# What is expected from a Translator in a large company – examples and learnings

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# Focus of this talk

***Which aspects a modelling translator needs to address when introducing modeling into a project and what skills are needed***

The Modelling Translator in a large company is the person/team which develops and proposes/shows the value of a modeling route to support projects

Material modelling can play a role in:

1. Solving customer problems
2. Development and commercialization of new material.
3. Introduction of commercialized materials at Customers.

# Background on Dow

## MATERIALS SCIENCE DIVISION: INNOVATION THAT DRIVES COMMERCIAL VALUE

### BUILDING BLOCKS

Advanced Back-Integration

- Ethylene
- Propylene
- Silicones

### CAPABILITIES

World-Class Science and Engineering Capabilities

- High-Throughput Research
- Catalyst Discovery & Ligand Synthesis
- Polymer Science
- Materials Science
- Formulation Expertise
- Process Engineering
- High-Performance Computer Modeling
- Application Development
- Product Safety

### SOLUTIONS

Narrower, Deeper End-Market Presence



# Modeling capabilities

Range of material modeling expertise/resources within R&D:

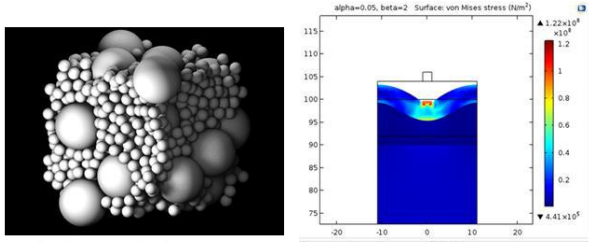
- Continuum modeling / FEA
- Material constitutive modeling
- CFD
- Structure-property modeling
- Discrete modeling

Leveraged from Corporate Research to the various business units

Globally connected Modeling Infrastructure: HPC, Software

**Cost of modeling is in effect the "loaded" cost of person's time.**

# Where material modeling is used

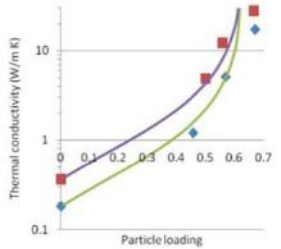


BEZRUKOV A. et al.: Spatial statistics for simulated packings of spheres. 2001

Support solving customers problems

Development new materials/formulations

Support Introduction Existing Materials

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# Types of Modeling – Types of Problems

| Customer Problems | New Material Dev. | Support Introduction Existing Materials |
|---|---|---|
| One-off type of modeling effort | One-off type of modeling effort | |
| | Digitalized Workflows | |
| | | Customer Apps |

# Support solving customer / internal clients problems:

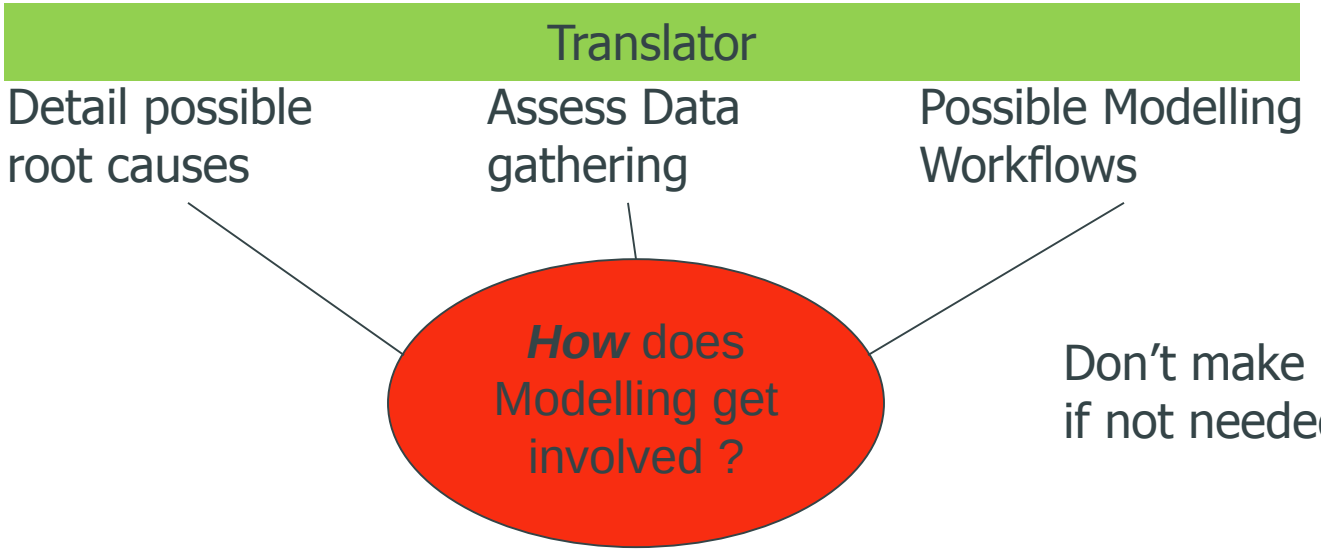
Many possible root causes
- Not solved through experimentation alone

