

mat 

a world of materials

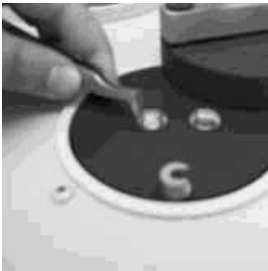
many products



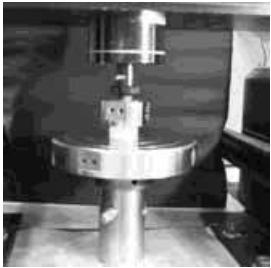
reality

each with its own reality

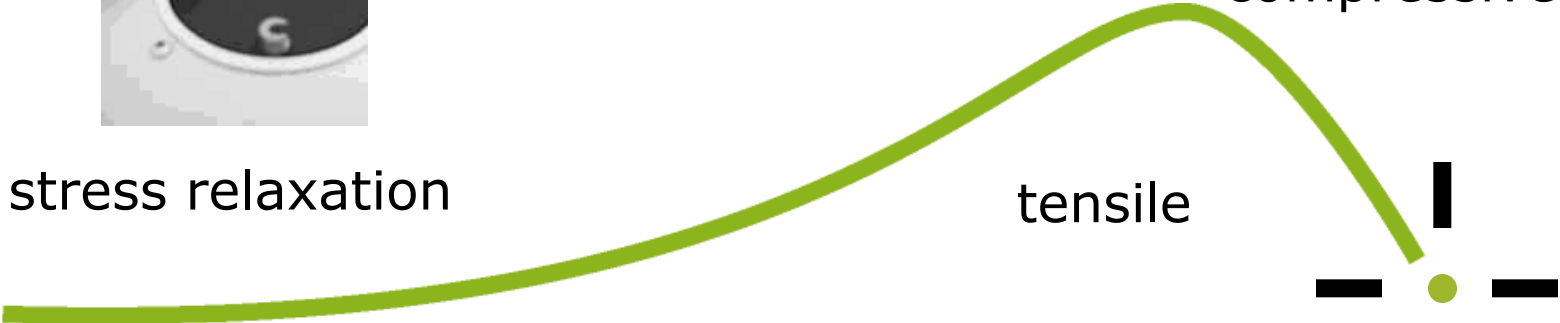
material data



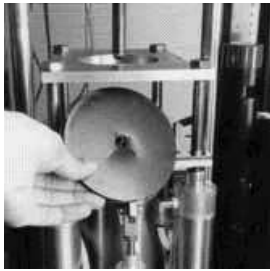
stress relaxation



compressive



viscosity



fatigue



conductivity



expansion

properties that describe reality

www.matereality.com
material databases for all



Material Databases that Serve Material Properties and Material Models

Hubert Lobo
President + CTO



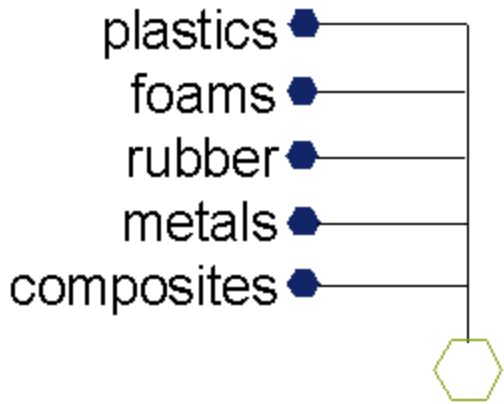
Matereality & DatapointLabs

- DatapointLabs est. 1995
 - Expert material testing
 - Mechanical, thermal, rheology properties
 - *TestPaks* for CAE
- Matereality est. 2002
 - Web material database company
 - Databases for suppliers, OEMs, Tier n..
 - Any material, any properties, one platform

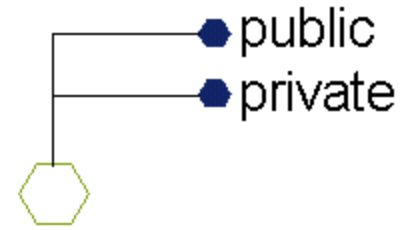
Purpose

- A Web Platform shared by
 - material supplier tech support engineers
 - Automotive end user design engineers
- Web Software (SAS) to
 - Locate and request data
 - Deliver design properties
 - Deliver material models for diverse CAE

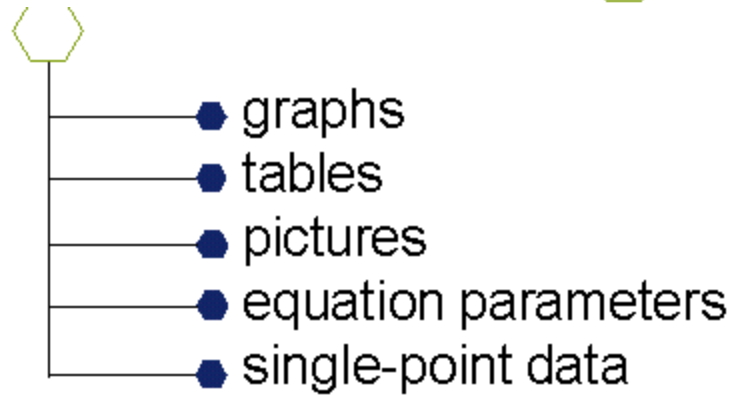
Matereality Databases



Global Data Center



- Complete
- Extensible
- Traceable
- Shareable
- Secure



no limits!

