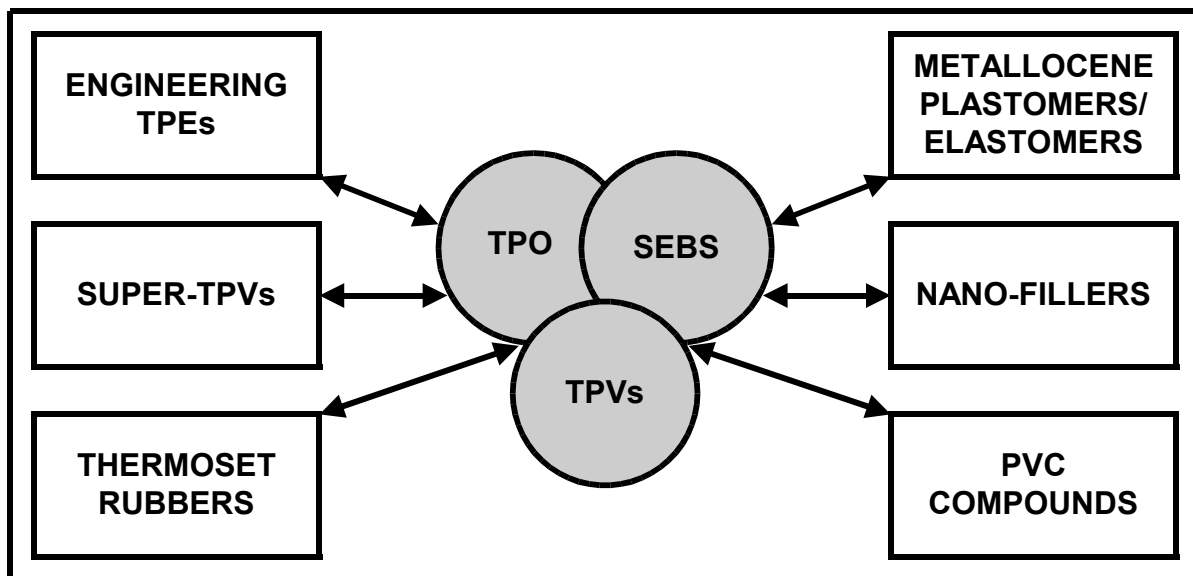


## Specialty Thermoplastic Elastomers . . . Markets, Economics, Technology, Intermaterials Competition



### *A Europe/U.S./Japan Multiclient Industry Analysis*

Completed in January 2006

**Robert Eller Associates, Inc.**

**CONSULTANTS TO THE PLASTICS AND RUBBER INDUSTRIES**

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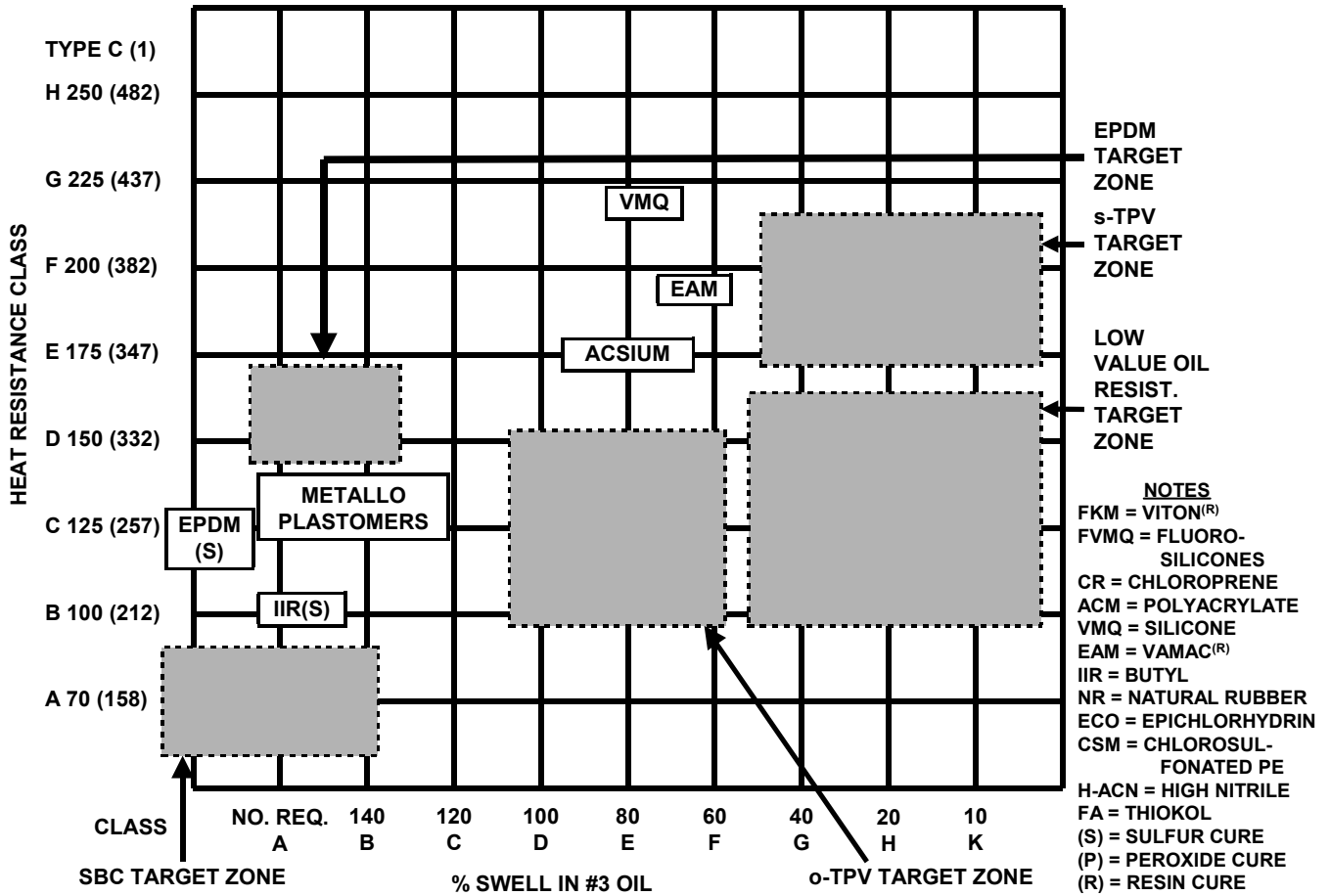
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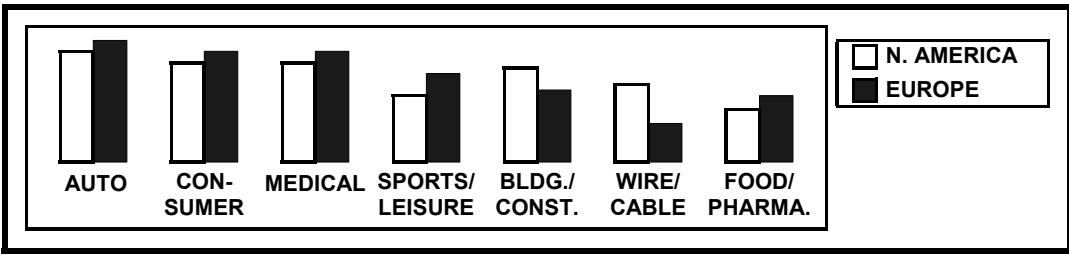
