Global Developments in Thermoplastic Elastomers

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Thermoplastic Elastomer Functional Value Drivers

- **Tactile (soft touch)**
  - Grips and touch characteristics
  - Emotive driver

- **Sealing: keep moisture/pressure in/out**
  - Auto and building and construction driven
  - Housewares: containers
  - Cap liners

- **Elasticity/flexibility**
  - Housewares
  - Wire and cable
  - Bags/films (also combine with sealing): packaging
  - Tubing
  - Footwear
  - Safety: air bags

Properties like compression set, hysteresis, chemical resistance, transparency and heat resistance are the feature/benefits which separate the TPE elastomer families.

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
Key Macro Issues Impacting Thermoplastic Elastomers

• Aging population (NA/Europe) will drive health segments
• Emerging middle class will drive consumer goods consumption in emerging economies (strong growth in automotive, electronics (communications), consumer durables and disposables and soft touch
• "Green" initiatives are taking hold
  – Migration/extractables have been lifted to high emotional issue with general public (BPA, PVC plasticizers, GE modified foods)
  – Bio-polymers (bio-sustainable and bio-degradable) will increase in significance
  – Recycle and design for end life will continue to increase
• NA/Europe low economic growth will continue
• China GDP will slow to 7-8%, higher productivity technologies will start being used, high labor intensity businesses move to lower labor cost economies or locations
  – Growth in SE Asia and India
• Quality will continue to be critical parameter and will continue to improve as emerging economies (China) moves up the quality scale
  – Emotive marketing will continue to increase (appeal to the five senses, beyond touch)
• Light weighting will increase in value in automotive
• Resin suppliers will continue to look for opportunities to move downstream to bring increased value to their businesses

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
Thermoplastic Elastomer Industry Structure and Dynamics

• **Region**: shifted to global 4-5 years ago, key China role, re-shoring effects

• **Concentration**: bipolar, 10-12 large suppliers, many small compounders

• **Entry barriers**: easy to enter, IP not critical (formulation driven)

• **Entry paths**: multiple: captive resin suppliers, distributors, compounders, back integrated fabricators

• **Target markets**: auto (dominates), broad range of low volume markets

• **Growth dynamics**:
  - EPDM, PVC substitution, automotive systems cost/weight save
  - Strong intra-TPE competition, cascade to lower cost TPEs
  - Broadening property envelope
  - Bio-TPEs entering
  - Applications development shifted to tier 1s, end users
  - Growth: tied to unit volume growth (e.g. auto) and substitution

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
Automotive: Key Growth Driver in NA and China

TYPICAL MARKET SECTOR SHARES FOR OLEFINIC AND STYRENE TPEs

HIGH GROWTH SECTORS

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2012
b/mydox/papers/TPE sectors 12.xls
## Thermoplastic Elastomer Industry Structure Shift Examples

<table>
<thead>
<tr>
<th>Shift Type</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition by major TPE supplier</td>
<td>Merquinsa acquisition by Lubrizol</td>
</tr>
<tr>
<td>Distributor entry into TPEs</td>
<td>- Albis $\rightarrow$ TPV entry. Ravago acquisitions</td>
</tr>
<tr>
<td>Resin supplier $\rightarrow$ compounding</td>
<td>TSRC, PP resin suppliers, others</td>
</tr>
<tr>
<td>Target U.S. markets (and European markets for China compounders)</td>
<td>TSRC, Ravago, Albis, CTS, Polymax, Hexpol, SO.F.TER, LCY, Dawn, NJOP</td>
</tr>
<tr>
<td>Emerging economies capacity expansion by western compounders</td>
<td>- PolyOne GLS into Brazil</td>
</tr>
<tr>
<td>Money coming out of China</td>
<td>- Nantong Polymax (TPE compound supply)</td>
</tr>
<tr>
<td></td>
<td>- TSRC acquisition of Dexco</td>
</tr>
<tr>
<td></td>
<td>-- KingFa investment in Hydro S&amp;S</td>
</tr>
<tr>
<td>Product line diversification</td>
<td>- Teknor Apex acquisition of DSM’s Sarlink®*</td>
</tr>
<tr>
<td></td>
<td>- Kraiburg : high temp TPV (Hipex®); silky touch</td>
</tr>
<tr>
<td>Major TPE supplier emphasizing specialty vs commodity grades</td>
<td>- Kraton entry into higher performance grades</td>
</tr>
<tr>
<td></td>
<td>- Kuraray entry into di-block/tri-block acrylic TPEs</td>
</tr>
<tr>
<td>Shifts to Asian production and market development</td>
<td>Many TPE suppliers, recently: CTS, Hexpol, Dow Corning/Multibase, Wittenburg, Elastron</td>
</tr>
<tr>
<td>TPE entry from other sectors</td>
<td>- Hexpol acquisitions: Elasto, Horst Mueller, Excel</td>
</tr>
<tr>
<td>Entrance into TPVs</td>
<td>- Entrance of many compounders: Koreans, Turkish, European</td>
</tr>
</tbody>
</table>