A variety of properties



Property Search

Class	Sub Class	Supplier
		Saint-Gobain

Material Properties Available

- Capillary Viscosity
- Charpy Impact
- Coefficient of Linear Thermal Expansion
- Compressive Creep
- Hardness
- Heat Deflection Temperature
- Instrumented Dart Impact
- Izod Impact
- Melt Elasticity
- Specific Heat
- Tensile Creep
- Tensile Properties
- Thermal Conductivity

All data is traceable

Data Certificate
 8586K162 > Tensile Properties

Technique	standards organization	ASTM
	standard number	ASTM D638-08
Sample Details	ID	15388
	sample source	client
Test Parameters	crosshead speed	5 mm/min
	extensometry	Axial - contact, 2" gage Class B-1
	gage length	50 mm
	laboratory humidity	51 %RH
	test temperature	-10 C
	test temperature	23 C
Specimen Details	test temperature	60 C
	conditioning	40 hours, 23C, 50%RH
	form	type I tensile bars
	other specimen preparation	machined plaque
	thickness	3.29 mm
Traceability	width	12.28 mm
	test laboratory	Datapoint Labs
	measurement date	8/6/2009
	accredited	Yes
	measurement instrument	Instron 8872 Servohydraulic UTM
	performed by	BL
certified by	BC	



Global Collaboration

UHMWPE Semi-transparent > Dynamic Mechanical Properties in Tension

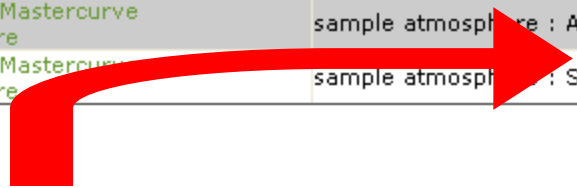
Click on the property titles below to view data

Summarized Results

aT v. Temperature	Effect of sample atmo
Modulus v. Time Mastercurve	Effect of sample atmo

Individual Results

Modulus v. Time Mastercurve	sample atmosphere : Air
aT v. Temperature	sample atmosphere : Air
Modulus v. Time Mastercurve	sample atmosphere : S
aT v. Temperature	sample atmosphere : S



Share | Modify Access | Request Review | Discard | Tr

Share this Material Data

Part # 8539K13 > Tensile Properties

Email Address :
use comma-delimiters for more than one recipient

Subject:

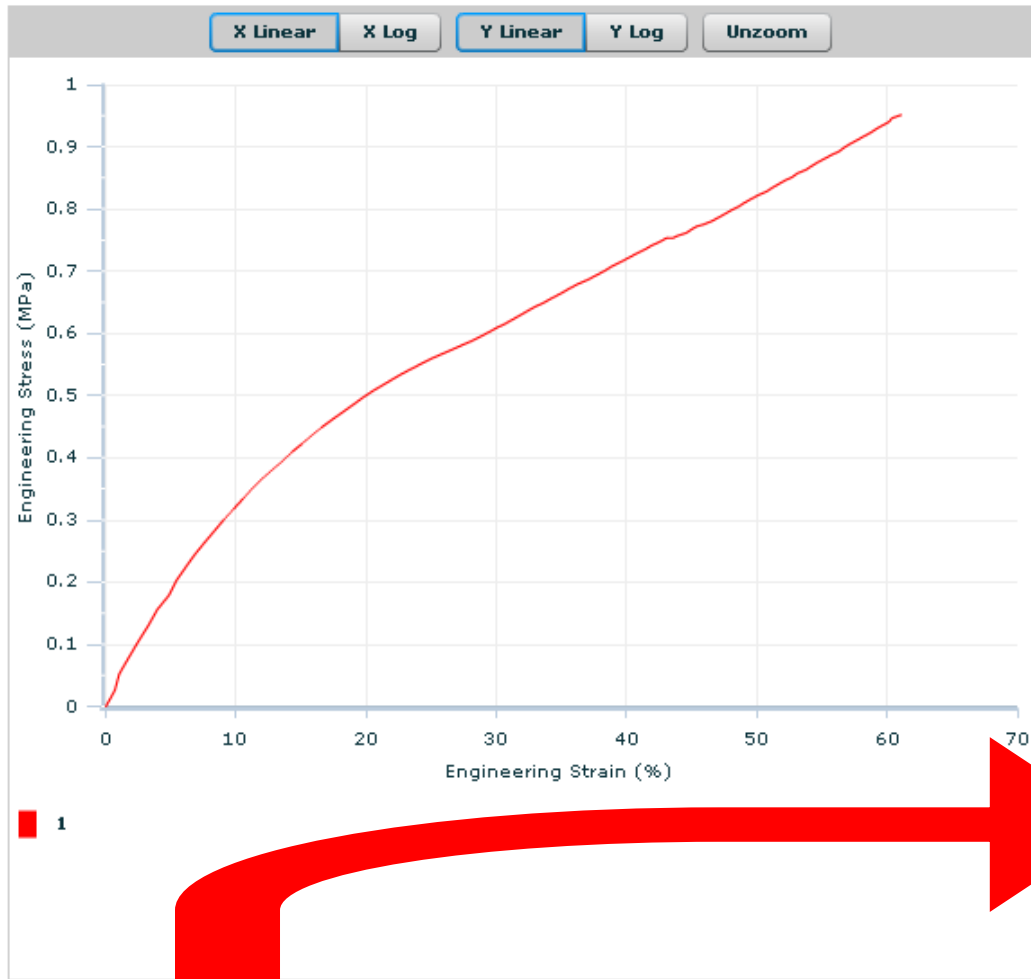
Message:

