



A Standardized Methodology for the Digimat MX Reverse Engineering Process

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Material Model Calibration Services

- Since 1995 -

DatapointLabs

expert material testing

∞ Scope

ü Over 200 physical properties

- Mechanical properties
- Thermal properties
- Flow properties

∞ Technical Heritage

ü Cornell University & C-Mold

- Cornell Injection Molding Program

∞ Expertise

ü *TestPaks* for CAE/ product development

- 25 CAE codes supported

ü >1,000 materials tested per year

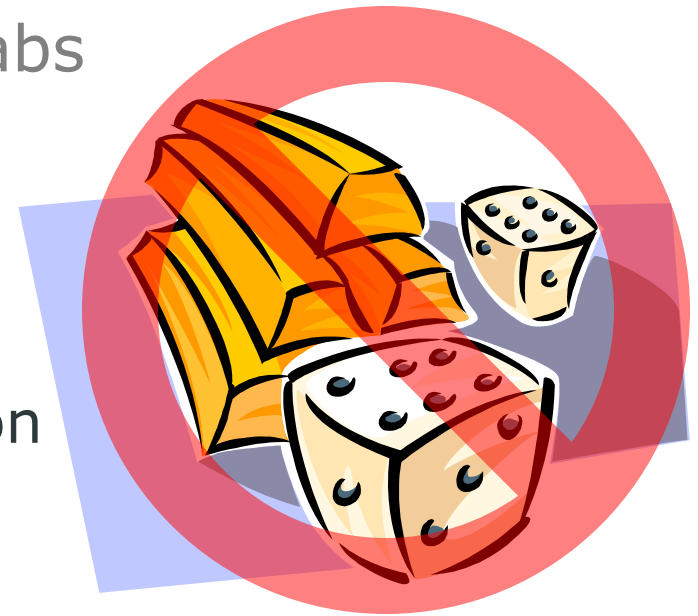
- Wide variety of materials

tensile
compressive
flexural
stress-strain
Poisson's ratio
high strain rate
bulk modulus
fatigue
visco-elasticity
stress relaxation
creep
friction
hyperelasticity
thermal expansion
thermal conductivity
specific heat
PVT
rheology

TestPaks[®] from DatapointLabs

∞ Material Testing
+
Material Parameter Conversion

- ü precise
- ü confidential
- ü fast & economic
- ü expert technical support



no gamble

available worldwide

Outline

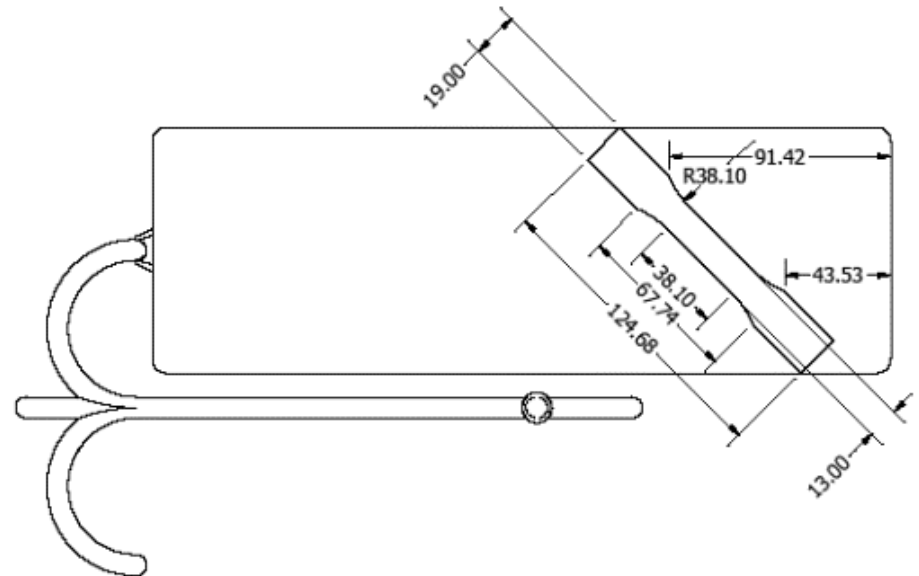
- ∞ 1. Standardized test methodology for DIGIMAT MX
 - ü Test plaque
 - ü Molding
 - ü Specimen profile
 - ü Machining procedure
 - ü Testing procedures
 - Quasi-static
 - Crash
 - Creep
 - Fatigue (under development)
- ∞ 2. Obtaining DIGIMAT data from Matereality databases
- ∞ 3. **NEW**- DIGIMAT MX reverse engineering service
 - e-Xstream + DatapointLabs joint cooperation