**SOURCE:** ROBERT ELLER ASSOCIATES LLC, 2013
Thermoplastic Elastomer Product Development Product Life Cycle Positions

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
<table>
<thead>
<tr>
<th>MARKET INTRO</th>
<th>GROWTH</th>
<th>MATURITY</th>
<th>SATURATION (DECLINE?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales vol.</td>
<td>0→Low</td>
<td>Increasing</td>
<td>Steady</td>
</tr>
<tr>
<td>Dev. costs</td>
<td>High</td>
<td>Reduced</td>
<td>None</td>
</tr>
<tr>
<td>Branding</td>
<td>None</td>
<td>High</td>
<td>None (commodity)</td>
</tr>
<tr>
<td>Mkt. approach</td>
<td>“Shaping”</td>
<td>Order seek</td>
<td>Order take</td>
</tr>
<tr>
<td>Inter TPE competition</td>
<td>Varies</td>
<td>Starts</td>
<td>Cascades to lowest cost TPE</td>
</tr>
<tr>
<td>Incumbent</td>
<td>Entrenched</td>
<td>Resistance</td>
<td>Replaced</td>
</tr>
<tr>
<td>Supply Chain Systems</td>
<td>None yet</td>
<td>Stimulates growth</td>
<td>Refined</td>
</tr>
<tr>
<td>Fabrication technology</td>
<td>Standard</td>
<td>Adopt starts</td>
<td>Accepted</td>
</tr>
<tr>
<td>Asia role</td>
<td>None</td>
<td>Slight</td>
<td>Adopt</td>
</tr>
<tr>
<td>Global spec</td>
<td>No</td>
<td>Starts</td>
<td>In place</td>
</tr>
<tr>
<td>Example</td>
<td>Radiator hose</td>
<td>Body/glazing seals</td>
<td>TPO fascia</td>
</tr>
</tbody>
</table>

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
## Maturing Businesses Becoming Commodities: Shift to Specialties

<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>COMMODITY</th>
<th>SPECIALTY</th>
</tr>
</thead>
</table>
| Number of grades | - Many standard grades  
- Compete for same business | - Few grades  
- Highly targeted |
| Major TPE suppliers | Continue supply or exit | Enter compounding |
| Competitive basis | Price. Trend toward global price | Performance (tailored) |
| Property differentiation | None → minor | Highly differentiated |
| Sales/marketing approach | - Pursue existing markets  
- Take orders/Use distributors | “Shape” new markets |
| Tech support, Applications dev. | Minimal | Substantial |
| Brand recognition | - Incumbent TPE suppliers (have it)  
- New entrants without it (e.g. Sinopec, TSRC) | No: must be built |
| TPE examples | - Standard SEBSs, SBS, TPO  
- Some o-TPVs, TPUs  
- Some COPEs | - New SEBS grades  
- s-TPVs, Bio-TPEs  
- Health care grades  
- New acrylic grades |

