# Introduction to MCPP, LLc.

## Welcome

**April 29, 2013**

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# Agenda

- Company History
- Overview
- Technology and Applications
- Manufacturing
- R&D Projects
- Discussions

# Company Overview

- MCPP-Detroit, LLC is a *110,000sq. ft.*, Warren, Michigan based custom compounder of TPV and PVC materials.

Company History


- In the late 90's the automotive interior, flexible PVC business began to move into the direction of more environmentally favorable and recyclable resins such as TPE and TPV. We quickly became a leader in colored non-PVC compounds to support the automotive interior business.

# Company Overview

- Continues to grow and expand it's compounding capabilities which includes **TREXPRENE®** TPV and other TPE based compounds. These materials are available in natural, black as well as 1000's of custom colors. The hardness ranges from 35A to 50D.

- In partnership with the Global Automotive OEMs we have one of the broadest approval ranges of any of the TPV compounders. These approvals support the majority of the global automotive companies.





# Technology, Quality and Lab Capabilities

# Lab Capabilities and Quality Systems

- It all starts with an ISO 9001:2008 certified facility and a lab that is A2LA accredited!

- ISO 9001 through 2013

- A2LA- Lab approved for more then 110 tests (focused on Elastomeric Testing)
  - ✓ This allows us to produce the majority of our own data for our 107 OEM Material Approvals

# Technology: Color Capabilities

- Our R&D, Laboratory and Color Personnel have over 100 years combined experience.

- This experience allows us to develop and manufacture our own color concentrates. This allows us to control and maximize the efficiency of not only our colors, but also the stabilizers used in our compounds.

- "Rapid Response" we can develop, gain OEM approval, and manufacture a custom color for both **Flexible PVC** and **TREXPRENE®** TPV in less than 5 days.

# Application Development Capabilities

- Profile Extrusion Capabilities: Customer development/prototyping, technology processing verification, and small pre-production runs
- 2- 85 Ton Van Dorn Injection Molding Machines


# TPV Technology

- Our R&D team has engineered products for a variety of customer requirements and demands. A recent **TREXPRENE®** development includes higher flowing grades for over mold applications and large parts to help with part aesthetics and process ability. These materials have begun to take a lead position in the world of injected molded elastomers.

- Our Material Engineers have also developed and commercialized **TREXPRENE®** containing anti-scratch / anti-wear technology to improve the performance versus traditional TPV's for a variety of applications.

# Product Portfolio & Specification Position

**TREXPRENE®** Thermoplastic Vulcanizates (TPV)

Fully vulcanized PP/EPDM blends well suited for a wide range of both Automotive and Non-Automotive applications. **TREXPRENE®** is available as a pre-colored, natural, or black material. A hardness range from 35A to 50D shore hardness is commercially available. These materials can be processed using injection, extrusion, blow molding, or thermoforming techniques. Our highly qualified R&D staff is always ready to customize **TREXPRENE®** to meet specific customer requirements.

**Auto Approvals- more than 62 TREXPRENE® Approvals**

**Toyota, Honda, Nissan, Hyundai, VW and others**

| | | |
|---|---|---|
| **GM**: | GMP.E/P.001* GMP.E/P.002* GMP.E/P.003*<br>GMP.E/P.004* GMP.E/P.005* GMP.E/P.006/7*<br>GMP.E.P.029* GMP.E.P.037* GMP.E/P.044*<br>GMP.E.P.067* GMP.E.P.071* GMP.E.P.078*<br>GMP.E.P.082* GMP.E.P.117* GMP.E.P.120*<br>GMN line callout | Global Specs: GMW 15812 Exterior* - all types<br>GMW 15816 Interior* - all types<br>GMW 15813 Under hood – all types |
| **Chrysler** | MS AR20A* MS AR20B* MS AR20C* MS AR20D* MS AR20E* MAR 26B * MS AR30A* MSJ 7000 *<br>MSDB 226* All duros MS AR100 | |
| **Ford** | WSB M2D 378-A1* WSB M2D 381-A1* WSB M2D 378-A2* WSB M2D 379-A1*<br>WSB M2D 382-A1* WSB M2D 379-A2* WSB M2D 380-A1* WSB M2D 380-A2*<br>WSB M2D 381-A4 * WSS M4D 510 A5/A6/A7/A8/A9* | |
| **Inteva** | DX3000001* DX300367 * | |