The DIGIMAT MX *TestPak* ...how it works

- ∞ Order your Digimat MX *TestPak* at datapointlabs.com
- ∞ Ship one 25kg bag of material
 - ü DHL pick-up service available
- ∞ One week for molding
- ∞ One week for testing
- ∞ DIGIMAT MX-ready data delivered via Internet
 - ü Pdf test report
 - ü Digital data to client material database at www.matereality.com

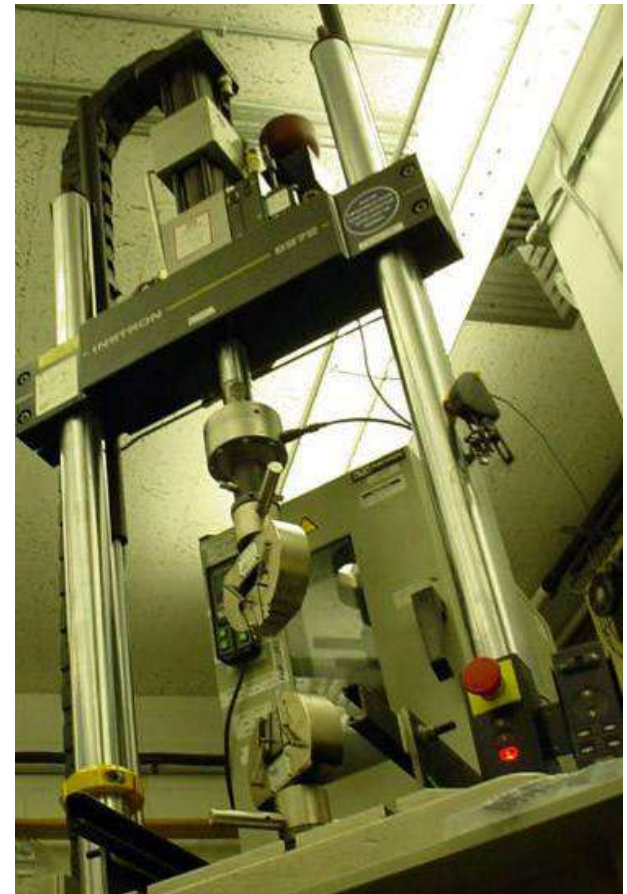
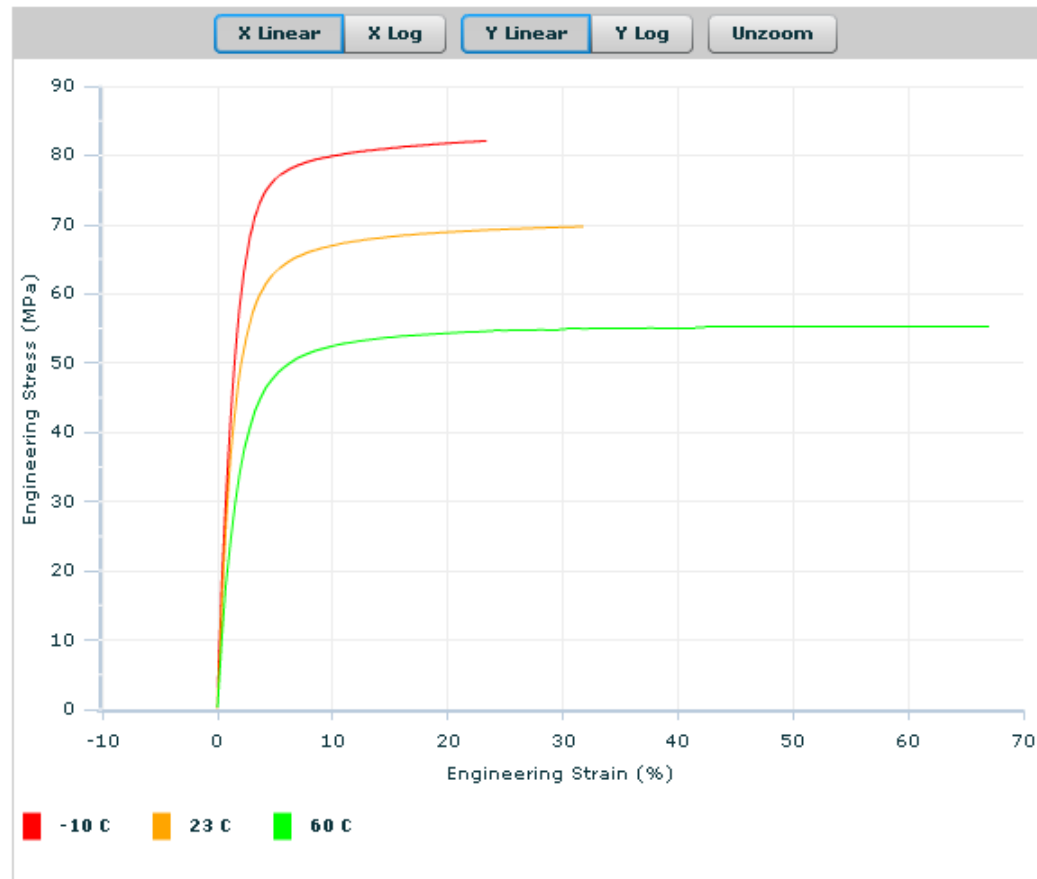
Basic DIGIMAT MX TestPak Protocol

