

*Lightweight flame-retardant
thermoset composites compounds
with low smoke generation*

Waldomiro Moreira
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ABMACO BRAZILIAN COMPOSITES ASSOCIATION

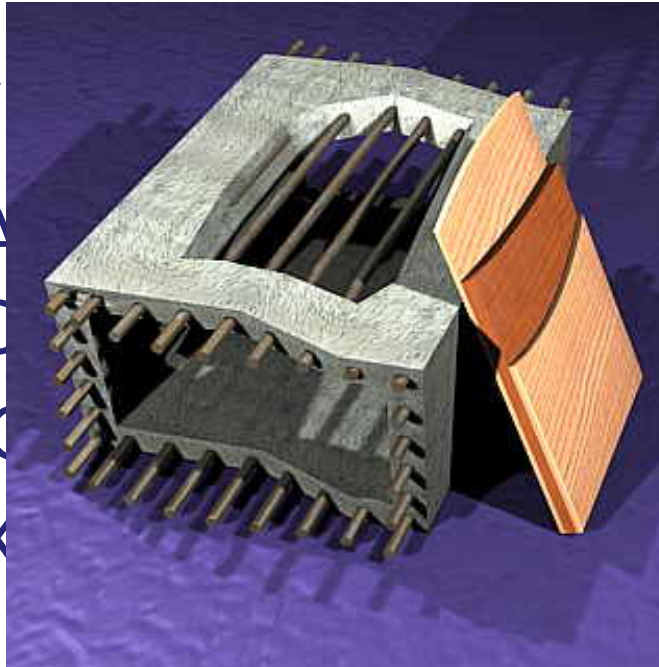
- MAIN OBJECTIVE: TO PROMOTE THE DEVELOPMENT OF THE COMPOSITE INDUSTRY IN BRAZIL AND IN THE LATIN AMERICAN MARKET
- FOUNDED IN 1997 BY 400 ASSOCIATED COMPANIES
- MISSION: TO PROMOTE THE PRACTICE OF THE COMPOSITE INDUSTRY IN THE LATIN AMERICAN MARKET
- “MATTEO” – THE ASSOCIATION’S ACTION PLAN



THE
SUPPLY CHAIN
PRODUCTS
SUPPORTED
INDUSTRY
ASSOCIATES
MARKET
“THE ACTIONS”
ABMACO – LATIN
AMERICAN ASSOCIATION

COMPOSITES MATERIALS

- DEFINITION: A COMBINATION OF TWO OR MORE MATERIALS (REINFORCING MATERIALS, FILLERS AND A MATRIX) RESULTING IN FORM OR COMPOSITION. THE FINAL PROPERTIES ARE SUPERIOR IF COMPARED TO THE COMPONENTS.
- POLYMERIC COMPOSITES: POLYMER MATRIX SUCH AS EPOXY, POLYESTER, VINYL, PHENOLICS....



- THIS PRESENTATION WILL FOCUS ON ULTRA-LOW VISCOSITY UNSATURATED POLYESTER DCPD RESINS FOR LOW VISCOSITY COMPOUNDS

UNSAT. POLYESTER RESIN

- PRODUCT OF AN ESTERIFICATION REACTION FROM DICARBOXYLIC ACIDS AND POLYHIDRIC ALCOHOLS SUCH AS MALEIC AND PHTHALIC ANYDRIDES AND GLYCOLS **EVEN BIOBASED RAW MATERIALS** DILUTED IN STYRENE MONOMER.
- **ADVANTAGES:** LOW COST, EASY PROCESSING, LONG LIFE, EXCELENT MECHANICAL PROPERTIES.
- **DISADVANTAGES:** THERMAL DEGRADATION BY COMBUSTION REACTION WITH DARK GREY/ BLACK SMOKE IF NOT PROPERLY FORMULATED EVEN COMPOUNDED.
- THE OBJECTIVE OF THIS PRESENTATION IS TO SHOW THE VERY UPDATED TECHNOLOGY FOR FLAME-RETARDANTS AND LOW SMOKE GENERATION COMPOUNDS

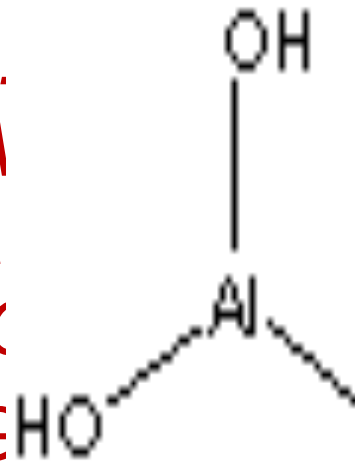
- PRIMARY SYSTEMS FOR UPR FLAME RETARDANCY:
 - HALOGENS IN POLYESTER CHAIN SUCH AS CLHOR, FLUORINE AND BROMINE (IN-SITU)
 - POLYCHLORINATED PARAFFIN + ANTIMONY TRIOXIDE OR POLYBROMINATED DIPHENYL ETHER (COMPOUNDED)
- *ADVANTAGES:* LOW COST, VERY EFFECTIVE UNDER STRINGENT STANDARTS SUCH AS UL 94 V0.
- *DISADVANTAGES:* DO NOT COMPLY TO SMOKE GENERATION AND SMOKE TOXICITY AND ENVIRONMENTAL HEALTH HAZARD
- **SO, WHAT TO DO NEXT?**



UPR LOW SMOKE

- METALLIC HYDROXIDE ADOPTION SUCH AS ATH – *ALUMINIUM TRIHYDRATE* ACTUALLY ALUMINIUM TRIHYDROXYDE

- *ADVANTAGES. RETARDANT A THROUGH WA AROUND 2040C*



FLAME SUPPRESSANT & DECOMPOSING (RMIC REACTION)