Here are the tensile properties you need.

Grant recipient(s) access to this data (if recipient is a Matereality user)

The recipient will receive this link by e-mail. If they have access to Matereality, and you have given permission, they will be taken directly to this data. If they do not have a login, they will be invited to create one so that they can view this data.

Direct export to Excel



Address <http://my.matereality.com/Export/Export.aspx?rid=25>

A1		= Material Name			
	A	B	C	D	E
1	Material Name	LATEX 40 Durometer			
2	Property Name	Biaxial Tensile Properties			
3	Parameter Name	form	cruciform specimen		
4	Parameter Name	condition	40 hours, 23C, 50%RH		
5	Parameter Name	other prep	cut from sheet		
6	Parameter Name	width	75		
7	Parameter Name	thickness	1.505		
8	Parameter Name	test temp	23		
9	Parameter Name	laboratory	47		
10	Parameter Name	crosshead	500		
11	Result Name	Engineering Biaxial Stress-Strain Curves			
12	Representative				
13	Engineering %	Engineering Stress			
14		MPa			
15					
16	0.05516	0.00017			
17	0.738	0.026532			
18	1.076157	0.052895			
19	1.827673	0.079359			
20	2.589937	0.10551			
21	3.351755	0.130915			
22	3.982366	0.155478			
23	4.905298	0.17912			
24	5.434129	0.202341			
25	6.172769	0.223984			
26	6.851641	0.244124			
27	7.629852	0.26364			
28	8.391452	0.282573			
29	9.098547	0.300537			
30	9.847187	0.317565			
31	10.58415	0.334547			
32	11.2897	0.350211			
33	12.02754	0.365961			
34	12.84748	0.38127			

Export.aspx?rid=25_634068587630/

CAE Model Creation Process

- Locate raw data specific to a simulation
- Present raw data for inspection
 - Quality check
 - Traceability check
- Convert raw data to material model
- Model tuning
- Output material card