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
<table>
<thead>
<tr>
<th></th>
<th>Footwear</th>
<th>Soft Touch</th>
<th>Seals</th>
<th>HFFR</th>
<th>PVC Substitution</th>
<th>Bio-grades</th>
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<tr>
<td><strong>Markets</strong></td>
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<td></td>
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<td>Stationery</td>
<td>Personal Care</td>
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<tr>
<td><strong>Products</strong></td>
<td>SBS</td>
<td>SBS</td>
<td>HSBC/OBC</td>
<td></td>
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<td></td>
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<td>Specialty grades</td>
<td>HSBC</td>
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<td></td>
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<td></td>
<td>x-linkable</td>
<td>TPV</td>
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<tr>
<td><strong>Intermaterial</strong></td>
<td>POEs</td>
<td>TPV</td>
<td>EPDM</td>
<td>PVC</td>
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<td>Flexible Noryl</td>
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<td></td>
<td>PTFE</td>
<td></td>
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<td><strong>Drivers</strong></td>
<td>Low labor costs (shift from HK)</td>
<td>Globalization shift</td>
<td>Costs</td>
<td>Exports</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>from NA/Europe</td>
<td></td>
<td>(RoHS/WEEE)</td>
<td></td>
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<tr>
<td><strong>Tech Reqmts</strong></td>
<td>Low</td>
<td>Low to Medium</td>
<td>Medium to High</td>
<td>High</td>
<td></td>
<td></td>
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<tr>
<td><strong>Who can do it?</strong></td>
<td>Anyone</td>
<td>Nearly everyone</td>
<td>MNC’s/ high competency Chinese</td>
<td>MNC’s/ high competency Chinese</td>
<td>Few to date</td>
<td></td>
</tr>
<tr>
<td><strong>Competitive Intensity</strong></td>
<td>Very High</td>
<td>Very High</td>
<td>Low to Moderate</td>
<td>High</td>
<td></td>
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<tr>
<td><strong>Life Cycle</strong></td>
<td>Decline</td>
<td>Mature</td>
<td>Growth</td>
<td>Early growth</td>
<td>Introduction</td>
<td>Development</td>
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<tr>
<td><strong>Key Technologies</strong></td>
<td>Injection</td>
<td>Injection</td>
<td>Extrusion</td>
<td>Profile Extrusion</td>
<td>Profile extrusion</td>
<td>Slush molding</td>
</tr>
<tr>
<td></td>
<td>Foaming</td>
<td>Two shot</td>
<td>Foaming</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Key Uncertainties</strong></td>
<td>Properties vs EPDM</td>
<td>Meet codes for exports</td>
<td>PVC substitution driver</td>
<td></td>
<td>Will consumers pay the premium?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PVC substitution driver</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

*Source: Robert Eller Associates, LLC 2013*
PVC Substitution

• **Wire and Cable**
  – Halogen free/low smoke/low toxicity: EU driven
    • Flexible PPE market development leader
    • SBC compounds slowly penetrating

• **Medical**
  – Extractables, plasticizer free: emotive driven
  – Infusion bags and tubing

• **Automotive**
  – Skins and coated fabrics
PVC Substitution: Slush Molding

Car Model: Audi E8
Part: Instrument Panel Skin Slush Molded
Raw Material Resin: Kraton
Compound: Laprene S formulated by SO.F.TER
Fabricator: Peguform
Features: Halogen free, phthalate free
30-40% lighter weight than PVC
Better low temperature performance than PVC
Better aging characteristics than PVC
Lower processing costs
Recyclable
Deep soft touch/haptics feel

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
PVC Substitution: Coated Fabrics

- PVC: the dominant incumbent strongly entrenched, cost effective
- SBC-TPEs: Phthalate-free, UV resistance, low temp properties

PHOTO: KRATON

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
**PVC Substitution: Infusion Bags**

