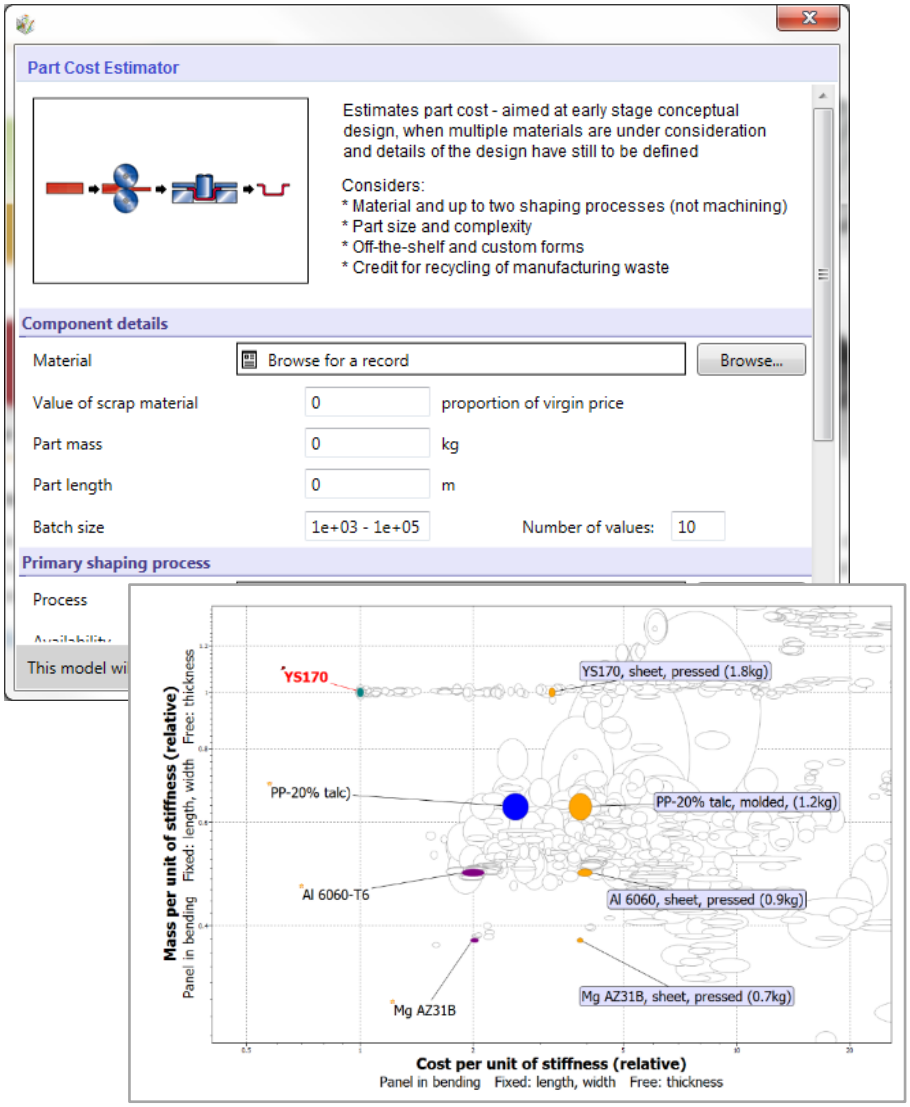


Part cost

Part cost determined by material & process chain

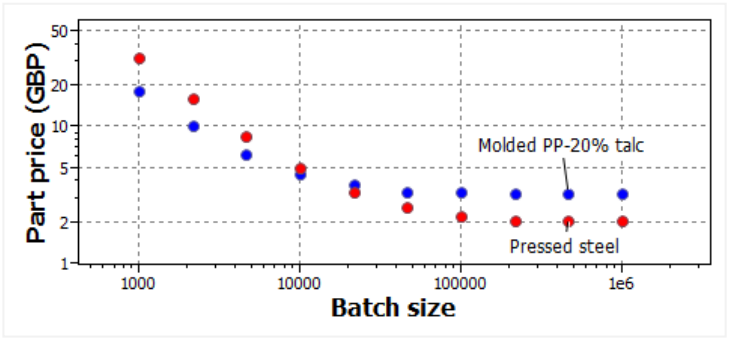