# TREXPRENE® Applications

- ✓Center console skins, cup holder inserts, & bin liner mats
- ✓Seat belt components
- ✓Door over-Molds
- ✓Air dams, wheel flares and other exterior parts
- ✓Various Weather seals
- ✓Interior door handles, shift knobs, grab handles
- ✓Under hood boots and bellows

# PVC Technology

- We have a core strength in Custom Colored Flexible PVC compounding.
- These technologies include clear PVC, pre-colored PVC, and a variety of custom PVC hybrid technologies.
- A database over 2000 color PVC formulations and over 1000 separate OEM color approvals
- PVC hardness range:
  - 45 Shore A to 90 Shore A
  - 35 Shore D to 50 Shore D
- Our Laboratory and Color Personnel have over 100 years combined experience.
- Our employees average more than 12 years experience.

# Product Portfolio & Specification Position

## Flexible PVC

Our Company has long held a lead position in the automotive colored flexible PVC market. With over a 1000 OEM approved color matches since 1969 and over 55 material approvals **Flexible PVC** is well suited to meet your Automotive needs.

**Auto Approvals- more than 55 + >1000 Color Approvals Flexible PVC Approvals**

| | |
|---|---|
| **GM:** | GMP.PVC.002, GMP.PVC.003, GMP.PVC.005, GMP.PVC.006, GMP.PVC.007, GMP.PVC.009, GMP.PVC.010, GMP.PVC.012 GMP.PVC.013, GMP.PVC.014, GMP.PVC.015, GMP.PVC.016, GMP.PVC.017,GMP.PVC.023 ,GMP.PVC.029,GMP.PVC.030 GMP.PVC.032, GMP.PVC.035, GMP.PVC.036, GMP.PVC.037, GMP.PVC.072, Approvals to GMW specs are pending. |
| **Ford:** | ESB-M4D37 ESB-M4D103 ESB-M4D259 ESB-M4D284 ESB-M4D292 ESB-M4D333 WSB-M4D871A1-A4 |
| **Chrysler:** | MS-DC-23 CPN2182 MS-DC-23 CPN3167 MS-DC-211 type A & B. MS-DC-220 CPN2088 MS-DC-220 CPN2297 MS-DC-220 CPN2712 MS-DC-220 CPN2772 MS-DC-220 CPN3699 MS-DC-232 CPN3168 MS-DC-236 MS-DC-251 MS-DC-252 MS-DC-526 CPN3197 MS-DC-543 various CPN's MS-DC-544 CPN 4106 |

# **Flexible PVC** Applications


- ✓ Assist / Grab Handles
- ✓ Door Armrest skins
- ✓ Center Console skins/lid covers
- ✓ Park Brake Handles
- ✓ Seat Belt Components
- ✓ Other "Soft" Trim

# Complimentary Product Portfolio

**TREXFLEX®**

This technology is typically produced using a combinations of recycled olefins and elastomers. It has a range of shore hardnesses from 65A to 50D. It is intended for applications where good surface quality and elastomeric properties are needed. It can be produced in black, natural, or in some cases pre-colored. The material is also available with or without UV stabilizers.

**TREXTUF®** Thermoplastic Olefins (TPO)

Mechanical blends of rubber modified olefins for use in a wide range of applications. TREXTUF® is available in a wide range of flexural modulus depending on the application. This range can be tailored to fit applications from a flexible air bag cover to a rigid bumper fascia. TREXTUF® can be color matched to a wide range of colors.

**TREXFIL®** Filled or Reinforced Olefins

TREXFIL® is intended for applications where extreme stiffness and processability is needed. This material is typically customized for a specific customer or application requirements.

# Manufacturing, Raw Materials, and Warehousing

# Manufacturing Capabilities


Manufacturing lines include both reactive twin-screws and single-screw technologies.

✓Our state of the art twin-screw extruders with loss weight feeding capability, underwater pelletizers, precise liquid injection capability and custom built dryers allow us to produce materials to the highest standards.

✓3 Single Screw Extruders for PVC and associated upstream and downstream capability (Bulk storage for raw materials)

# Raw Materials

- We consider our raw materials and suppliers critical to our business success. Therefore, we have three critical aspects that we take into account when securing supply:
  1. All of our key raw materials are at a minimum dually sourced.
     - This allows for great flexibility in our manufacturing process and helps with security of supply.
  2. Bulk storage and adequate internal warehousing space allows us to spot buy when we see price opportunity.
  3. Our technical staff is dedicated to working closely with our suppliers on specific requirements to help with our product development.