- ∞ Mold 100X200X3.16mm plaques
 - ü Edge gated on 100 mm end
 - ü Long flow length
 - ü Fully developed flow
 - ü Highly fiber orientation
- ∞ Cut test specimens by CNC
- ∞ 5 specimens each (0° , 90° , other orientations...)
- ∞ Obtain true stress-strain data



Stress-strain data

Engineering Tensile Stress-Strain Curves



DIGIMAT MX *TestPak* outputs

- ∞ CAD drawings of plaque and specimens
- ∞ Plaque molding conditions
- ∞ True stress strain data (M-204) at 23°C
 - ü 0°, 90° orientation from plaque

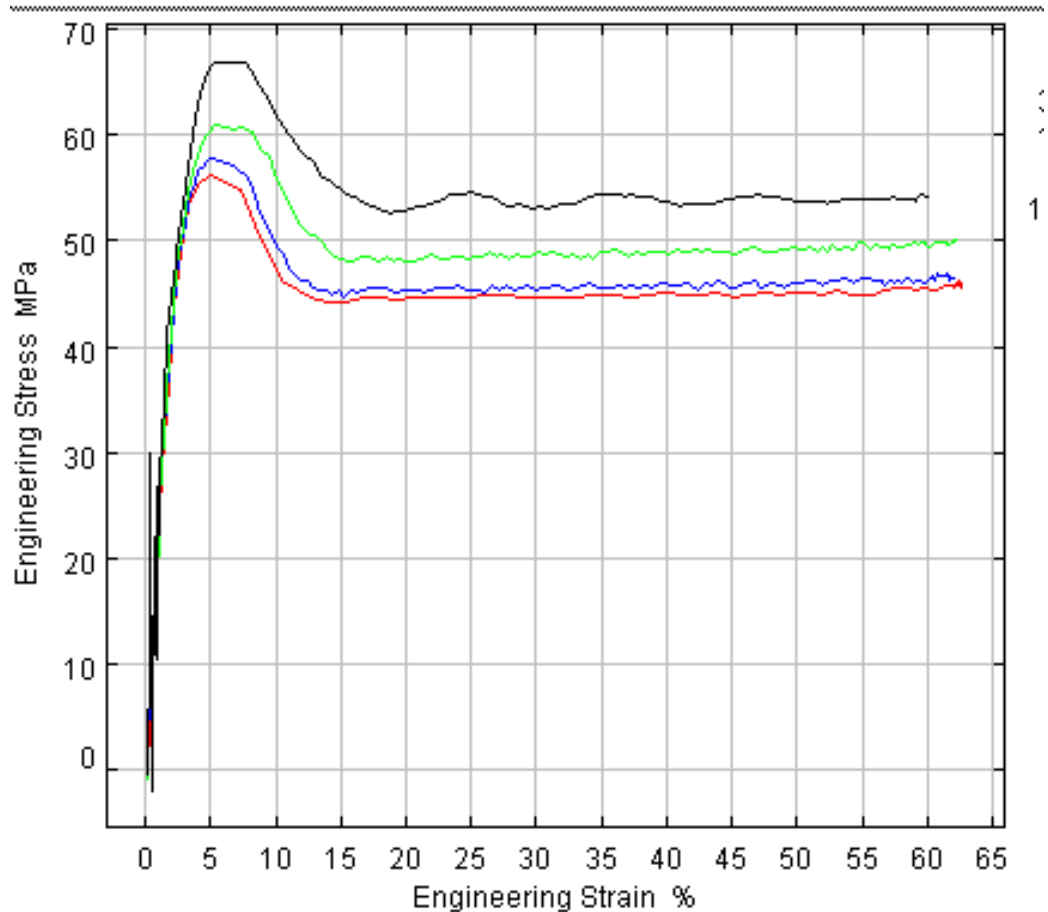
-
- ∞ Customer performs DIGIMAT MX Reverse Engineering
 - ü Data is ready for FEA

DIGIMAT *TestPak* options

- ∞ Additional directions (10°, 20°, 45°)
- ∞ Thermomechanical (from -40° to 150°C)
- ∞ Strain-rate dependent (0.01 to 100/s)
- ∞ 3 point bend data (quasi isotropy)
- ∞ Tensile bar data (coarse fit)
- ∞ Visco-elasticity
- ∞ Low cycle fatigue (Lemaitre-Chaboche)
- ∞ High cycle fatigue (under development)