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**TARGET MARKETS FOR SUPER-TPVs AND NANO-TPEs**



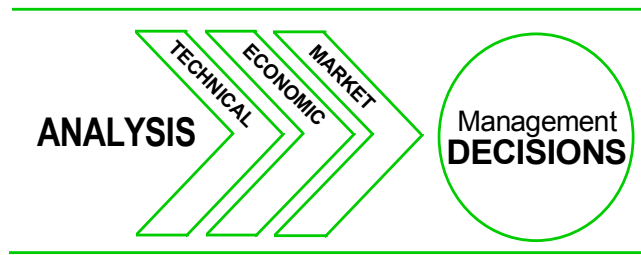
SOURCE: ROBERT ELLER ASSOCIATES, INC., TPE MULTICLIENT, 2005

**TPE MARKET SECTOR GROWTH RATES (N. AMERICA, EUROPE -- 2005/2010) (EXAMPLE ONLY)**



**EUROPEAN TPE MARKETS (2005/2010) (EXAMPLE ONLY)**

MARKET SECTOR	2005/2010 MARKET SIZE, TONNES				
	f-TPV	p-TPV	s-TPO	SEBS	m-PO
APPLIANCE/TOOL					
AUTO					
BLDG./CONST.					
CONSUMER					
FOOD/PHARMA.					
MEDICAL					
SPORTS/LEISURE					
WIRE/CABLE					



