



Johns Manville

JM Spray Up Roving & Chopped Strand Mat Applicability in Reinforcement Industry

Moscow, February/March 2005

**Robert Gasparik
Johns Manville**

- Introduction to Johns Manville
- Introduction to Glass Fiber Production
- Application selection of Spray Up roving
- Application selection of CSM



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Global Production Sites for Reinforcements and Product Portfolio





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Johns Manville Slovakia, a.s.

Greenfield plant - on schedule for October 2004

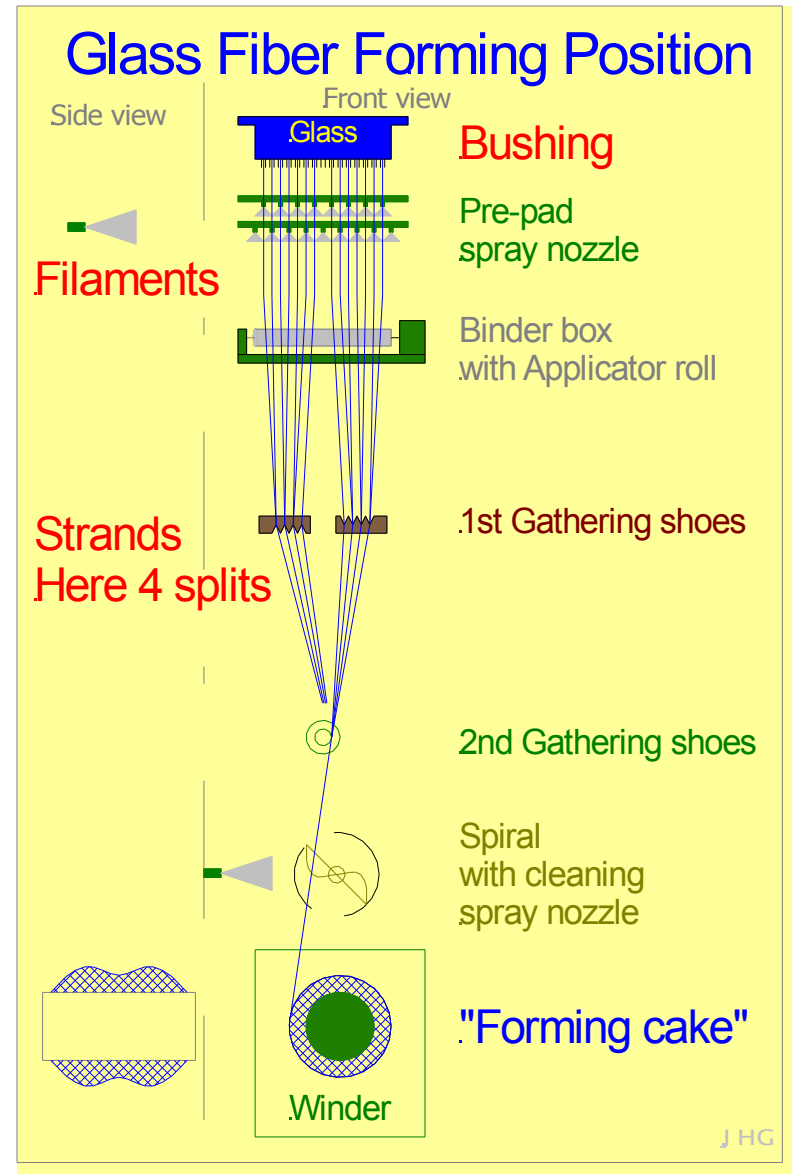


Warren Buffett -

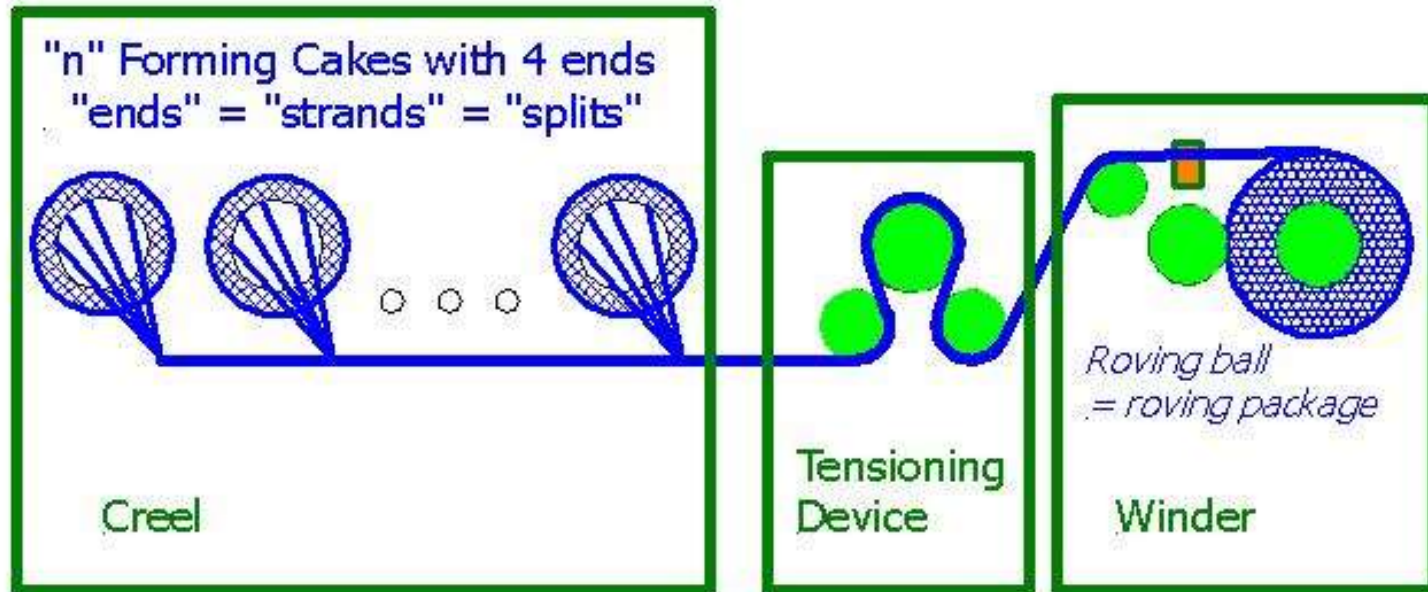
owner of Berkshire Hathaway -
investing in the
wind energy market



- Bushing has thousands of « holes »
- Filaments (ϕ in microns)
- Binder => Size or Sizing
(Better to restrict Binder for the mat)
- Strand = Split
- On the « forming cake » here,
4 strands are wound together.