**Application:** IV bag

**TPE type:** H-SBC (SEBS)

**Key properties:** Elasticity, Low temp, Clarity, PP compatibility

**Processing:** Co-Extrusion

---

**Application:** Infusion bottle closure

**TPE type:** H-SBC (SEBS)

**Key properties:** Re-sealing, Bond to polyolefins

**Processing:** 2 component injection

**SOURCE:** ROBERT ELLER ASSOCIATES LLC, 2013
Bio TPEs

• **Driving forces:**
  – Emotive from the consumer perspective
  – Sustainability from the manufacturer

• **Applications**
  – Driven by marketing to consumers/consumer oriented products (both disposable and durable goods)
  – Footwear

• **Definitions**
  – Renewable or Sustainable Compounds
    • Produced from renewable raw material sources that are sustainable from plants or animals
  – Bio-degradable
    • Compostable
    • International standards
      – Plastic biodegradation: EU13432/EN14995/ASTM D6400
      – Aerobic biodegradation: EN14046/ISO1485551
  • Can be either synthetic or bio-based

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
<table>
<thead>
<tr>
<th>Feedstock Source</th>
<th>Status and Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>Shenhua/Dow in China: Polyolefins plant under construction</td>
</tr>
<tr>
<td>Corn</td>
<td>PLA, polyols (COPE, TPU) Materials in production</td>
</tr>
<tr>
<td>Castor Bean</td>
<td>COPA In production</td>
</tr>
<tr>
<td>Biomass</td>
<td>Butadiene via butanediol Versalis in development</td>
</tr>
<tr>
<td>Waste CO</td>
<td>Butadiene Invista/Lanza Tech in development</td>
</tr>
<tr>
<td>Starch</td>
<td>Teknor Apex, Cereplast, Roquette (Gaialene) in production</td>
</tr>
<tr>
<td>Sugar</td>
<td>Braskem (in production for PE, PP planned) Dow Mitsui JV project delayed</td>
</tr>
<tr>
<td>Algae</td>
<td>Algenol (Dow) Solarzyme (Dow) Synthetic Genomics (ExxonMobil) All in R&amp;D/Pilot Plant stage</td>
</tr>
<tr>
<td>Yeasts</td>
<td>Amyris (Kraton, Kuraray) Isoprene in R&amp;D phase</td>
</tr>
</tbody>
</table>

Source: Robert Eller Associates LLC 2013
## Thermoplastic Elastomer Compounds Based on Renewable Raw Materials

<table>
<thead>
<tr>
<th>Elastomer Family</th>
<th>Renewable/Sustainable Source</th>
<th>Market Driver</th>
<th>Producers</th>
<th>Renewable Content (%)</th>
<th>Hardness Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBC</td>
<td>Starch (Gaialene)</td>
<td>Consumer products</td>
<td>CTS</td>
<td>20-50</td>
<td>22-85 (Shore A)</td>
</tr>
<tr>
<td>TPU</td>
<td>Polyols based on plants (corn and fats/oils)</td>
<td>Footwear</td>
<td>Lubrizol Bayer API GLS BASF/Oleon</td>
<td>20-70</td>
<td>70 (Shore A) to 55 (Shore D)</td>
</tr>
<tr>
<td>COPE (TPE-E)</td>
<td>Polyols based on plants (corn)</td>
<td></td>
<td>DSM DuPont GLS</td>
<td>20-60</td>
<td>35-55 (Shore D)</td>
</tr>
<tr>
<td>COPA</td>
<td>Castor Oil</td>
<td>Footwear</td>
<td>Arkema Evonil</td>
<td>25-94</td>
<td>35-72 (Shore D)</td>
</tr>
<tr>
<td>EPDM</td>
<td>Sugar (Braskem ethylene)</td>
<td></td>
<td>DSM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013*
Plant-based Fillers/Fibers for Bio-plastics/elastomers

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
Biodegradable Thermoplastic Elastomers

- **API (Italy):** Apinat
  - Based on TPU and aliphatic copolyester
  - Two series of biodegradable, one from
    - synthetic raw materials
    - renewable raw materials (polyols derived from plant (mainly corn))
  - Hardness from 55 Shore A to 78 Shore D