High $ at stake

***When*** does Modelling get involved ?

Blistering of lightweight sandwich panels

# Support solving customer / internal clients problems:



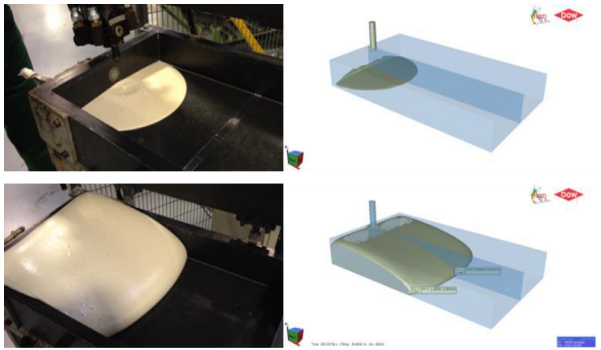

Don’t make it too complex if not needed

- Define a modeling scope/plan with milestones and risks, resources, timing
- Communicate the risks and limitations of the modeling approaches
- Cost of the modeling work assessed by the business versus the value it can/will bring

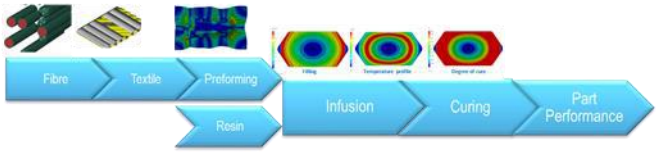
# Development new materials/formulations

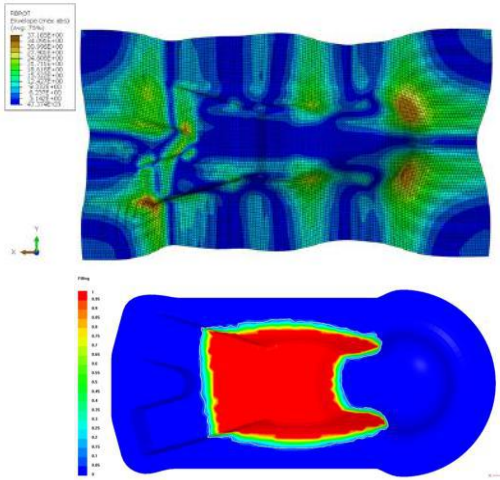
Material Modeling can be used for different aspects:

- Structure-Property modeling of new material/formulation
- How a new material/formulation can be processed by customers
- How the material performs in an application



# Development new materials/formulations




Internal translator needs to be able to communicate what modeling can bring

- Quantify Performance in end-application
- How Material Process
- Obtain digitalized workflow
- Gain Insights (IP)

Typically not so easy to obtain performance/advantage through experimentation alone:

- Want to do early developments without customer data in order to develop and protect technology (IP)
- Complex fabrication steps. Dow material is often only part of complex system

# Development new materials/formulations


Translator “Economic” Skills needed: **Assess the value**

Assess the Dow Technology vs Next Best Alternative:

- Quantify the advantages (e.g. vs benchmark).
- Understand the value chain.
  - Advantages to Formulator/Convertor/Tier 1 (e.g. processing advantages)
  - OEM benefits e.g. reduced weight, longer life, ….
  - End-User benefits (e.g. recyclability, fuel economy)
  - Closely work with marketing. Also understand how potential value to be captured
- Support the value proposition/ value capture of Technology
- Cost modeling -> support with data from modeling (e.g. cycle time)

# Development new materials/formulations


Translator “Economic” Skills needed:

- Assess the advantages in time-to-market: How can modeling help accelerate new developments/formulations:
  - Dow / Customer much faster to the right solution = time-to-market = $
  - Need to be able to go through the different scenario’s and work closely/integral with the product development team

Reduced cost for experiments (less trial and error) is important but more important how much more program/projects with same resources

# Development new materials/formulations


Translator needs to be able to

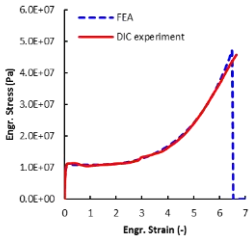
- Define a modeling scope/plan with milestones and risks, resources, timing
- Also communicate the risks and limitations of the modeling approaches -> don’t oversell what modeling can bring.
- Cost of the modeling work assessed by the business versus the value it can/will bring

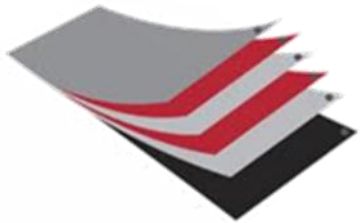
Specially the development of digitalized workflow is a capability build with high investments

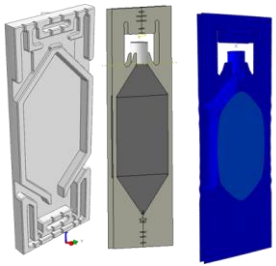
# Support Introduction Existing Materials

Building digitalized workflows to connect materials/material selection to end-customer part performance

Example : Flexible packaging

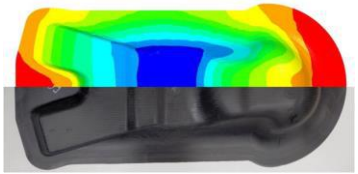


Translator need to define what is needed to build/run such capability.

# Support Introduction Existing Materials

Modeling provides the opportunity to be faster/less testing/trials vs. not using modeling

- Development of specific material modeling driven apps for customers to obtain answers on material characteristics
- Modeling to guide material selection and optimum use of Dow material in processing and in end-application

# Some examples – high level

E.g. developing a very fast cure epoxy formulation for high volume composites application:

Develop the material models which predict rheo-kinetics and use these models to predict the processing & performance of (typical/targeted) customer applications:  these will be used for overall benefits of the technology and value of the material to the customers/market.

- Cycle time benefits -> Investment/cost benefits at customer
- Performance benefits (e.g. lower weight of a part)
- Other benefits (e.g. ability to integrate more parts = cost benefit)

# Some examples – high level

E.g. developing a new foam formulation for acoustic/thermal insulation of appliances:

Foam modeling (both process modeling and structure-property modeling) followed by acoustic and thermal modeling of the foam in the (customer) application: Obtain through this modeling the benefits in terms of:

- Material usage needed to reach target performance
- Performance benefits (e.g. acoustic – reduced dB)
- Cycle-time benefits -> costs/investments
- Other benefits: e.g. improved EH&S, reduced packaging space (design freedom),….

# Some additional aspects for a Translator to consider

Modelling to steer experimental work / DOE’s

Develop IP from the insights gained

Novel modelling methodology/approach protected as a trade secret. Deliver material models to customers with non-analysis clause in encrypted in black-box.

In some markets: ability to model your technology is a requirement in order to sell, e.g. automotive  (cost of doing business)

# Finally some skills/traits for a Translator

- ✓ Well networked across different disciplines and functions
- ✓ Broad understanding of different experimental and/or modeling technologies and methodologies
- ✓ Good communication, negotiation and influencing skills, and ability to convey complex topics to a broader audience
- ✓ Ability to connect fundamental research with application development
- ✓ Basic financial acumen (value proposition concept, costing, NPV)
- ✓ More experienced (following most of the above)

# Thank you!