# Warehousing


- Our Warehousing facility has both a finished goods and incoming raw material area
- Finished Goods encompasses approximately 30,000sq. Ft with adequate room for expansion
- Raw material space encompasses approximately 40,000 sq. ft. and is located in-line with our manufacturing lines
- Large drying capacity near our warehouse space allows for finished good devolitization and drying of particular incoming raw materials

# TPV Development Team

## R & D TEAM:

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### Dave Patel:

**RESEARCH & DEVELOPMENT MANAGER SINCE 1996**

- Ph.D. in Rubber Technology from Bombay University (Department of Chemical Technology)
- Worked with Monsanto Rubber Chemicals & BTR (NIRLON) Belting manufacturer
- Total 32 years of combined experience in rubber & thermoplastic rubber.
- Involved as key recipient for transfer of technology from UK for conveyor belting.
- Lead –In Product Development such as Trexprene.
- ISO, A2LA Deputy representative & Auditor

### Sudhakar Haraga:

**RESEARCH & DEVELOPMENT ENGINEER SINCE 2000**

- Bachelors in Engineering (Polymer Science & Technology) from University of Mysore, (India)
- Project Management of turnkey projects for new pilot & production lines.
- Total 19 years experience in product & process development for elastomers, engineering & commodity polymers
- Twin screw line process owner; Product submission specialist to OEM

### John Whitaker:

**QUALITY MANAGER**

- ISO, A2LA Lead
- Over 30 years with the company

# Why TPV TREXPRENE®

## TPV DEVELOPMENT WAS GREAT CHALLENGE

- Very Few Players in the market & a protected technology
- SEBS Chemistry was doable by many.
- SEBS Great product but expensive when compared to flexible PVC.
- Low cost SEBS was inferior compared to PVC
- Some OEM's were not in favor of SEBS due to its inferior Scuff & Marr properties, surface exudation & pinking.
- **WRITING WAS CLEAR ON THE WALL** In year 2000 General Motors announced that by year 2004 there shall be no PVC in GM cars. Forecast was not 100% accurate, but PVC based components are on the decline and are being replaced by soft touch TPV's
- **THIS THREAT WAS OUR GREAT MOTIVATOR**. For a standalone Company like ours it was a question of survival

# Why TPV - TREXPRENE®

- **HISTORY OF TREXPRENE® TPV DEVELOPMENT**
- 1999 – Company was in need of a new product, till then custom colored PVC compounds was the main product
- 2000 – Decision was made to produce soft touch compounds based on either SEBS or Vulcanized EPDM
- 2001-2002 With limited infrastructure and resources we had to look into different alternatives to head start the project in pursuit to develop TPV. We did not loose steam but had to test our capability , test market response and OEM acceptance of a newly developed products.
- 2002 – LINE-1: First Twin Screw Line from B&P Process CT-58 (40:1) was commissioned
- 2009-LINE-1Ancillary : Rubber bale granulator & Belt feeder added
- 2010-LINE 1 modification: CT-58 was modified to 52:1
- 2011- LINE-2: Second Twin Screw Line from Leistritz ZSE-87 MaXX(56:1) was commissioned
- 2012-LINE 2 Auxiliary : Melt pump, Continuous Screen changer & Classifier added
- 2012- Atlas Xenon Weatherometer added to the Laboratory
- 2013- Lica High Resolution Microscope, Wallace Hardness Tester & Dynisco Capillary Rheometer added to the Laboratory

# Why TPV (TREXPRENE®)

**TWO STAGES OF TPV DEVELOPMENT:**

**STAGE-1**

- In 2002 we started using Sarlink master batch in both Peroxide and Phenolic versions
- This was a head start for all the preliminary developments in Twin Line-1
- We utilized our strength in developing pre-colored compounds on the production line and started getting OEM color & material approvals
- We made tailor made compounds to meet the customers requirements and that was the key
- Our strength was in developing formulations and test using our A2LA accredited lab before sending it to the customer
- North American OEM's follows material specification and we recognized that the first step is to get out material approved by the OEM' for respective specifications
- After material approval, colors are approved for model years, it is convenient for TIER-1, TIER-2 & TIER-3 companies to use mold in color **TREXPRENE®**
- **Excellent team work from all departments was key in development of TREXPRENE®**