Search engine locates data

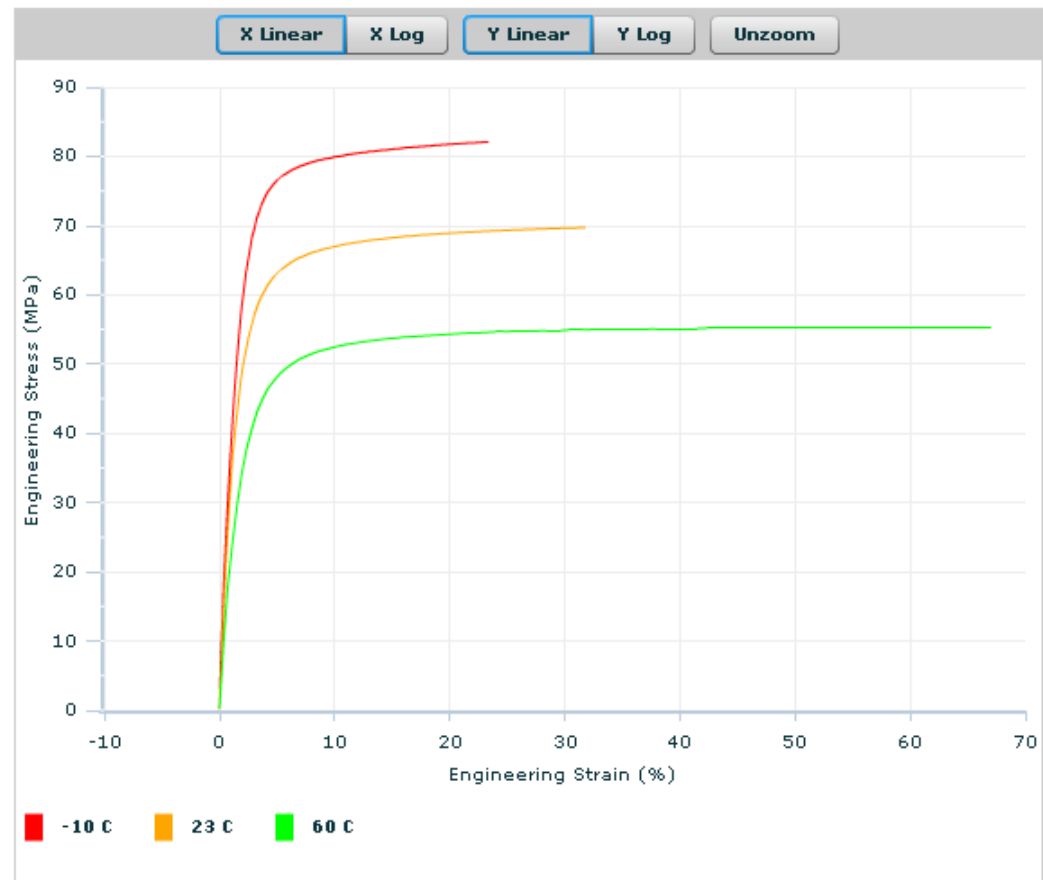


The screenshot shows the Matereality website interface. At the top left is the Matereality logo. A navigation bar contains links for Home, Help, and Logout, and a note: Confidential Demo Purposes's Matereality. A breadcrumb trail reads Home > Search > Select > MIROResult. On the left sidebar, there are links for my account, my data, data center, my users, and contact us, each with a hexagonal icon. The main content area features a red and orange icon of an eye, followed by the text CAE Wizard: ANSYS MISO. Below this is a note: Note: Some MIRO 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. A comparison table follows with two columns: Match 0 and Match 1. The table lists four materials: ABS #8586K162, Delrin 8753K13, HDPE #8619K441, and Makrolon 7435. Match 0 has green dots for all four, while Match 1 has hexagonal icons for all four.

	Match 0	Match 1
ABS #8586K162	●	⬡
Delrin 8753K13	●	⬡
HDPE #8619K441	●	⬡
Makrolon 7435	●	⬡

Raw data from testing

Engineering Tensile Stress-Strain Curves

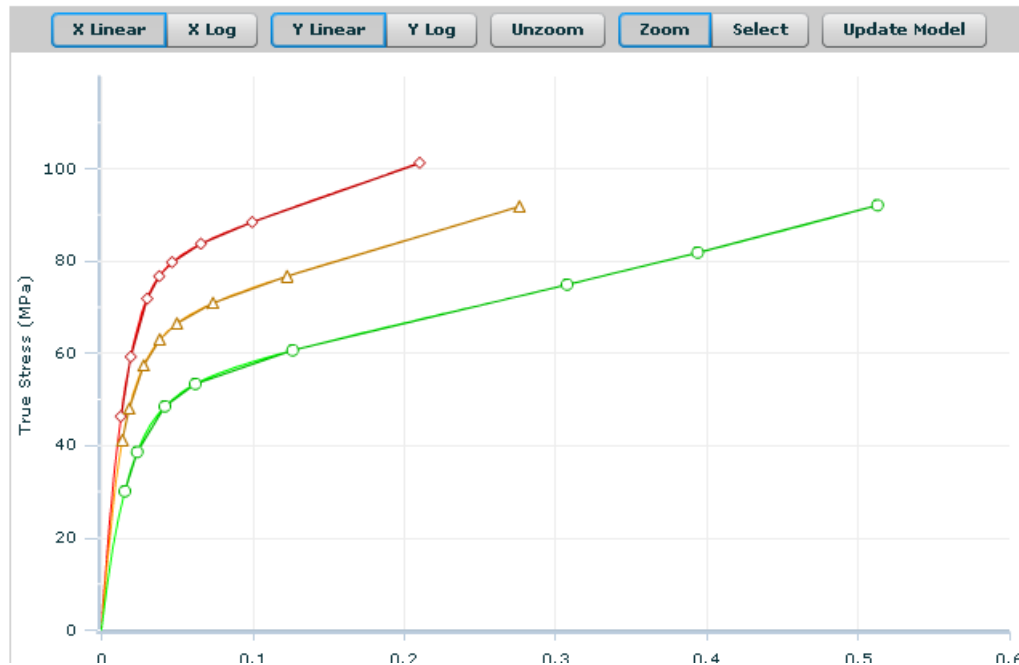


Post-processing and output

*Elastic

Temperature (C)	Modulus (MPa)	Poisson's Ratio
-10	3607.59123689013	0.2413
23	3183.7938807461	0.323571664399527
60	2174.59568965032	0.39415

*Plastic Plot



```
** Output generated by Matereality
** Abaqus Plastic Model
*MATERIAL, name=Delrin8753K13
*ELASTIC
3607.59123689013, 0.2413, -10
3183.7938807461, 0.323571664399527, 23
2174.59568965032, 0.39415, 60
****
*PLASTIC
46.381708640637, 0,-1.000E+01
59.3182190072696, 0.0028490427305577354,-1.000E+01
71.8736400512504, 0.01017006174294555,-1.000E+01
76.7156702762688, 0.016802750802138691,-1.000E+01
79.8204244473178, 0.0246331420035193,-1.000E+01
83.7520014704219, 0.042400203020399568,-1.000E+01
88.44580120706, 0.07511425176203515,-1.000E+01
101.286187380666, 0.18221125102592156,-1.000E+01
**
41.2027474277636, 0,2.300E+01
48.0138087197766, 0.0021790259049776321,2.300E+01
57.359137021248, 0.00867790936047107,2.300E+01
62.9873556601982, 0.017373626682723388,2.300E+01
66.4967793306663, 0.027568865979447788,2.300E+01
70.9009392980115, 0.05004465060490744,2.300E+01
76.72575710626, 0.096883146480115784,2.300E+01
91.876816291205, 0.24545717623947155,2.300E+01
**
30.11774647629, 0,6.000E+01
38.66825030697, 0.0039035831184979289,6.000E+01
48.5300393483556, 0.017108653508792655,6.000E+01
53.3730143012474, 0.03494428420354867,6.000E+01
60.661535633334, 0.095585277502911209,6.000E+01
74.9317547325, 0.26978649975467672,6.000E+01
81.885009651224, 0.35258702479111464,6.000E+01
92.151413540012, 0.46612695216059519,6.000E+01
**
```