Part Cost Estimator

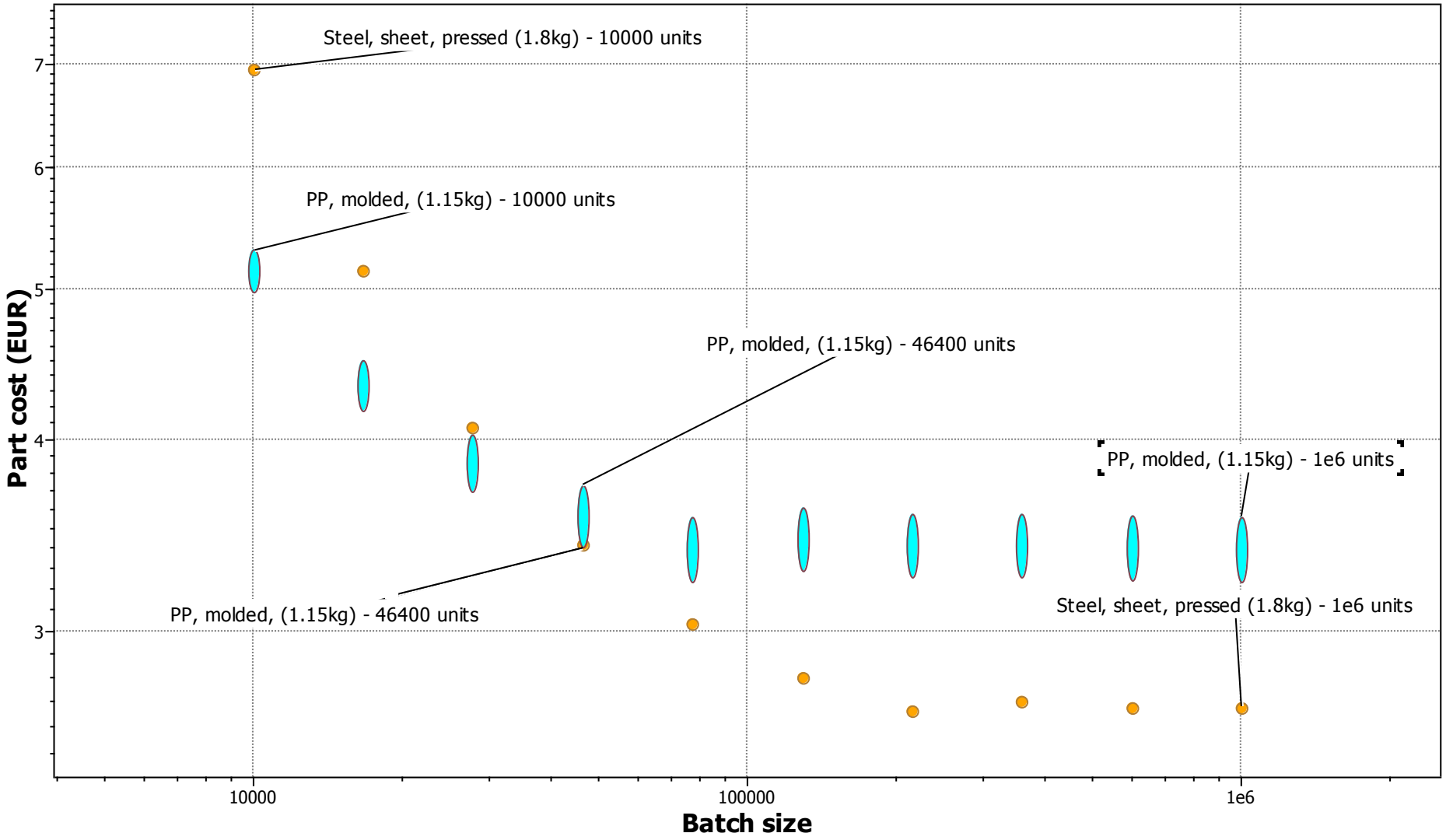


Tool for estimating part cost in the early stages of design!