## **Specialty Thermoplastic Elastomers . . . Markets, Economics, Technology, Intermaterials Competition**

*Robert Eller Associates, Inc. (REA) is pleased to present for your consideration this prospectus for our second analysis of the key technology, economics, and markets for olefinic, styrenic, and super-TPVs in Europe and North America.*

The technology, economics, markets, and structure of the supply chain for specialty TPEs are undergoing major shifts. Some examples of key trends to be analyzed in the study are:

- The entry of super-TPVs and crosslinked SEBS grades into the market
- Broadening the range of matrix resin and elastomer combinations
- The influence of Asian markets on TPE geographic focus and end-use demand
- The impact of Japanese and Korean OEM share gain in North America and Europe
- The role of nano-fillers in TPE property modification and market potential
- The proliferation of vulcanization technology
- Fundamental shifts in supply chain structure
- Increased penetration by TPEs into traditional rubber markets
- New metallocene resin technology and increased penetration of reactor products, which are:
  - altering compounding technology requirements and capabilities
  - shifting the path to market and affecting the value chain
- Expanded TPE performance envelope (compression set, UV resistance, softness, adhesion, oil resistance, vibration damping) that facilitates entry into new market sectors and increased competition potential with rubber
- Enhanced multi-shot molding technologies capable of substantial cost savings
- Improved foaming technologies
- Uncertainty over PVC substitution impacts
- Price erosion and commoditization of some TPE sectors
- Convergence of European, Japanese and N. American technologies
- Growth of TPE concentrates and direct compounding, which are shifting path to market

REA's analysis will quantify the effects of these changes on the competition within the target TPE group and the competition with PVC, rubber, and the engineering TPEs.

## STUDY OBJECTIVES

This REA multiclient study analyzes and characterizes all TPE market segments in Europe and North America with respect to:

- Implications of new resin, filler, and vulcanization technologies
- Intra-TPE competition
- Competition between the target TPEs and other plastics and rubbers
- Macro-economic and new technology impacts on TPE pricing
- Value chain analysis and value-added opportunities
- Driving forces for material and process substitution
- The implications of new fabrication processes on competitive manufacturing economics and market position
- Compounding costs via captive and merchant TPE compounding
- Market, technology, and economic implications of path-to-market shifts

## SCOPE

**TPE Compound Coverage:** The target TPE compounds analyzed in this study include SEBS (and SEPS), olefinic TPVs (o-TPVs), the full range of new generation super-TPVs, and specialty TPOs. (Commodity TPO applications are included for reference but not analyzed in-depth.) Intra-TPE competition as well as competition between the target TPEs and other polymer families (rubber, PVC, polyolefin resins) are analyzed.

**Regional Coverage:** Europe and North America are the primary focus of this study with regard to technology, economics, markets, and industry structure. The Japanese TPE industry has been analyzed with respect to TPE resin, compound technology, supplier industry structure, and penetration of North American and European markets. The implications of Asian market demand shifts are also analyzed.

**Forward Vision:** The primary emphasis of the study is on the analysis and forecast of likely evolution during the next five years (2005-2010). The current situation and REA's view of technical, economic, and market implications formed the basis for our forecasts.

**Fabrication Process Technology:** A fundamental hypothesis of our study is that economic pressures will stimulate fabrication process technology. REA has identified and analyzed the TPE impact of key current and evolving technologies (multi-shot molding, sequential valve gating, foam extrusion/molding, slush molding, extrusion [sheet, profile], blow molding, textile coating, foams, and co-processing).

**Property Envelope Shifts and Graphic Representation:** A series of graphs clearly defines the current and evolving TPE property envelopes, the associated intermaterials competition, and market implications. These property/market envelope graphics are an aid to market participation, planning, and quantification.