- **Green Dot Holdings (US):** Terratek Flex GDH-B1
  - Starch based compostable thermoplastic elastomer
  - Initial applications in cell phone cases, toys and furniture
  - Startup company, limited supply capabilities

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
Automotive: Key market for Thermoplastic Elastomers

- **THE AUTO MARKET**
  - 40-50% of current TPE demand
  - Key incumbents: EPDM, PVC, TPO
  - Global footprint

- **RADIATOR HOSE**
  - o-TPV

- **WIRE/CABLE**
  - COPE
  - o-TPV

- **BUMPER FASCIA**
  - SBC AS MODIFIER
  - THINNER WALLS

- **UNDERHOOD**
  - S-TPV
  - COPE
  - TPO
  - Hi FLOW SEBS, o-TPV
  - COPE

- **BODY/GLAZING SEALS**
  - o-TPV
  - Hi MELT STRENGTH (HMS)
  - CROSSLINKED SEBS

- **SKINS**
  - TPO
  - Hi FLOW SEBS, o-TPV
  - COPE

- **WINDOW ENCAPSULATION**
  - HIGH FLOW SEBS, o-TPV

- **COATED FABRICS**
  - SEBS

- **SOURCE:** ROBERT ELLER ASSOCIATES LLC, 2012

**THE AUTO MARKET**

- Role for lightweighting, systems cost-save
- Key target properties: low V.O.C., thin wall, low odor, oil/fuel resistance, heat resistance, sustainable
- Role for process technology, co-processing innovations

**SOURCE:** ROBERT ELLER ASSOCIATES LLC, 2012
Thermoplastic Elastomers in Window Encapsulation

- **Application:** Rear quarter window encapsulation seal

- **TPE Candidates:** PUR, o-TPV, SEBS (H-SBC), PVC, EPDM

- **Key Properties:**
  - High flow (to reduce breakage)
  - Glass adhesion
  - UV/weather resistance
  - Low compression set
  - Squeak resistance
  - Scratch resistance

- **Notes:**
  - Example of intense inter-material competition
  - Example of static seal application
  - Two shot molding adds value
  - Colors?
  - Narrower profiles?
  - Systems cost save opportunities
  - Polycarbonate glazing could shift requirements

Source: Kraiburg

Source: Robert Eller Associates LLC

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
Under Hood Temperature Increases ➔ High Heat Thermoplastic Elastomers

• Application: Air duct cuff
• TPE type: s-TPV (Zeotherm)
• Key properties: Heat resistance, Ease of processing, Polyamide adhesion

Note: Example of metal replacement (e.g. polyamide) pulling TPEs into under-hood applications

• Application: Hot air duct (primarily turbo engines)
• TPE type: s-TPV (Zeotherm)
• Key properties: Heat resistance, Processing ease
• Processing: Blow molding

Source: Zeon Chemicals

Source; Zeon Chemicals

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
Broadening the Thermoplastic Elastomer Application Base

• Application: High temp hose
• Target markets: Auto under hood, industrial hose
• TPE types: Several depending on heat resistance level (COPE, TPEE, s-TPV)
• Key properties: Temp resistance
  Low stiffness
• Process: Water Injection molding technology (WIT)
• TPE enabling technology: temp resist (s-TPVs)
• Note:
  - Woven mesh inserted during molding process
  - Mesh insertion developed at IKV

Source: Akro-Plastic GmbH

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
## Co-processing Drives Thermoplastic Elastomer Growth in Rigid/Flexible Systems

<table>
<thead>
<tr>
<th>TYPE</th>
<th>STRUCTURE</th>
<th>NOTE/EXAMPLE APPLICATION</th>
</tr>
</thead>
</table>
| Overmold, Film coex, 2-shot mold | TPE Substrate (rigid segment) | - Soft touch phones  
- Some 2-tone applications  
- Vibration damping |
| Side by Side | TPE Rigid Segment | - 2-tone  
- Door trim, console, IP  
- Bumper fascia |
| Edging | | - Body/glazing seals (profiles)  
- Cowl vent seals  
- Co-extrusion or 2-shot |
| Co-blow Mold | TPE (flexible) Rigid | - Boots/bellows, hose  
- Ducting |
| Co-extrusion Blow Mold or Co-extrusion | o-TPV s-TPV or ETP inner | Under-hood:  
- Hose (e.g. fuel)  
- Duct |
Automotive Hose: Adding Value Via Coextrusion