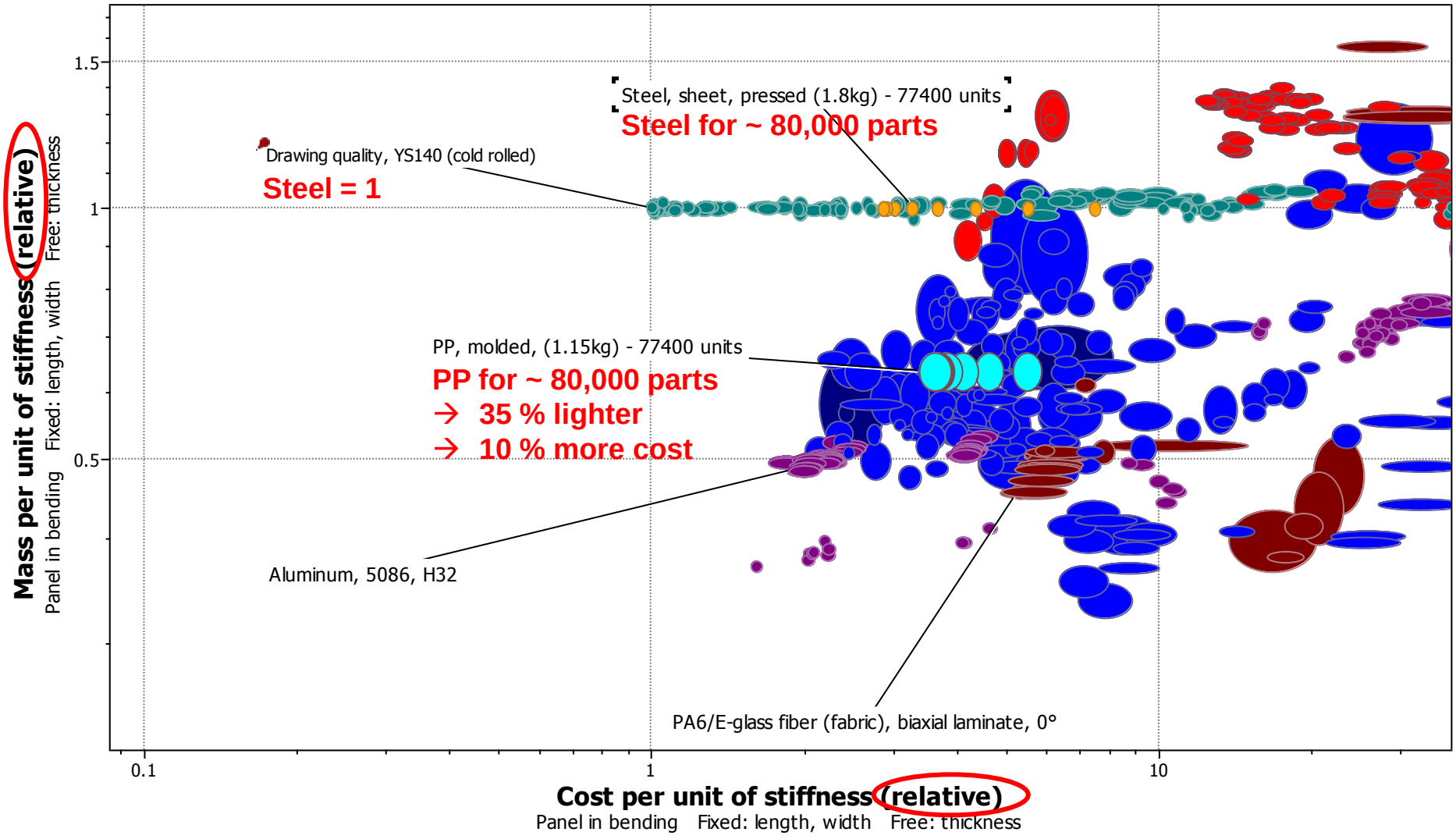
- **Considers**
  - Material & up to 2 shaping processes
  - Part size & complexity
  - Off-the-shelf & custom forms
  - Credit for recycling manufacturing waste
- **Requires minimal information on design**
- **Combines with selection & charting tools**