- *DISADVANTAGE SE THE COMPOUND VISCOSITY CAUSING MOLDING TROUBLES SUCH AS VOIDS AND DRY FIBERS*

- **SO, WHAT TO DO NEXT?**

ULTRA-LOW VISCOSITY UPR

- UPR COMPOUND: 50% ATH
 - 50% UPR VISCOSITY 25-50 cPs
 - MAX 47% STYRENE
 - GEL TIME 15~20min
- COMPOUND VISCOSITY 286 g/cm³
- MECHANICAL PROPERTIES – 25% 450g/m² GLASS MAT
 - DENSITY 1,7 g/cm³
 - ELONGATION AT BREAK 2%
 - TENSILE STRENGTH 103 mPa
 - FLEXURAL STRENGTH 182 mPa
 - WATER ABSORPTION 0,23%

RULES TO BE FOLLOWED

- ASTM E-162 “Standard test Method for surface flammability of materials using a radiant heat energy source”
- NEED: $I_p \leq 45$ REACHED 41 [FLAME.pdf](#)

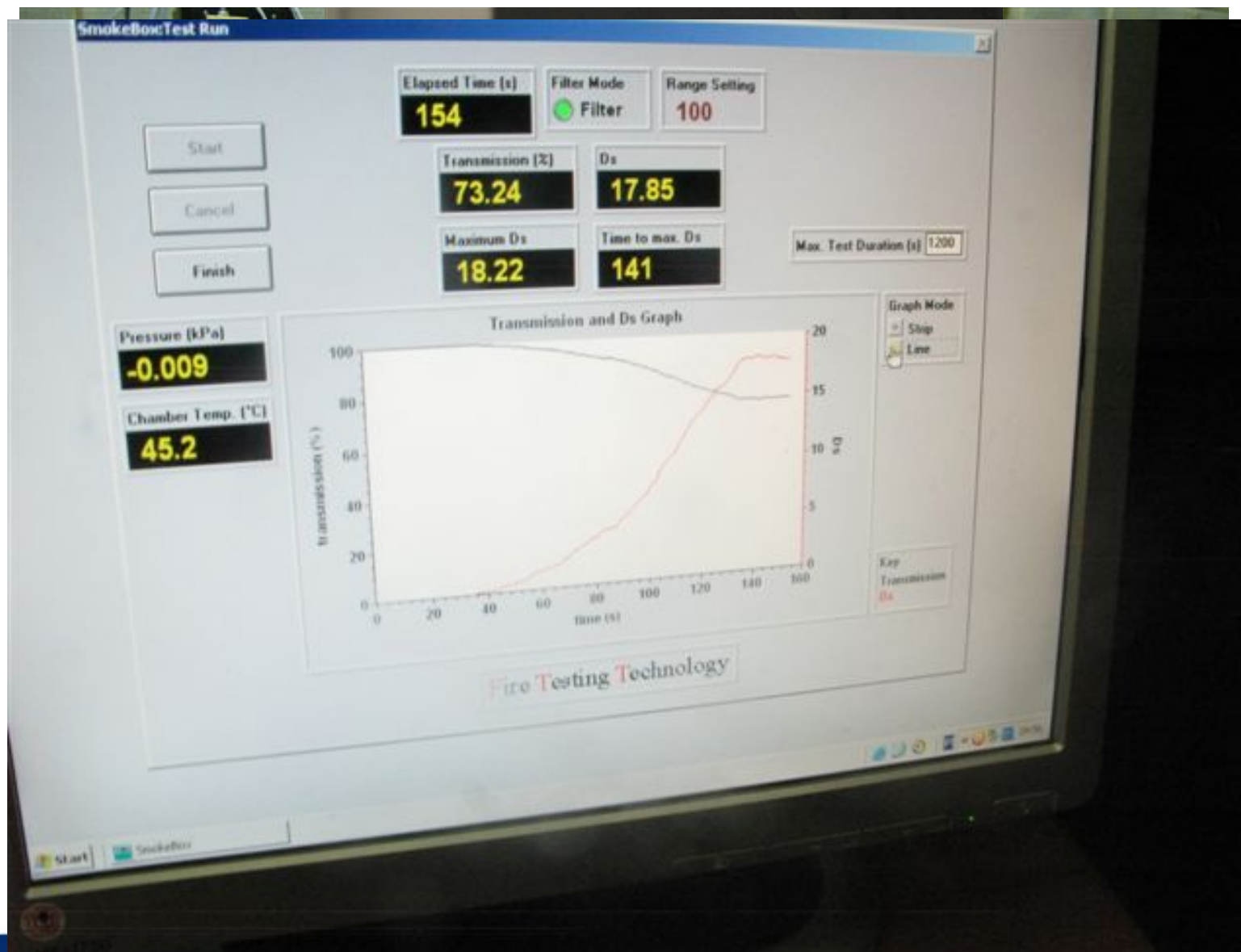
LAB FACILITIES – RADIANT PANEL



RULES TO BE FOLLOWED

- ASTM E-660 “Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials”
- NEED: $D_m \leq 300$ REACHED 182
[OPTICAL DENSITY.pdf](#)

LAB FACILITIES – SMOKE CHAMBER



RULES TO BE FOLLOWED

- Boeing Specification Support Standard BSS 7239-1988 “Test Method for Toxic Gas Generation by Materials on Combustion”

TOXIC GAS	STANDARD (PPM)	REACHED MAX (PPM)
HF	200	0
HCL	500	0
CO	3500	300
HCN	150	01
SO ₂	100	10
NO _x	100	0

LAB FACILITIES – TOXIC GAS



APPLICATIONS



THANKS....

waldomiro.moreira@elekeiroz.com.br

www.abmaco.org.br