Example: Crash properties for DIGIMAT

Engineering Tensile Stress-Strain Curves

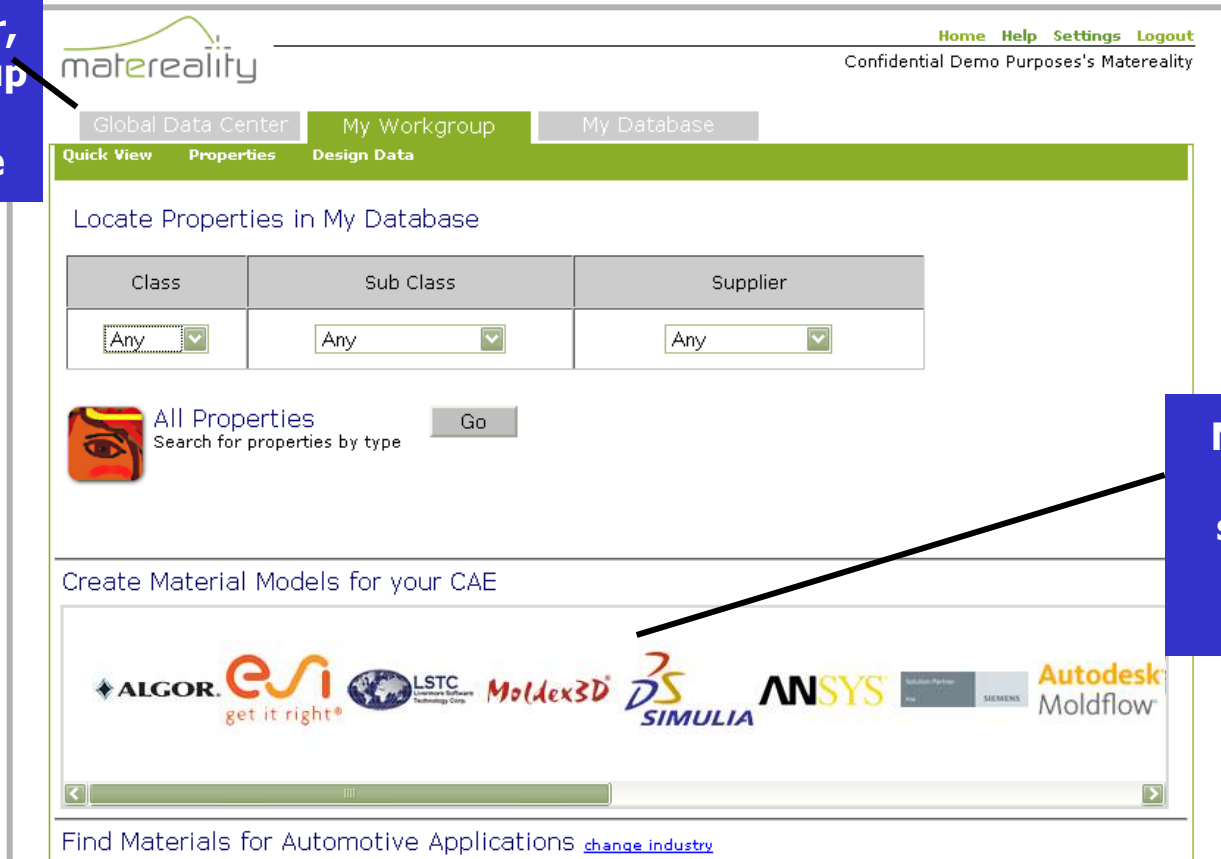




Part 2: DIGIMAT CAE Modeler

Procedure to locate and extract material data
from your Matereality database to DIGIMAT

You can extract data from the Global Data Center, company workgroup or your own material database



Home Help Settings Logout
Confidential Demo Purposes's Matereality

Global Data Center My Workgroup My Database

Quick View Properties Design Data

Locate Properties in My Database

Class	Sub Class	Supplier
Any	Any	Any

All Properties Search for properties by type

Create Material Models for your CAE

ALGOR. esi get it right® LSTC LS-DYNA Technology Corp. Moldex3D DS SIMULIA ANSYS Autodesk Moldflow

Find Materials for Automotive Applications [change industrv](#)

Next, Select the CAE software of interest: DIGIMAT

Start DIGIMAT CAE Modeler

The screenshot shows a web browser window with the URL `servertwo/dev/Digimat/CAESearch.aspx?CAE=Digimat`. The page features the Matereality logo and navigation links for Home, Help, Settings, and Logout. The main heading is "Locate Data for Digimat in the Global Data Center" with a "Tutorial" link. Below this is the section "Apply Material Constraints" which contains a table with three columns: "Class", "Sub Class", and "Supplier". Each column has a dropdown menu currently set to "Any".

Home Help Settings Logout
Confidential Demo Purposes's Matereality

Locate Data for Digimat in the Global Data Center

[Tutorial](#)

Apply Material Constraints

Class	Sub Class	Supplier
Any	Any	Any


Get [Plugins](#) for your software.

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View available DIGIMAT data

Note: Some MJRO wizard searches are highly restrictive to permit the necessary downstream data-processing. A failed search does not necessarily mean that the data you need is not within Matereality. More data may be found by doing a Property Search. Additional manual data processing may be needed to make it ready for your end-use application.

