



Ultrasonic Technology in the 21st Century

What's New in Booth 624?

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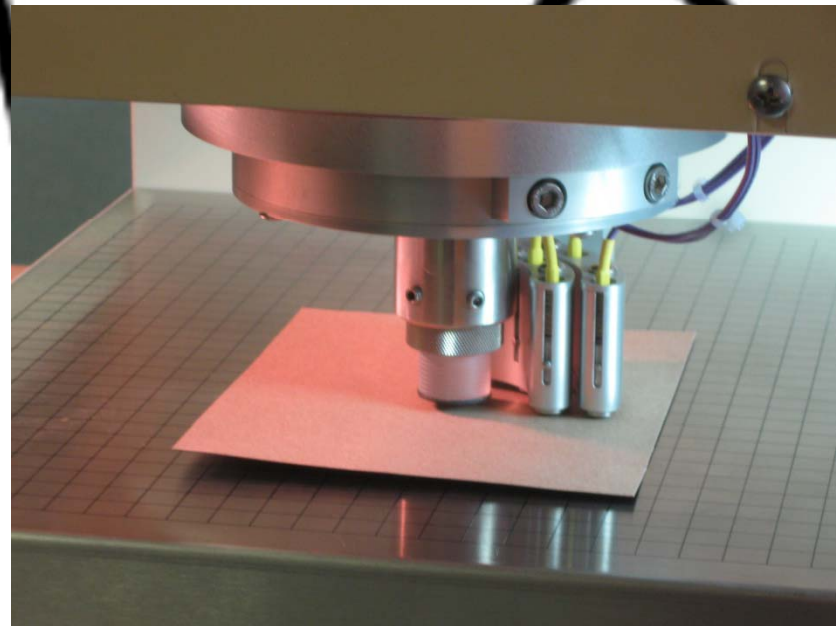
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OPUS 3-D

A Unique MD, CD, and ZD Test Instrument



What does OPUS 3-D measure?

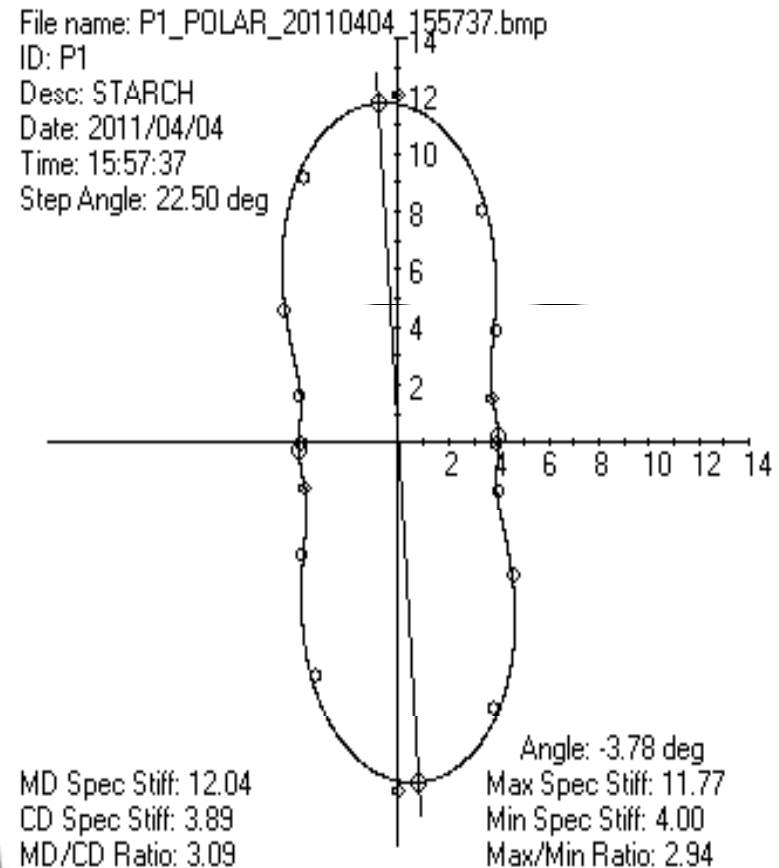
Measuring Soft-Platen thickness (TAPPI 551) and Signal Travel Time, we calculate apparent Density and determine:

	ZD Longitudinal	MD Longitudinal	CD Longitudinal	CD Shear	45 Shear
Velocity	✓	✓	✓	✓	✓
Specific Stiffness	✓	✓	✓	✓	✓
Elastic Stiffness	✓	✓		✓	✓
Young's Modulus	✓	✓	✓	✓ MD-CD	
Tensile Stiffness		✓	✓		



What else can OPUS 3-D do?

- MD-CD Stiffness Ratio
- Stiffness Orientation (aka Polar Diagrams)
- MD-CD Poisson's Ratio
- CD-MD Poisson's Ratio
- Predicted Softness (Non-Wovens)



Common application areas are:

- Paper and Paperboard products
- Non-Wovens , Fabrics, and Tissue Softness
- Thin Film Plastics, Gypsum and Composites
- Pressure sensitive materials
- Strengthening aids and additives for paper and like materials
- 3-D Modeling of Cores and Tubes
- Effects of increased moisture in papers
- Runnability and Medium properties



Prediction of End Use Performance Using Elastic Parameters

Property

MD Tensile Strength

CD Tensile Strength

ZD Tensile Strength

MD/CD Tensile Ratio

MD Bending Stiffness

CD Bending Stiffness

Internal Bond Strength

Bursting Strength

Elastic Parameters

C11

C22

C33

$C11/C22$

$C11 * T^3$ (T=Thickness)

$C22 * T^3$ (T=Thickness)

C33

$C11 + C22$



Papermaking Processes vs. Paper Elastic Stiffness Properties

Elastic Stiffness Constants	Refining Level	MD/CD Anisotropy Ratio	Wet Pressing Level	MD Wet Straining Level	Restrained Drying
	From Low To High	From Low To High	From Low To High	From Low To High	From Full Restraint To CD only
MD:C11	↑	↑	↑	↑	0
CD:C22	↑	↓	↑	↓	↓
ZD:C33	↑	0	↑	↓	0
MD-CD:C66		↓	↑	0	
MD-ZD:C55		↑	↑	↓	
CD-ZD:C44		↓	↑	↓	



Advantages of OPUS 3-D

- Provides unique information that has many potential applications
- Non-destructive with NO SAMPLE PREP
- Sensitive to small variations
- Accurate and repeatable (less than 5%)
- Removes test ambiguity (NO more tape)
- Short test time and easy to use



Acknowledgements

SoniSys, Inc. thanks TAPPI for the opportunity to present our new OPUS 3-D. We also want to thank Naylor, LLC. for all of their help.

Thank each of you for your attention.

Please stop by Booth 624 to see OPUS 3-D.