Rubber materials

The screenshot shows the Matereality website interface. At the top left is the Matereality logo. A navigation bar contains links for Home, Help, and Logout, and a note about Confidential Demo Purposes's Matereality. A left sidebar lists user account options: my account, my data, data center, my users, and contact us. The main content area features a breadcrumb trail: Home > Search > Select > MIROResult > MIROSummary. The title is 'SILICONE>NASTRAN MATHP Data'. Below the title is a text instruction: 'Raw data is summarized below. Click on the property titles to view details.' A table titled 'Hyperelastic Properties' contains three rows of data. At the bottom center is an 'Export' button.

my account ○

my data ○

data center ○

my users ○

contact us ○

[Home](#) | [Help](#) | [Logout](#) Confidential Demo Purposes's Matereality

[Home](#) > [Search](#) > [Select](#) > [MIROResult](#) > [MIROSummary](#)

SILICONE>NASTRAN MATHP Data

Raw data is summarized below. Click on the property titles to view details.

Hyperelastic Properties

Engineering Stress-Strain Curves		test mode : Tensile
Engineering Stress-Strain Curves		test mode : Biaxial Tensile Properties
Engineering Stress-Strain Curves		test mode : Planar

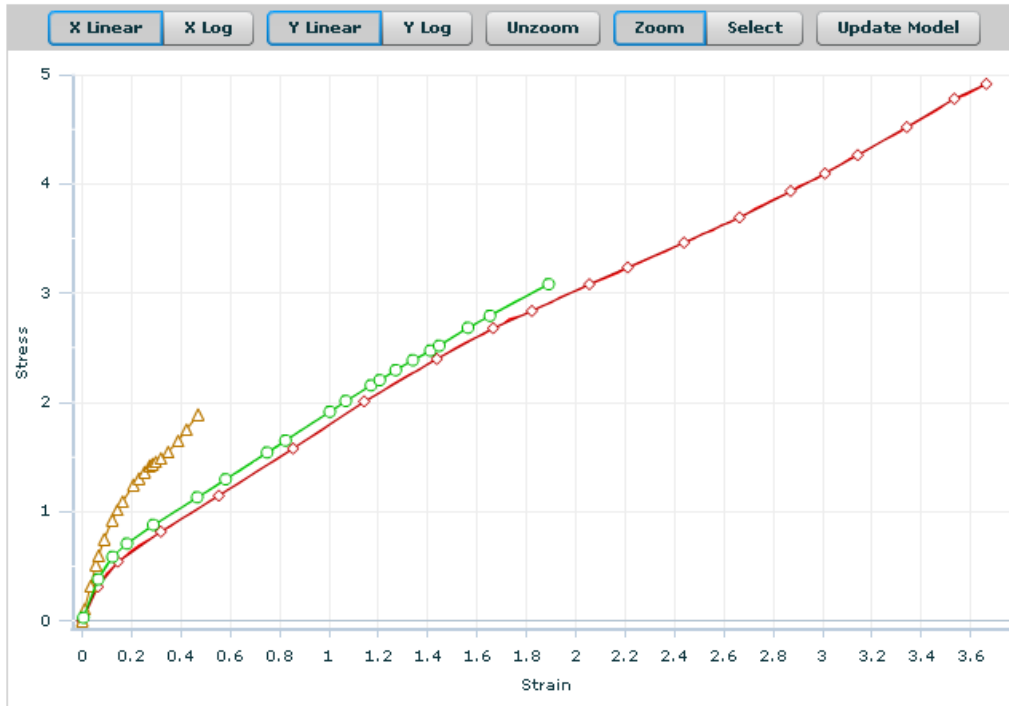
[Export](#)

