# Evolution of Polyurea “Spray”

Building on the Future

Polyurea Development Association

November 30 - December 1, 2000

New Orleans, Louisiana

Creativity!

June 10, 1986

# First “Polyurea” Spray Sample

# Take a Small Step Back in Time

# Polyurea RIM Technology

- Simultaneous Development
  - Texaco Chemical Company - US
  - Bayer Corporation - Germany
- Early 1980's with major push in mid 1980's
- Joint work between Mobay / Miles / Bayer and Texaco Chemical Co.
- Simultaneous work with Dow Chemical

# Polyurea RIM Advantages

- Faster molding cycle times
- Higher thermal stability for online painting
- Reduced scrap rate in produced parts
- Molded parts “fit” better

# Take Another Small Step Back in Time

# Mid 1970’s

- Jefferson Chemical Company
  cyanoethylated polyetheramines

- Used by Dick Rowton, 1973
  solvented “polyurea” systems
  plural component, fast cure

# Earlier “Polyurea”

- First reference from Hill and Walker (1948)

  -Thermal properties of polyurea as compared to polyurethanes, polyester, polyethylene, polyamides

- First patent from 1970

# Key to this Technology is Polyetheramines

- Developed and Patented in early 70’s
- Used as well for epoxy curing agents

# Now the Program Starts

- Editorial in Modern Plastic - Infamous Someone

THE LEADING EDGE

## POLYUREA— AN ENTREPRENEUR'S DREAM

BY EDWIN F. BUSHMAN
SENIOR EDITOR

RIM (reaction injection molded) polyurethane vertical body panels on the 1984 Fiero and other Detroit models aroused world-wide attention in the future of plastic auto skins. But the three-minute RIM cycle in urethane thermosets prompted a cry for a one-minute RIM material to pace assembly lines. Dow and Mobay quickly rose to the occasion, with speedy polyurea chemistry; and soon RIM-polyurea automotive panels with better heat sag performance and with cycles of just over a minute replaced the urethanes. The time saved would far outweigh a higher materials cost.

A major factor behind the polyurea success was a key supplier to Dow and Mobay, Texaco Chemical Co., holder of basic patents for a key ingredient of the polyureas, JEFFAMINE* polyetheramine. JEFFAMINE is a major part of the B-component in the superfast isocyanate-amine RIM reaction. Texaco's market development manager at Houston headquarters, Dr. Rodney F. Lloyd, advises *PlasticTrends* that the polymer can gel in just two seconds.

**"...new applications, especially in geomembrane, construction, emergency,**

TEXACO

Gusmer two-part spray gun

tioning, spray-up, pour-up equipment (Gusmer, Binks). Or it could even accept chopped-glass reinforcement (Binks Poly-Craft, Gusmer-Venus). Lloyd speculates that spray-up systems such as in the Texaco lab might apply coatings of 15 to 30 pounds per minute on a $20,000 to $36,000 investment. And the solid coating can be made as a soft, stretch elastomer or a tough, hard elastomer, pigmented, filled or glass-reinforced and heat-resistant to 350 degrees F.

What's good about this polyurea spray market is that the A and B liquid ingredients use no tricky catalyst at all, include

woven fabric as optional reinforcement...A small body of water or compatible liquid might be given a quick safety or evaporation cover with a polyurea overspray...In earthquake, flood, fire or other disaster relief, instant "housing in a barrel" capabilities exist. In this case, a light framework of uprights, tops and a burlap or felt covering could be stiffened and made waterproof by spray application of polyurea, ready to move into in minutes.

Helicopter landings on sandy or soft areas, as in Viet Nam-type operations, spread erosive sand and debris over a wide area. Soil stabilization of such a landing

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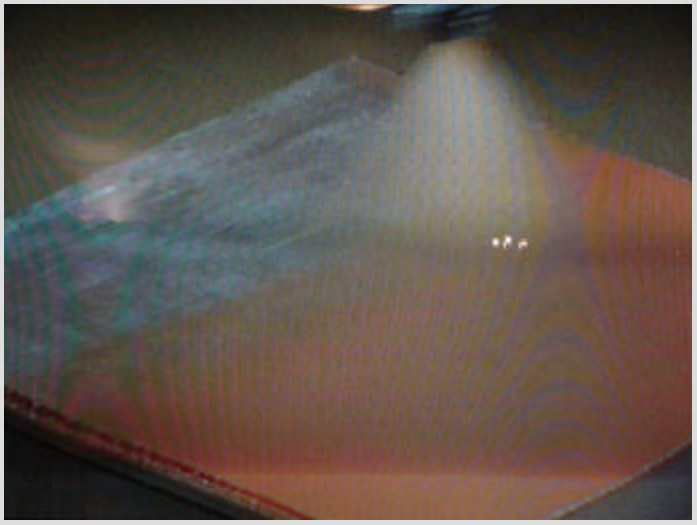