**STAGE-2**

- Next step was to develop our own TPV- with indigenous technology

# TREXPRENE® - TYPES

## TREXPRENE® PHENOLIC CURED

**(FOR INTERIOR, EXTERIOR AND UNDER THE HOOD APPLICATION)**

- FULLY CROSSLINKED – PHENOLIC TPV
- FOR INJECTION MOLDING APPLICATION – WE CAN MAKE WITH SLIP MATERIAL (LOW FRICTION), WE CAN CONTROL THE RHEOLOGY TO SUIT CUSTOMER DEMAND AND TOOLING.
- ALL GRADES (HARDNESS FROM 50 SHORE –A TO 50 SHORE-D) ARE MADE IN NATURAL, MOLD IN COLOR, BLACK.
- THEY ARE TESTED PER VARIOUS ASTM, ISO, SAE, FMVSS SPECIFICATIONS AND PROCEDURE
- TREXPRENE MEETS FOGGING, COMPRESSION SET, HIGH TEMP LONG TERM AGING, COLOR FASTNESS TO LIGHT (XENON INTERIOR AND EXTERIOR), GAS FADE RESISTANCE, NATURAL WEATHERING AT ARIZONA AND FLORIDA AFTER 2 YEARS ETC.
- EFFORTS ARE IN PROGRESS TO PERFECT MATERIAL FOR EXTRUSION APPLICATION. MEANWHILE FOR EXTRUSION APPLICATION WE USE PHENOLIC LOW HARDNESS MASTER BATCH.
- THE NEWLY INSTALLED TAPE EXTRUDER IS UTILIZED TO SEE EXTRUSION QUALITY

# TREXPRENE® - TYPES

## TREXPRENE® – PEROXIDE CURE

**(FOR INTERIOR APPLICATION)**

- CROSSLINKED – PEROXIDE CURE TPV
- FOR INJECTION MOLDING APPLICATION – WE CAN MAKE WITH SLIP MATERIAL (LOW FRICTION), WE CAN CONTROL THE RHEOLOGY TO SUIT CUSTOMER DEMAND AND TOOLING.
- ALL GRADES (HARDNESS FROM 40 SHORE–A TO 50 SHORE-D) ARE MADE IN NATURAL, MOLD IN COLOR, MATCHED BLACK AND GENERIC BLACK.
- THEY ARE TESTED PER VARIOUS ASTM, ISO, SAE, FMVSS SPECIFICATIONS AND PROCEDURE
- TREXPRENE MEETS FOGGING, COMPRESSION SET, HIGH TEMP LONG TERM AGING, COLOR FASTNESS TO LIGHT (XENON INTERIOR), GAS FADE RESISTANCE, ETC.
- EFFORTS ARE IN PROGRESS TO PERFECT MATERIAL FOR EXTRUSION APPLICATION. MEANWHILE FOR EXTRUSION APPLICATION WE USE PEROXIDE LOW HARDNESS MASTER BATCH.
- THE NEWLY INSTALLED TAPE EXTRUDER IS UTILIZED TO SEE EXTRUSION QUALITY

# Deficiency:

**DEFICIENCY:**

- Uninterrupted handling of ground rubber
- More than 2 Million Pounds of injection grade **TREXPRENE®** was sold, but still lacking the ability to produce extrusion grade product
- Need to control gels & improve the surface on extruded tapes & profiles (coarseness & surface irregularities found in extruded products)
- Still in need to do **thorough validation** of TPV's.
- **FTIR AND DSC** for laboratory analysis of critical raw materials and finished products.
- On the wish list we need a Lab scale twin line (56:1 L/D) with material handling and ancillary equipments for prototyping and new material developments
- ALL OUR R & D TAKES PLACE ON PRODUCTION EQUIPMENT. This takes valuable production time and resources. Lab line will help us in **improving the quality** of the existing product and **to develop new products** which will be an asset to our operation

# Projects

–Make extrusion grade Phenolic TPV using K5531A & R697 with fractional melt PPHP, oil & curatives at Detroit plant.

–Produce C-TPO at Bellevue plant using R697 rubber, oil, PPHP & Zinc oxide pre-blend (lab Banbury and then scale up using the production Banbury). Dave to send formulation to Lee Wilson.

–Make TPV from the pelletized C-TPO at Detroit plant.