Hyper-elastic model output

SILICONE>Nastran MATHP

Nastran MATHP
MID RHO AV TREF GE NA ND

TEST DATA



```
! Materiality Download
! Material Information
! Name: SILICONE
! Class: Rubber
! Subclass: Silicone Rubber
! Manufacturer: McMaster Carr
! SampleID: 11673
! SampleSource: client
! BEGIN MATHP (Hyperelastic Material Properties)
!
! MATHP, MID, A10, AD1, D1, RHO, AV, TREF, GE, [+
! [+], [], NA, ND, [], [], [], [], [+
! [+], A20, A11, A02, D2, [], [], [], [+
! [+], A30, A21, A12, A03, D3, [], [], [+
! [+], A40, A31, A22, A13, A04, D4, [], [+
! [+], A50, A41, A32, A23, A14, A05, D5, [], [+
! [+], TAB1, TAB2, TAB3, TAB4, [], [], TABD, []
!
! Uses TAB1-4 To calculate Aij comp: D1
!
MATHP,1,,,,,1.0E0,,,+
+,,3.0E0,3.0E0,,,,,+
+,,,,,+
+,,,,,+
+,,,,,+
+,,,,,+
+,1301,1302,,1304,,,
!
! BEGIN Uniaxial Test Data (Simple Compression/Tension)
TABLES1,1301,,,,,+
+,1.1362E-4,1.78E-3,6.3601E-2,3.1231E-1,1.4471E-1,5.4138E-1,3.1899E-1,8.1615E-1,+
+,5.5398E-1,1.1472E0,8.543E-1,1.577E0,1.1434E0,2.0085E0,1.4366E0,3.3983E0,+
+,1.6661E0,2.6811E0,1.8222E0,2.8377E0,2.0562E0,3.0832E0,2.2115E0,3.2348E0,+
+,2.4307E0,3.4646E0,2.6633E0,3.694E0,2.872E0,3.9331E0,3.01E0,4.0964E0,+
+,3.1435E0,4.2639E0,3.3418E0,4.5219E0,3.5349E0,4.78E0,3.6647E0,4.9142E0,+
```

Injection-molding data

CALIBRE* 3031>Moldflow Data

Raw data is summarized below. Click on the property titles to view details.

Thermal Conductivity

Thermal Conductivity v. Temperature		
-------------------------------------	--	--

No-Flow Temperature

No-Flow Temperature	188 C	
---------------------	-------	--

Specific Heat

Specific Heat v. Temperature Data		
Transition End	131 C	
Transition Onset	141 C	
Transition Temperature	137 C	

Pressure-Volume-Temperature

Solid Density	1189.3 kg/m3	pressure : 0 MPa
Two Domain Tait Model		

Capillary Viscosity

Cross/WLF Model		
-----------------	--	--



File Download

Do you want to save this file?

Name: ...realityExport632963425476464883[1].21000.udb
Type: Unknown File Type, 1.29 KB
From: servertwo

click the "Save button" →

Save Cancel

While files from the Internet can be useful, some files can potentially harm your computer. If you do not trust the source, do not save this file. [What's the risk?](#)

Mechanical properties

Mechanical properties in the fields below

Elastic modulus, 1st principal direction (E1) [Pa]

Elastic modulus, 2nd principal direction (E2) [Pa]

Poissons ratio (v12)

Poissons ratio (v23)

Shear modulus (G12) [Pa]

High-strain rate tensile data

Makrolon 7435>LS-DYNA MAT_024 Data

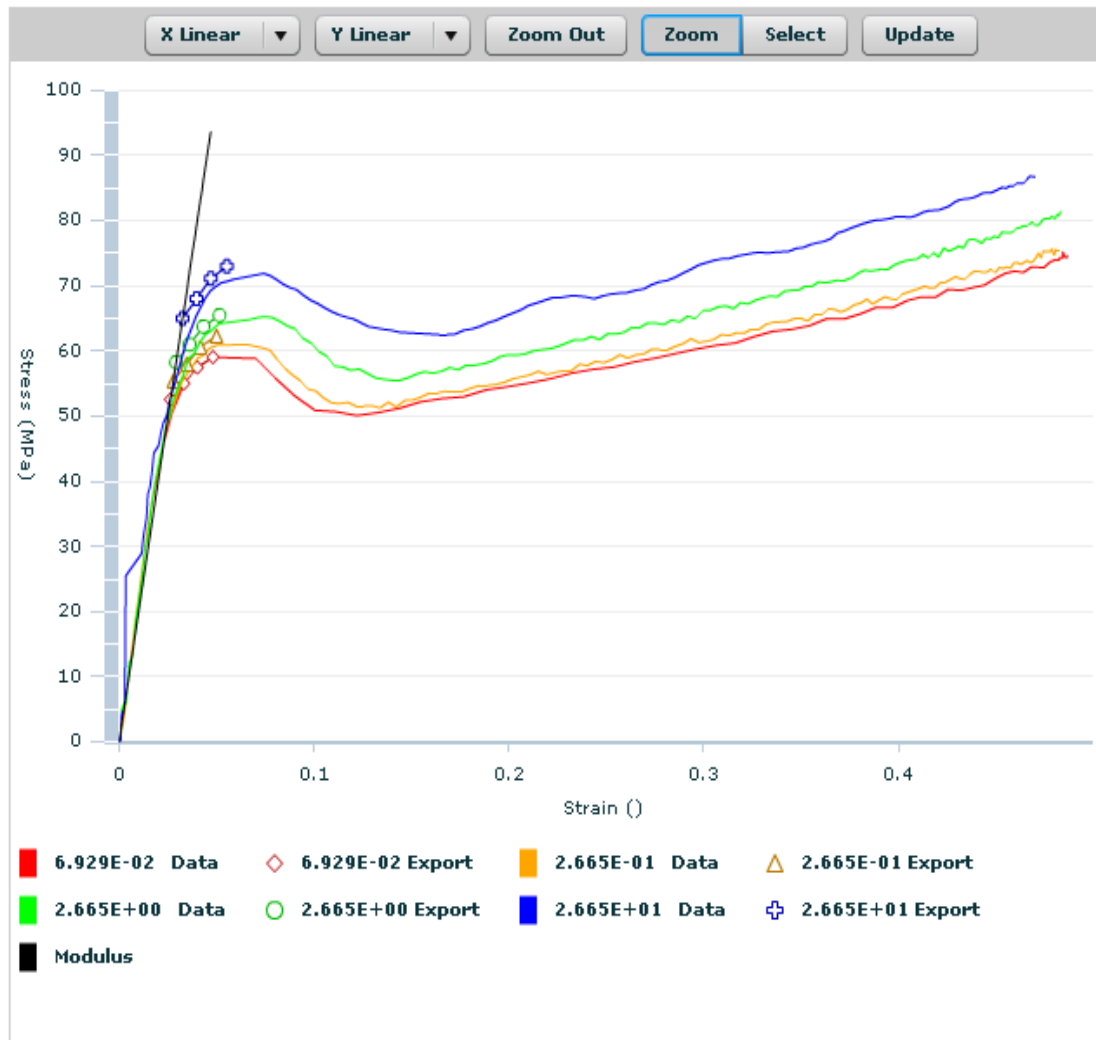
Raw data is summarized below. Click on the property titles to view details.

