THERMOSET MATERIAL DATA CARDS AND PROCESS MODELING - GAME CHANGER FOR SMC MARKET

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OWENS CORNING AT A GLANCE

68 CONSECUTIVE YEARS AS A FORTUNE® 500 COMPANY

$9.8 BILLION IN SALES

*2022 REVENUE

19,000 EMPLOYEES PLUS 1 PINK PANTHER

31 COUNTRIES WHERE WE OPERATE

Serving residential, commercial, and industrial markets

INSULATION | ROOFING | COMPOSITES
REDUCING OUR ENVIRONMENTAL FOOTPRINT IS KEY

2021 energy savings

Initiated 29 energy-saving projects

Shrank energy use by 34,000+ megawatt hours

Reduced greenhouse gas emissions by over 8,000 metric tons

For more information: http://sustainability.owenscorning.com/
Welcome to the **PINK TANK™**

**A ONE-STOP SHOP**

for development of **customized solutions** to optimize the end product and bring future **material conversion** opportunities to life.
A COMPREHENSIVE RESOURCE

TEST
performance characteristics

MODEL
Produce using composite material

SHOW
cost/performance of the end part
SMC MARKET PAIN POINTS

- SMC is one of the leading materials for many composite markets (Transportation, Automotive, Sanitary ...)
- SMC is made up of TS resin, long chopped fibers, fillers & additives, all those ingredients interacts together during manufacturing
- During the compression molding process, SMC material will flow to fill the mold and shape the part
- The flow pattern dictates the fiber distribution and accordingly the final part performance
- For complex part shapes, our customers often experience high performance variability & part defects leading to not meeting the specs.
SMC MATERIAL DATA CARDS & PROCESS MODELING

Unique capability to develop full characterization

Start-to-finish modeling from material data cards to part design

Increased accuracy for predictive modeling

One of few labs globally
Saves time and money
SMC design applications
The PINKTANK™ team determines the **right process** using the **right product**. We test and quantify the outcome of the formulation to **substantially limit** the “guesswork”, saving **time** and **money**.

**Use of material data cards to determine**

- Low formula variability
- Optimized formulation (FW fraction)
- Tweaks for different applications (viscosity, reactivity, etc.)
- Root cause of quality concerns (mechanical, aesthetics, etc.)
- Target (medium) range of viscosity & reactivity for ideal balance

**Better understanding of material data card = better design of SMC**
VALUE FOR MOLDERS

The PINKTANK™ team determines the right process using the right product. We test and quantify the outcome of the formulation to optimize productivity and save money.

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<th>Use of material data cards to determine</th>
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<td>Part design</td>
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<td>Ideal Molding Parameters</td>
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Leverage fiber orientation & distribution obtained on micro-scale to understand localized part performance, identify weakness areas, and optimize design.
SMC TEST CASE

FLAT PANEL
Process modeling able to accurately predict filling pattern of SMC material within flat panel mold.
SMC FLAT PANEL TEST CASE

Predicting impact of fiber orientation on tensile properties within flat SMC panel.
COUPLED FEA SIMULATION

- Each coupon deforms differently based on its fiber orientation.
- Bending toward the outer edge where there is higher fiber alignment.
- Center coupon does no bend due to random fiber orientation.

Contours of Von Mises Stresses
COUPLED FEA SIMULATION

Good accuracy in predicting stress-strain curves at multiple coupon locations. Note that the experimental curve is an average of multiple curves.
COUPLED FEA SIMULATION

+90% accuracy in predicting SMC stiffness and strength by this modeling approach! This could not be achieved without the accurate Material Data Cards.
DESIGN AT THE SERVICE OF SMC
BETTER QUALITY. MORE BENEFITS. MORE OPPORTUNITIES.

• A boost in quality, part performance or cost optimization through design.

OPTIMIZING QUALITY

1. VARIABILITY
2. SCRAP RATE
3. CHARGE PLACEMENT
4. DESIGN

ACCELERATE R&D

1. MULTI-MATERIALS
2. NEW FEATURES
3. REDUCED TIME TO MARKET

ACCELERATE MATERIAL CONVERSION

1. MATERIALS SUBSTITUTION
2. REDUCED TRIALS
3. NEW MARKET SHARES

OPTIMIZING COST PERFORMANCE

1. SAFETY FACTOR
2. WEIGHT REDUCTION
3. COST REDUCTION

NEW FEATURES
REDUCED TIME TO MARKET
MULTI-MATERIALS
TIME TO MARKET

NEW MARKET SHARES
REMARKS
MARKET
MARKET
MARKET