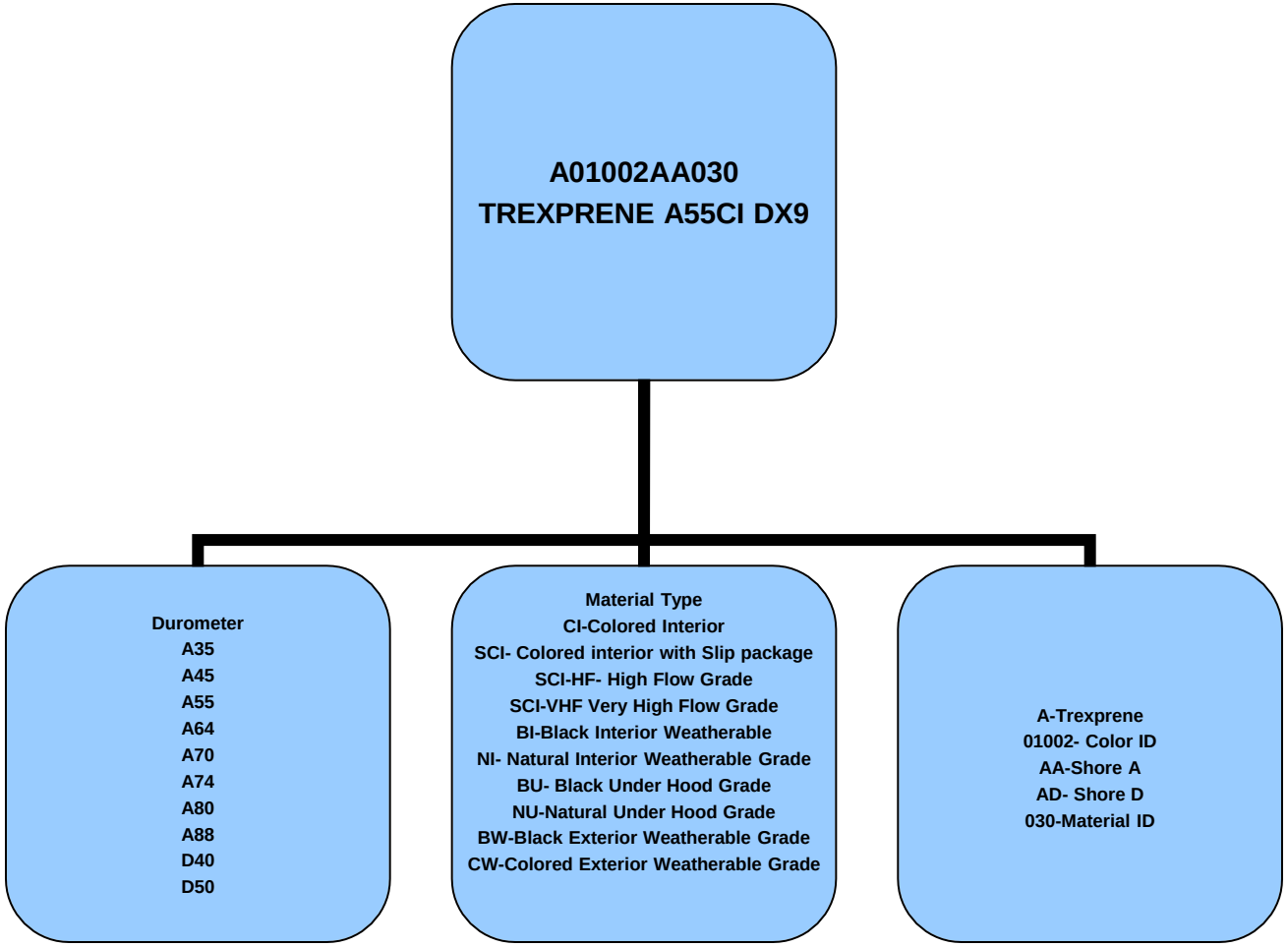
–Test and evaluate the finished product

–Produce C-TPO at Bellevue plant using R539/R563 rubber , oil, PPHP & Zinc oxide pre-blend (lab Banbury and then scale up using production Banbury).

–Make TPV from the pelletized C-TPO at Detroit plant.

–Test and evaluate the finished product

# TREXPRENE® - Nomenclature



# Summary

- The TPV market globally is growing faster then regional GDP which makes this a very dynamic market
- Market growth is dependent on many key global factors including raw material availability and technology innovations
- **TREXPRENE®** has a strong automotive approval position second to none

# Questions & Discussions