Tensile Properties

Engineering Tensile Stress-Strain Curves		strain rate : 0.0692899615250087 /s
Engineering Tensile Stress-Strain Curves		strain rate : 0.266526757607555 /s
Engineering Tensile Stress-Strain Curves		strain rate : 2.66526757607555 /s
Engineering Tensile Stress-Strain Curves		strain rate : 26.6526757607555 /s
Eyring Plot		
Eyring Plot		
Poissons Ratio	0.4	strain rate : 0.0692899615250087 /s
Tensile Modulus	1992 MPa	strain rate : 0.0692899615250087 /s
Tensile Modulus	2171 MPa	strain rate : 0.266526757607555 /s
Tensile Modulus	2148 MPa	strain rate : 2.66526757607555 /s
Tensile Modulus	2417 MPa	strain rate : 26.6526757607555 /s

Export

MAT 24 automated data fit



Rate dependency tuning

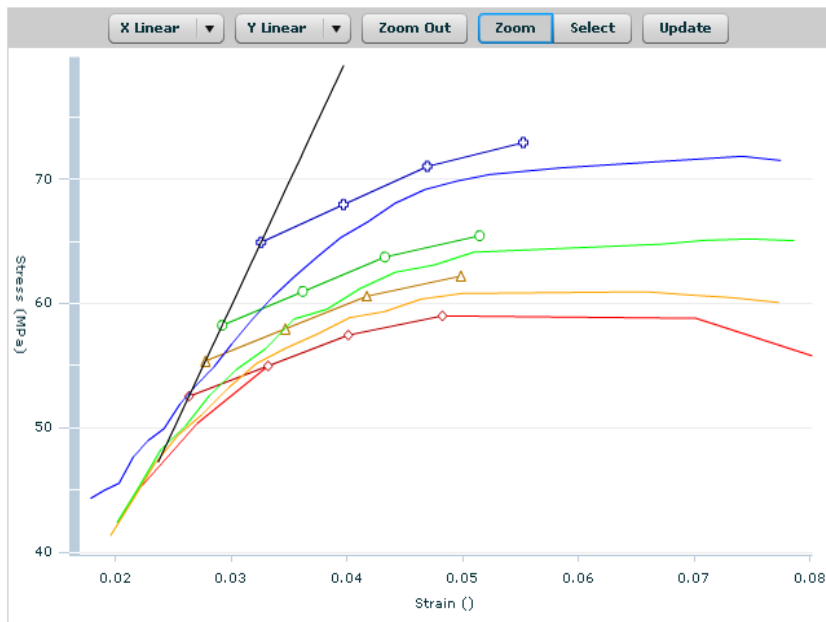
LCSR

Strain Rate (/s)	Stress Ratio
0.06929	1
0.2665	1.0545454545454545
2.665	1.1090909090909091
26.65	1.2363636363636363