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- Polyurea video - copy more than any video
- Very Creative Sales Force!

**Cowabunga Dudes!!**

# Application Interests

- Encapsulate Corpses
- Human Form Targets
- Coat Jockey Straps
- Polyurea Particles
- Line manholes

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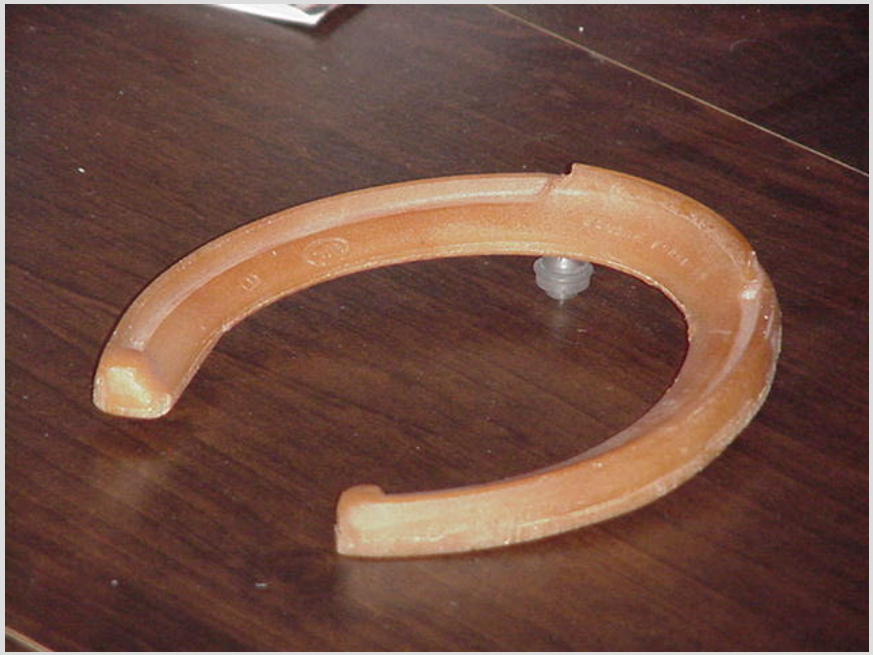

# First Major OEM Application

- Wire Harness Program for Chrysler

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- Today, we have the handles coated with polyurea spray for Sebring Convertible

# Early Marketing Approach

- First targeted polyurethane foam suppliers
  - had the knowledge of formulating
  - had the blending capabilities
  - had the equipment experience, or so we thought

# The “*Truth & Myth*” of it is

- First commercial application of spray polyurea was done by a company from Utah on a roofing application in Texas - late 1980’s
- Numerous “polyurethane” formulations modified with amine and now called “polyurea”

# Caulk & Joint Sealants

- Now they want to slow it down!?
- Remo drum heads

  effectively replaced epoxy system

- Gulf War Application

  repair holes in runways

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- Believe it or not, strong application potential
  - Automotive applications
  - Construction applications

# Interesting Application Work

- Pipe Lining Work - Wastewater

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# New Technologies of “Polyurea”

- Aspartic Esters - introduced in early ‘90s
  - slower cure systems / handmix
  - used in decorative applications
  - more on this later in program

- Slower Cure / Airless Spray Systems

# Where are We Today?

- Numerous formulators representing the Global Industry
- Several major equipment suppliers
- Hundreds of application areas
- Web sites key’ed on “polyurea”
- Major Specification Work

# Where are We Today?

- Characterization by Major Associations
  - NACE - National Association of Corrosion Engineers
  - SSPC - Society of Protective Coatings
  - ICRI - International Concrete Repair Institute

# Where are We Today?

- Polyurea Development Association!