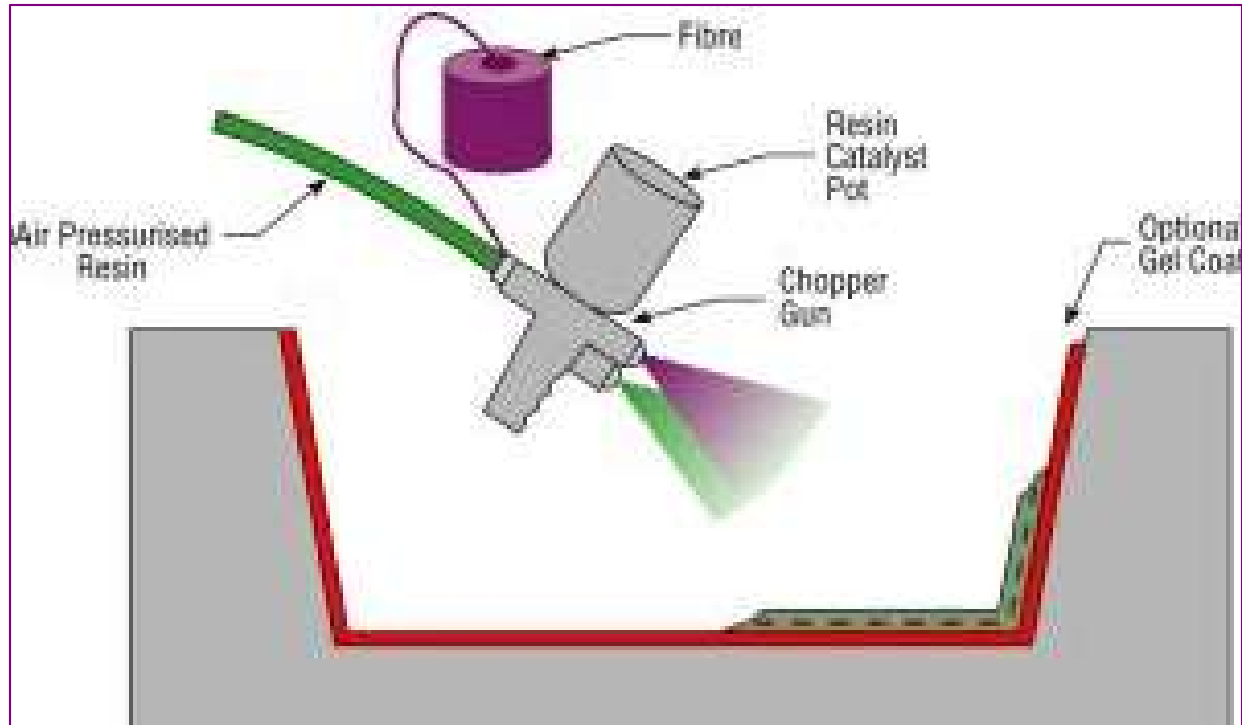


Roving-ball Production Line



"Roving Tex" = "n" x # "splits" x "strand tex" JHG

Spray Up (Gun) Technology Principle



- **External / Internal mixing the resin with catalyst**
- **Glass roving chopping and mixing with catalyst – resin mixture**
- **Spraying onto molding or laminated surface; rolling and curing**
- **Intensive cooperation with Wolfangel**

Product segmentation

Due to:

Hardness: (influencing chopability & spring back) - **soft roving** *ES 11 2400 816*
- **hard roving** *ES 11 2400 819*

Wetability: (influencing falling from vertical parts, air entrapment) - **slow wet out** *ES 11 2400 816*
- **fast wet out** *ES 11 2400 819*

Application recommendations

ES 11 2400 816:

- Vertical parts (walls..)
- Cylindrical objects (silos, etc.)
- Complicated shape objects (pool part etc.)

ES 11 2400 819:

- Large area parts (TGV parts..)
- Horizontal parts
- Large pools, tanks

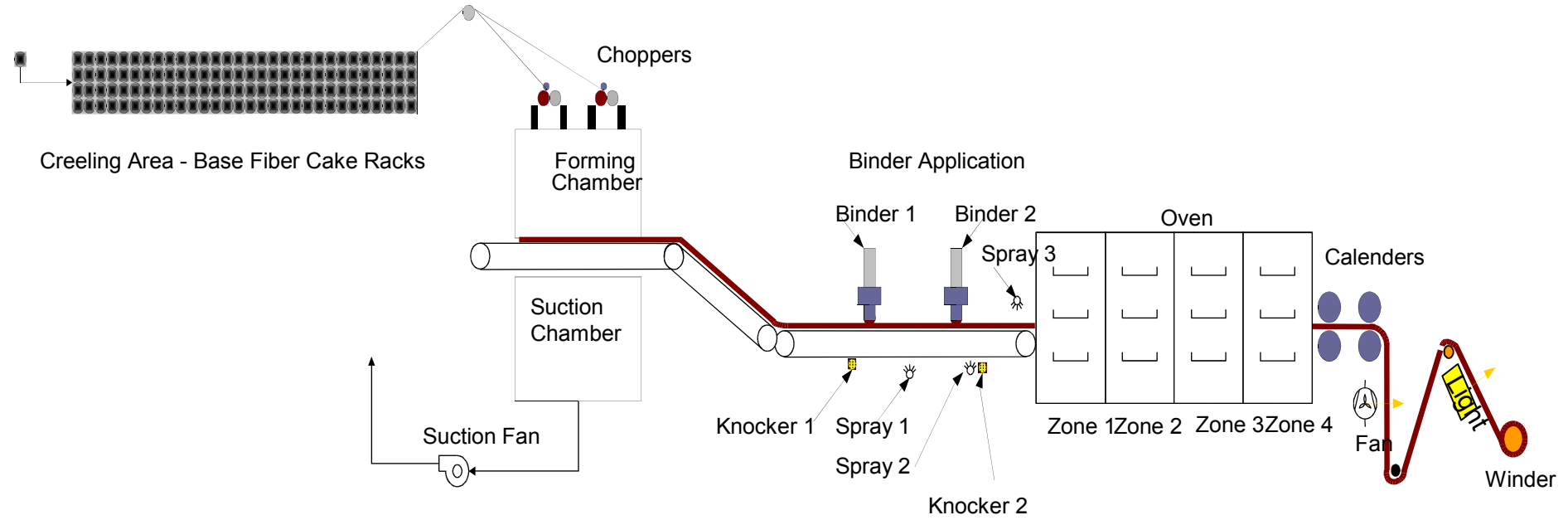
chopability:

- The harder the roving the better for chopping, however the spring back around corners may appear if the fiber chopped too short (816 better for difficult shapes)

Definitions...Spray up Related Terms

- **Runability**.....Ability to run continuously without stops
- **Chopability**.....Force it takes to cut a bundle of fibers without damage
- **Fuzz/Fly**.....Quantity of lost fibers during run-out
- **Carpet Uniformity**...Height and homogeneity of carpet
- **Statics**.....Quantity of chopped glass attached on metal sheet
- **Wet Trough**.....Rate at which resins goes through the matrix
- **Wet Out**.....Rate at which resin breaks down the sizing on the glass
- **Shapeability**.....Ability to roll the glass around tight radii spots
- **Air Entrapment**.....Creation of air bubbles

Chopped Strand Mat Production Principle



JM Chopped Strand Mats Utilization

Chopped strand mats	Contact lamination	Continuous lamination	RTM	
ES 22-5 (Emulsion)	yes	no	no	
ES 22-6 (Emulsion)	yes	no	no	
ES 33-0-12,5 (Powder)	yes	yes	no	
ES 33-0-25 (Powder)	yes	yes	no	

Product segmentation: binder type, grammage, linear density (tex)

Due to:

Binder type: *Emulsion* – hand lamination (hand rolling) – easier to process;

Properties:

- lower tensile strength than powder CSM
- PVAC binder; product name: ES 22-6; ES 22-1; ES 22-5
- Milky laminate, less transparent

Powder – continuous lamination (line), also hand lamination

Properties:

- more transparent laminate,
- higher tensile strength than emulsion CSM
- PES binder

Product segmentation

Due to:

Grammage: the higher the grammage the higher the tensile strength and the lower the binder

content	Product GSM's
	Emulsion ES 22-6: 225; 300; 375; 450; 600
	Powder ES-33-0-12,5: 100; 130; 150; 180; 225; 250; 300; 325; 350; 375; 425; 450; 500; 525; 600
	Powder ES-33-0-25: 225; 300; 325; 350; 375; 425; 450; 500; 525; 600

Due to:

Linear density (Tex of base fiber):

- the lower the tex:
 - the finer the laminate surface
 - the slower wetting
 - the higher tensile strength
 - the more suitable for continuous lamination
 - JM solution: product ES 33-0-12.5
- The higher tex: JM product for standard laminate surface: ES 33-0-25
(12.5 & 25 stand for base fiber tex)

Emulsion CSM

- Boats
- Sanitaries
- Pools, Tanks
- Truck panels, etc.
- Non-transparent laminates



All emulsion types suitable: ES 22-1; ES 22-5, ES 22-6

Powder CSM

- Truck panels – only ES 33-0-12.5 (gives fine laminate surface)
- Decorating panels – only ES 33-0-12.5 (give fine laminate surfaces)
- Headliners – ES 33-0-12.5 100 (low weight)
- Corrugated sheets – mainly ES 33-0-25 (no fine surface needed)
- Construction industry – all types
- Semitransparent laminate products – ES 33-0-12.5 (fine base fiber used)



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Engineered Products Group

Automotive

Key Markets

Wind Energy

Marine



Construction (e.g. Gypsum Board)

Industrial (e.g. pipes)

Electronics