**Pricing:** The current/future dynamics of pricing for the target TPEs are analyzed with respect to:

- Anticipated shifts in monomer pricing due to global market pressures
- New resin technologies
- Shift in path to market
- New compounding technologies, including direct compounding
- Competition at the rubber interface
- Increased presence of independent and captive compounders
- Globalization of TPE markets
- The profitability squeeze on fabricators and TPE compounders
- The cascade effect toward lower cost TPEs

**Market Sector Structure:** As in REA's first global TPE multiclient study, all major end use market sectors and associated applications for the target TPEs in Europe and North America have been analyzed and quantified with respect to TPE usage (by type), shifts in TPE demand, implications of a broadened property envelope, and current and anticipated future pricing. The automotive sector accounts for approximately 40% of the coverage analysis.

**Structural Change:** The structure of the TPE supply chain is changing as a result of economic pressures and new resin, process and compounding technologies. These structural changes in Europe and North America have been documented and analyzed for their implications on markets, profitability, and TPE demand.

**Supplier Strategies:** The implications of an expanded resin supplier base in styrenics, olefinics, and super-TPVs has been analyzed as well as the strategies of major TPE compounders.

**PVC vs. TPE Competition:** European environmental legislation has been put in place to varying degrees, but has had little impact on TPE demand thus far. PVC resin and compounding technologies have improved, and PVC has gained share in several markets. REA has analyzed and forecasted the implications of European environmental legislation on target markets and TPE substitution potential.

**Rubber Replacement:** REA has identified and quantified the target rubber markets (roofing, belting, hose, automotive body/glazing seals, building/construction glazing seals) and developed a characterization of substitution dynamics and future TPE substitution potential.

**Time Horizon:** Current markets have been characterized for the base year 2005 and forecast through 2010.

## HOW TO SUBSCRIBE

An order form outlining costs, terms, and conditions is enclosed with this prospectus. To subscribe, fill out the form and return it to REA with the subscription payment.

## STUDY OUTLINE

<u>Chapter</u>	<u>Title</u>
1	Introduction
2	Executive Summary <ul style="list-style-type: none"><li>A. Demand Trends and Market Structure for Target TPEs in Europe and N. America</li><li>B. Target TPE Market Structure</li><li>C. China/Asia and East Europe Market Shift Effects</li><li>D. Fabrication Process/Materials Technology Influences</li></ul>
3	Automotive TPE <ul style="list-style-type: none"><li>A. Summary</li><li>B. Automotive TPO</li><li>C. Interiors (Airbag Doors, Skins, Coated Fabrics, Acoustics)</li><li>D. Body/Glazing Seals</li><li>E. Boots, Bellows, Hose, Belting</li><li>F. Automotive Rubber Markets</li><li>G. Exterior</li></ul>
4	Demand Forecasts/Market Sector Profiles: Non-Automotive <ul style="list-style-type: none"><li>A. Summary of Non-Automotive TPE Analysis</li><li>B. Appliance/Tool</li><li>C. Building/Construction</li><li>D. Consumer Products/Housewares</li><li>E. Electrical/Electronics and Personal Communications</li><li>F. Fluid Handling/Industrial</li><li>G. Food/Pharmaceutical Packaging</li><li>H. Footwear</li><li>I. Medical</li><li>J. Personal Care/Cosmetics</li><li>K. Sports/Leisure</li><li>L. Wire/Cable</li><li>M. Soft Touch (Implications for all Mkts.)</li><li>N. Film and Sheet</li><li>O. Coated Fabrics</li></ul>
5	Intra-TPE and Intermaterials Competition <ul style="list-style-type: none"><li>A. Summary</li><li>B. The TPE Property Envelope</li><li>C. Competition with Rubber</li><li>D. Competition with Engineering TPEs</li><li>E. The Metallocene Polyolefin, Plastomer, Specialty TPO Interface</li><li>F. Nano-composite TPOs, TPVs, and SEBS</li></ul>
6	Fabrication Process Technology and Effect on TPE Selection
7	Compounding and New Materials Technologies <ul style="list-style-type: none"><li>A. Implications of Nano-fillers</li><li>B. Role of Foaming Technology</li><li>C. Formulation/Compounding Strategies</li></ul>
8	Super-TPVs <ul style="list-style-type: none"><li>A. Summary</li><li>B. Competitive Position of s-TPVs</li><li>C. Industry Structure</li></ul>
9	Economic Factors Affecting Current/Future TPE Pricing
10	Industry Structure and Supplier Strategy (N. America/Europe/Japan) <ul style="list-style-type: none"><li>A. Summary</li><li>B. Ownership Shifts</li><li>C. Resin Supplier Strategies</li><li>D. Path to Market and Supply Chain Shift Implications</li><li>E. TPE Compounder/Supplier Profiles</li><li>F. Implications of Asian and E. European Market Shifts (Asia/East Europe)</li><li>G. China TPE Market Overview</li><li>H. Role of Japanese Companies in Target TPE Sectors</li></ul>
Appendices:	<ul style="list-style-type: none"><li>A. References</li><li>B. Glossary of Abbreviations</li><li>C. TPE Grades and Suppliers</li><li>D. Photos of Key Applications</li><li>E. Statistical Reference for TPE Material Shares and TPE Compounder Sales (By Market Sector)</li></ul>