LCSR

Strain Rate (/s)	Stress Ratio
0.06929	1
0.2665	1.0305054545454546
2.665	1.081002509090909
26.65	1.2063636363636363

lcsr

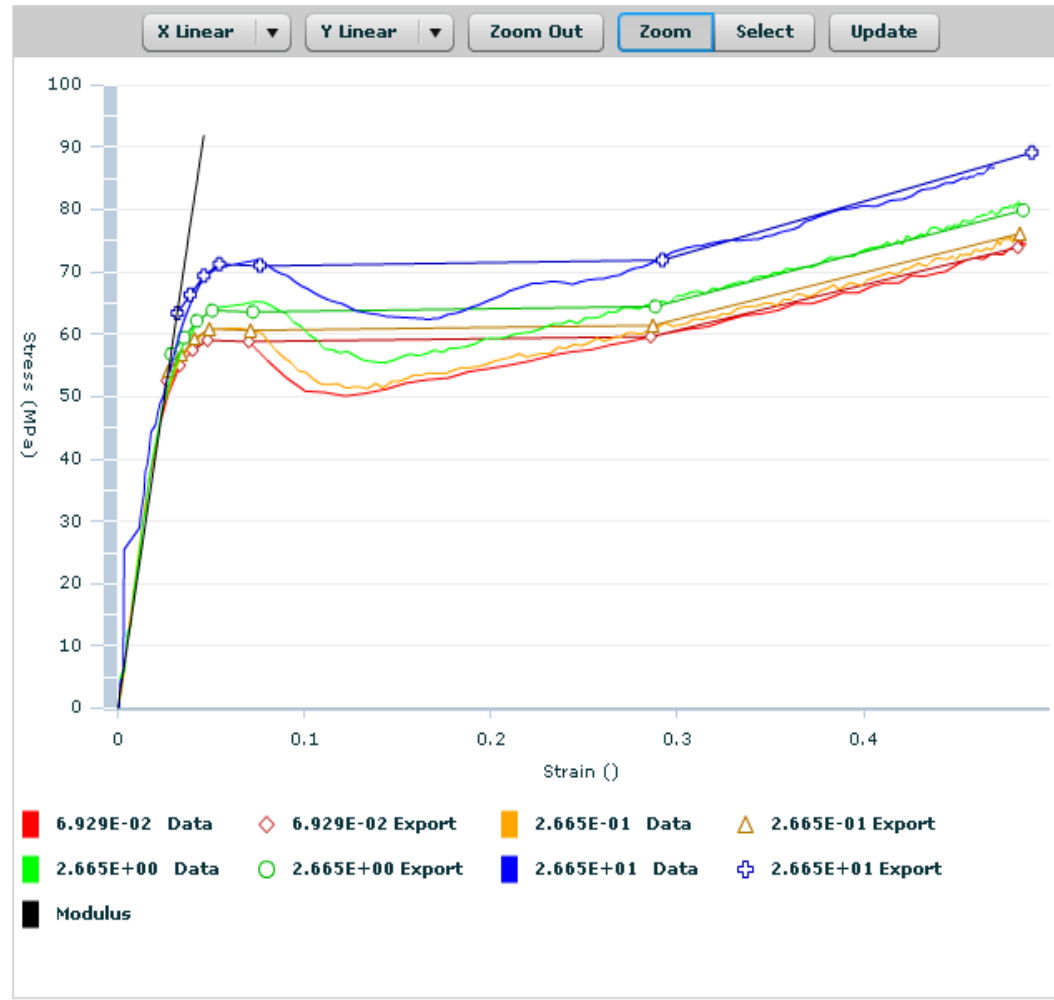


lcsr



Modeling post-yield & failure

lcsr



Writing the .dyn file

Ls-Dyna MAT_024 (LCSR)

LS-DYNA MAT_024

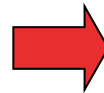
mid	ro	e MPa	pr	sigy	etan	fail	tdel
10025	1e9	1991.836425	0.4	51		73	

c	p	lcss	lcsr	vp

LCSR

Strain Rate (/s)	Stress Ratio
0.06929	1
0.2665	1.0305054545454546
2.665	1.081002509090909
26.65	1.2063636363636363

lcsr



```
*MAT_024
$# mid ro e pr sigy etan fail tdel
10025 1.0E+09 1.992E+03 4.0E-01 5.1E+01 0.0E+00 7.3E+01 0.0E+00
$# c p lcss lcsr vp
1002 0.0E+00
$# eps
5.608E-03 1.131E-02 1.864E-02 4.065E-02 2.561E-01 4.458E-01
$# es
5.497E+01 5.746E+01 5.901E+01 5.882E+01 5.958E+01 7.387E+01
*DEFINE_CURVE_TITLE
lcsr
$# lcid sidr sfa sfo offa offo
1002 0 1.0E+00 1.0E+00 0.0E+00 0.0E+00
$# A1 O1
6.929E-02 1.0E+00
2.665E-01 1.031E+00
2.665E+00 1.081E+00
2.665E+01 1.206E+00
```


Supported Software

Matereality
Partners

 **ABAQUS**

 **ALGOR.**

 **ANSYS**

 **Moldex3D**

 **Moldflow**
plastics made smarter

 **UGS**
Transforming the
process of innovation

- ABAQUS
- ANSYS
- Autodesk Algor
- Autodesk Moldflow
- LS-DYNA
- Moldex3D
- Matlab
- PAM-CRASH
- NX Nastran

 matereality

Conclusion

- Web-Platform to store any material data
- Web-Software to convert data to
 - Elastic-Plastic cards for plastics
 - Crash material cards for CAE
 - Hyperelastic cards for rubber materials
 - Injection-molding simulation inputs
 - NASTRAN input decks
- Many CAE software supported