	Match 0	Match 1	Match 2
8539K13 NYLON 66	●	○	○
8580K182 ABS	●	○	○
8619K441 HDPE	●	○	○
8742K133	●	○	○
8742K133 PP	●	●	○
8752K111 LDPEWPE	●	●	●
9286K14-PTFE	●	○	○



Add additional required information

Bayblend FR 2010 - Digimat Calibration - Google Chrome

servertwo/dev/Digimat/Export/SelectExportFormat.aspx?rid=35_634516107354015777&orid=15_634516107144795688&STemplate

CAEmodeler Bayblend FR 2010 - Digimat Calibration

Material Raw Data CAE Model

Update

View Model

Download

Fillers

----- %

Calcium Carbonate %

Carbon Fiber %

Glass Bead %

Glass Fiber

Mica

Talc

Other

angle

flow

Typically orientations such as flow, long are 0°, while orientations such as x-flow, crossflow, etc. are 90°

Enter the filler type and the % content

Add orientation information

Bayblend FR 2010 - Digimat Calibration - Google Chrome

servertwo/dev/Digimat/Export/SelectExportFormat.aspx?rid=35_634516107354015777&orid=15_634516107144795688&STemplate

CAEmodeler Bayblend FR 2010 - Digimat Calibration

Material Raw Data CAE Model

Update

View Model

Download

Download

Click Download to send the material model file directly into your CAE

Enter the orientation angle of the data. eg. 0, 15, 30, 45 or 90

Download

Fillers

Glass Bead 5 %

----- %

----- %

Orientations

Orientation Label	angle
flow	0

Typically orientations such as flow, long are 0°, while orientations such as x-flow, crossflow, etc. are 90°

DIGIMAT-ready XML output

```
<MatML_Doc xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="http://www.matml.org/downloads/matml.xsd">
  <!-- MatML version 3.0 -->
  <Material>
    <BulkDetails>
      <Name>Bayblend FR 2010</Name>
      <Class>Plastic</Class>
      <Subclass>PC/ABS</Subclass>
      <Source>Bayer</Source>
    </BulkDetails>
    <PropertyData property="Tensile_Properties.Tensile_Modulus" technique="ISO_527-1.1993"
source="Confidential_Demo_Purposes" specimen="I18655">
      <Data format="float">2700000000</Data>
      <ParameterValue format="float" parameter="Tensile_Properties.test_temperature">296</ParameterValue>
      <ParameterValue format="string" parameter="Tensile_Properties.form">"ISO Type
1A"</ParameterValue>
      <ParameterValue format="string"
parameter="Tensile_Properties.specimen_orientation">"0"</ParameterValue>
      <ParameterValue format="float" parameter="Tensile_Properties.thickness">0.004</ParameterValue>
      <ParameterValue format="float" parameter="Tensile_Properties.width">0.01</ParameterValue>
    </PropertyData>
    <PropertyData property="Tensile_Properties.Tensile_Strength_at_Break" technique="ISO_527-1.1993"
source="Confidential_Demo_Purposes" specimen="I18655">
      <Data format="float">60000000</Data>
      <ParameterValue format="float" parameter="Tensile_Properties.test_temperature">296</ParameterValue>
      <ParameterValue format="string" parameter="Tensile_Properties.form">"ISO Type
1A"</ParameterValue>
      <ParameterValue format="string"
parameter="Tensile_Properties.specimen_orientation">"0"</ParameterValue>
      <ParameterValue format="float" parameter="Tensile_Properties.thickness">0.004</ParameterValue>
      <ParameterValue format="float" parameter="Tensile_Properties.width">0.01</ParameterValue>
    </PropertyData>
    <PropertyData property="Tensile_Properties.Engineering_Tensile_Stress-
Strain_Curves.Engineering_Stress" technique="ISO_527-1.1993" source="Confidential_Demo_Purposes">
```