## REA QUALIFICATIONS

REA is a strategic, technology, and market consulting resource specializing in providing decision-quality analysis in support of management decision-making, and investment and acquisition analysis in the global plastics and rubber sectors.

REA associates have carried out pioneering technical, economic, and market multiclient and single client studies in most major plastic and rubber sectors. Our experience in the rubber sector provides unique perspective for the analysis of TPE growth opportunities. In addition to REA's first edition of the TPE multiclient study (completed in 2000), we have recently completed multiclient analyses of automotive interior soft trim and new generation nonwovens in automotive applications.

Recent strategy, market, technology, and acquisition analyses have included:

- Analysis of long-glass fiber reinforced PP compound markets and technologies
- Analysis of TPE opportunities in building/construction glazing
- Growth prospects for TPEs in consumer and medical markets
- Numerous product positioning studies for new TPEs
- Analyses of the role of metallocene polyolefins and styrenics
- Several acquisition and joint venture analyses in the automotive and non-automotive industries in the U.S. and Europe
- TPO and other TPEs in automotive applications
- Automotive PP resins and compounds in the U.S. and Europe
- Compounding strategy for TPE and resin suppliers
- Joint ventures and alliances in the TPE compounding sector
- Compounding, fabrication cost analyses, and supply chain management
- Development of rubber and TPE formulations to meet target requirements
- Opportunities for tire recyclate in TPE formulation