Part cost vs. batch size



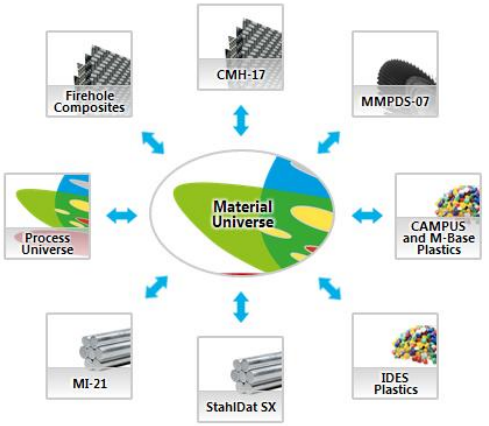
Part cost estimation - overview



Summary

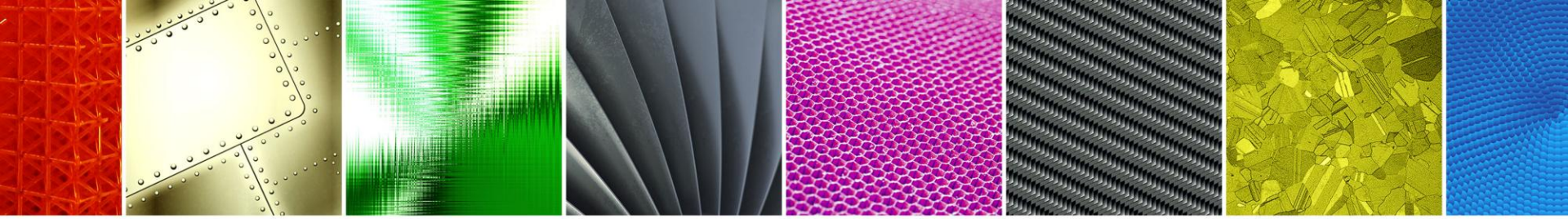
CES Selector

- Provides ready access to high quality materials data
- Tools for finding candidate materials
- **Part Cost Estimator**
  - Material + 2 shaping processes
  - Size of production run
  - Part size & complexity
  - Custom & off-the-shelf parts
  - Credit for recycling manufacturing waste



Benefits

- Focus development on the most appropriate materials
- Identify benefits and differences in performance
- Increase confidence in material choices
- Save time, effort, money



Vielen Dank für Ihre Aufmerksamkeit!

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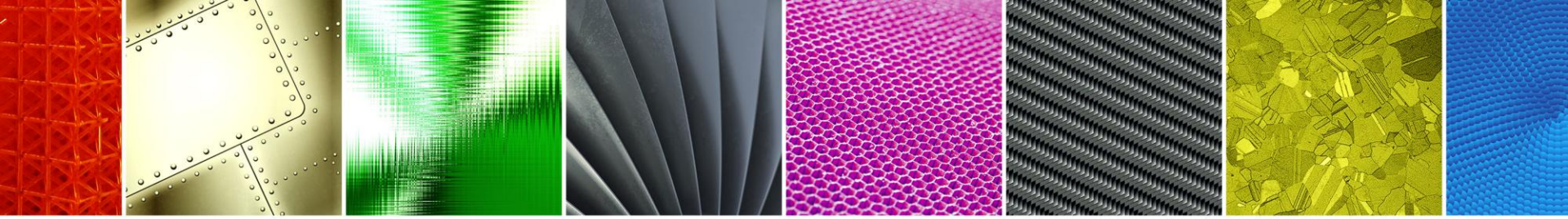

„Part Cost Estimation in Early Stages of Design“

Web-Seminar Recording:

https://www.youtube.com/watch?v=CqEbITT9BdY&feature=youtu.be

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