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
Dolphin Process: Reducing Steps in Auto Interior Soft Trim Applications

Application: Soft touch instrument panel, door trim, glove box
Vehicle: Daimler Actros
TPE type: COPE (TPEE)
Substrate: PC/ABS
Features:
- Entire part in single injection machine (two barrel rotary platen) with expansion/decompression option
- 8 step process → 2 step
- Cost save vs off line skin forming (slush, thermoform or PU spray), substrate injection, PU foaming

Photo: So.F.Ter (Italy)

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
TPE Elastomer Feedstock Developments

- **Elastomers:**
  - POE capacity expansions
    - Singapore (ExxonMobil)
    - Thailand (Dow)
    - Middle East (XOM/SABIC, Sadara)
  - EPDM capacity expansion
    - Asia (market demand)
      - Koreans (SK, Kumho)
      - China (Lanxess, Sinopec and several new entrants)
    - Middle East and North American (low cost gas)
      - Sumitomo, Dow
    - Europe
      - Versalis
  - SBC expansions
    - China SEBS /SEPS (TSRC, Sinopec, Oretel)
    - Taiwan (Kraton, LCY)
- **Polybutene instead of PP**

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
Extending the SBC Property Range

• **The challenges:**
  - Steep melt viscosity decline with temperature (+ for high filler applications, high flow applications) limits processing /properties)
  - High compression set, especially at elevated temperatures

• **High melt strength (HMS) grades allow:**
  - Blow moldability
  - Foamability
  - Film extrusion/calendaring (for PVC film substitution)
  - Profile/tubing extrusion
  - Thermoformability

• **Improved compression set properties allows:**
  - Competition with o-TPV rubber substitution (e.g. body/glazing seals)
  - Non-auto sealing applications (e.g. packaging, industrial)

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
Summary

• Thermoplastic Elastomer life cycle: maturing and commoditizing
  • Move to specialties for higher profits
• Asia shift:
  • Decreased Western Thermoplastic Elastomer demand
  • Large multinationals adapting to broader range of Asian quality/price tiers
  • China slowed GDP growth (auto growth remains high)
  • Re-shoring of TPE customer base to West (primarily starting in U.S.)
• Thermoplastic Elastomer industry structure shifting in response to:
  • Maturing supply side (maturing of some TPE grades)
  • Low cost raw materials search (shale gas abundance in U.S., affect European competitiveness in EPDM and POEs?)
  • Global market shifts toward Asia (partially modulated by re-shoring to U.S.)
• Global recession effects:
  • Decline of China exports → Europe, U.S. shifts to domestic markets
  • Some TPE raw material price declines
• TPE properties envelope expanding:
  • New applications in auto, health care, packaging, consumer
  • SBCs, most rapid properties expansion
  • Many opportunities for value add
  • Role for process/materials combinations

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
Summary (cont’d.)

• PVC substitution
  • Strong growth in wire and cable, medical and automotive
  • SBCs leading replacement candidate

• Bio TPEs
  • Technology being positioned
  • Applications and markets emerging
  • Key issue is value

• Auto remains major global demand driver:
  • Recovery in U.S., severe auto recession in Europe
  • EPDM substitution (e.g. hose, body/glazing seals) driver
  • Interior skins/soft touch remain battleground
  • “Green” demands stimulate TPE substitution
  • s-TPVs compete in more demanding high heat applications

• Processing technology is opening new application opportunities

SOURCE: ROBERT ELLER ASSOCIATES LLC, 2013
Thank You!

Robert Eller Associates LLC

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