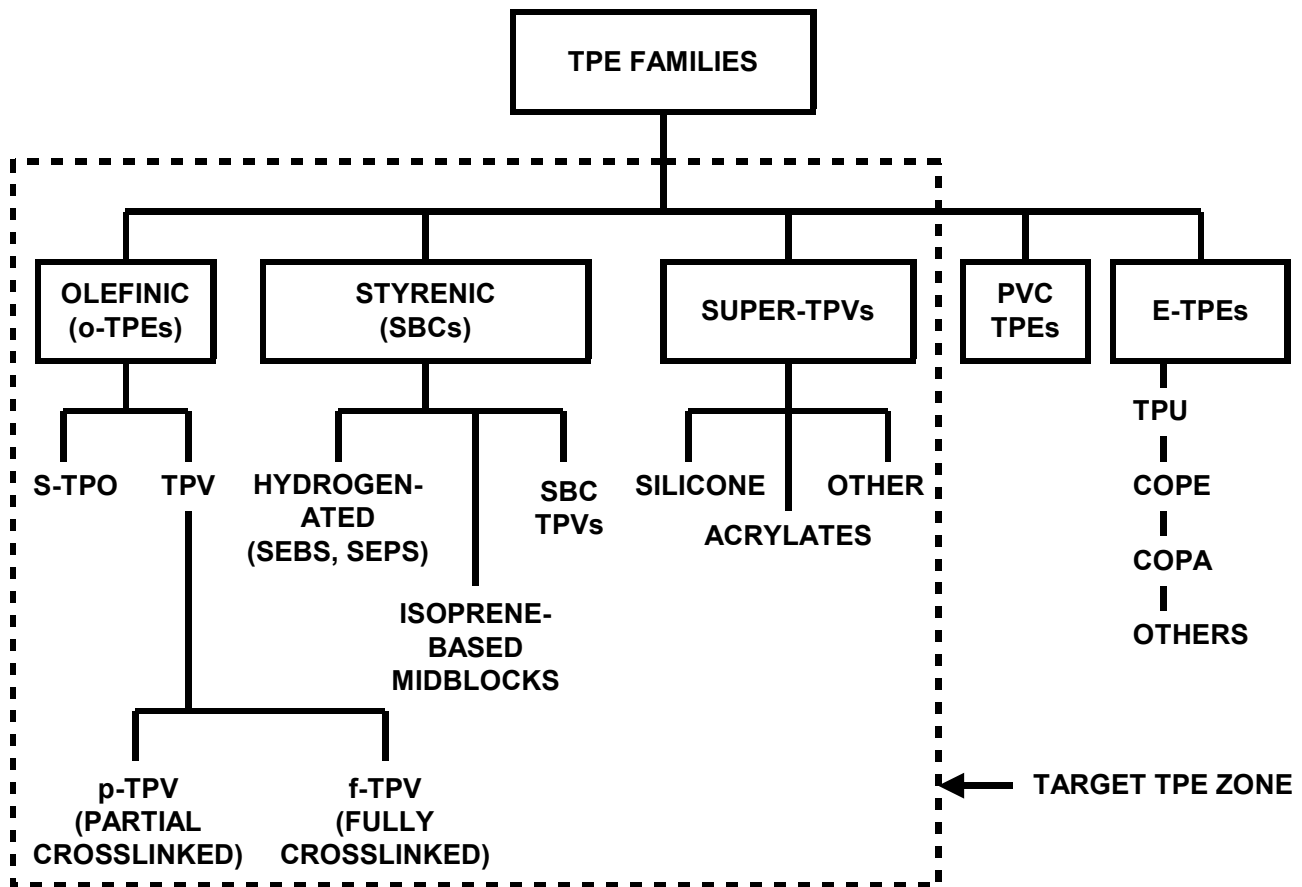
This study was directed by Robert Eller, working in close coordination with REA associates experienced in the compounding, management, and marketing of TPEs in the U.S., Europe and Asia. Prior to establishing REA, he directed plastics consulting studies at Arthur D. Little, Inc. in the U.S. and Europe, and served as General Manager of Multibase (USA). He has directed numerous analyses of the technology, economics, and markets for TPEs, and arranged several joint ventures and acquisitions in the sector.

## WHO SHOULD SUBSCRIBE

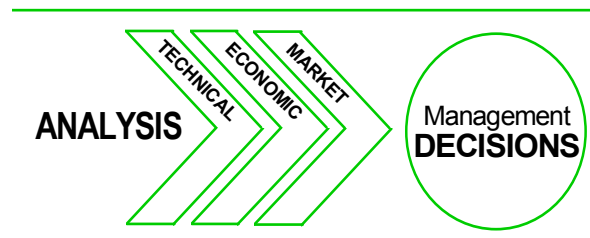
As with all REA studies, this study provides *analysis* in support of management decisions and formulation of strategy for the participants listed below:

- Resin and elastomer suppliers evaluating TPE participation
- TPE and PVC compounders
- Rubber compounders and fabricators seeking growth from the TPE opportunity
- Fabricators (auto, sheet, coated fabrics, medical, consumer products)
- Parts manufacturers evaluating materials alternatives
- Additive suppliers
- Surface coating and adhesives suppliers
- Textile suppliers seeking an understanding of elastomeric textile markets

**TARGET TPE ZONE**



SOURCE: ROBERT ELLER ASSOCIATES, INC., 2005



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This signed order form constitutes an agreement to subscribe to this multiclient study. To subscribe, mail, fax, or e-mail the completed order form to our Akron office, indicating billing coordinates. This order form may also be downloaded from the REA Web Site. Please contact REA for more information on study contents, scope, and approach.

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