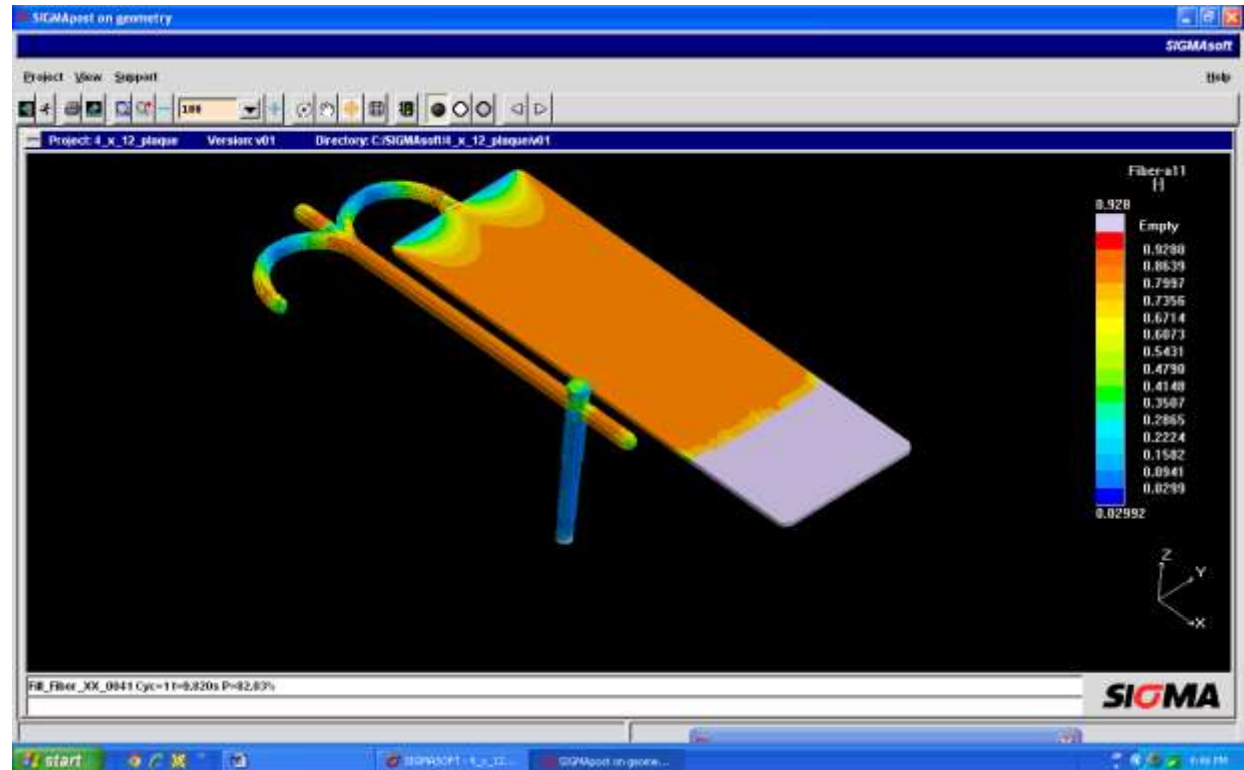
Part 3

NEW DIGIMAT MX Reverse Engineering Service

a e-Xstream + DatapointLabs joint cooperation

NEW DIGIMAT MX Reverse Engineering Service

- ∞ Testing performed at DatapointLabs
- ∞ DIGIMAT MX-ready data sent to e-Xstream for reverse engineering
- ∞ Simulation-ready data delivered to client



DIGIMAT Reverse Engineering

 Provided by Jan

Final outputs

 Provided by Jan

New Process with Reverse Engineering

- ∞ Order your Digimat *TestPak* at datapointlabs.com
- ∞ Ship one 25kg bag of material
 - ü DHL pick-up service
- ∞ One week for molding
- ∞ One week for testing
- ∞ One week for reverse engineering
- ∞ DIGIMAT ready data delivered via Internet
 - ü Pdf test report
 - ü Raw digital data to client material database at www.matereality.com
 - ü DIGIMAT-ready data file

THANK YOU FOR YOUR ATTENTION

ANY QUESTION?

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