



Robert Eller Associates, Inc.

CONSULTANTS TO THE PLASTICS AND RUBBER INDUSTRIES

OVERVIEW OF TECHNOLOGY, ECONOMICS AND MARKETS FOR STYRENIC AND OLEFINIC TPEs IN EUROPE/N. AMERICA BASED ON REA TPE MULTICLIENT STUDY

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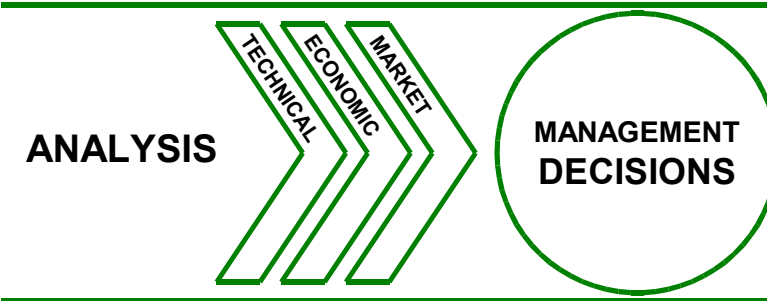
PREPARED FOR:

JAPAN TPE SEMINAR

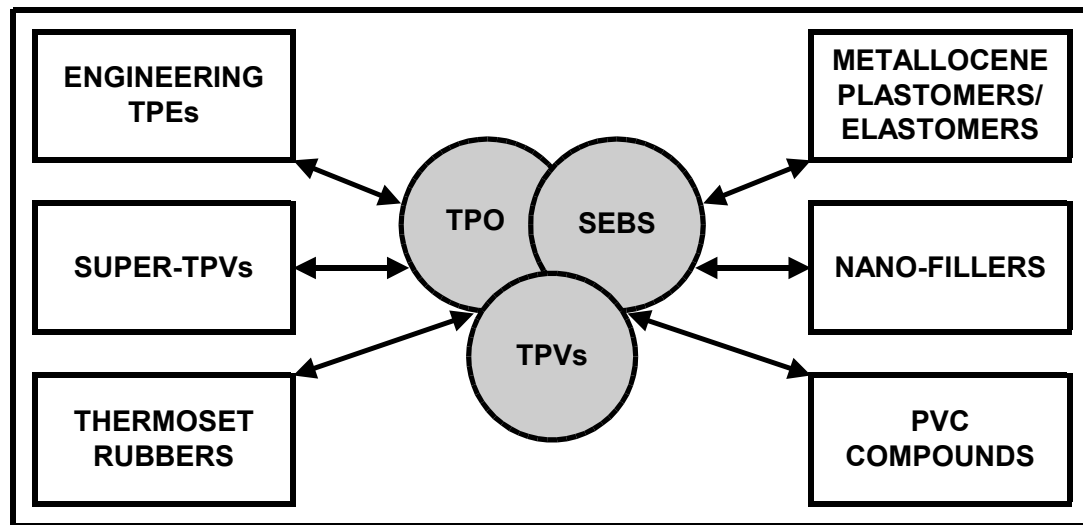
Tokyo, Japan

March 7, 2006

re/mydox/papers/Japan TPE



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



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

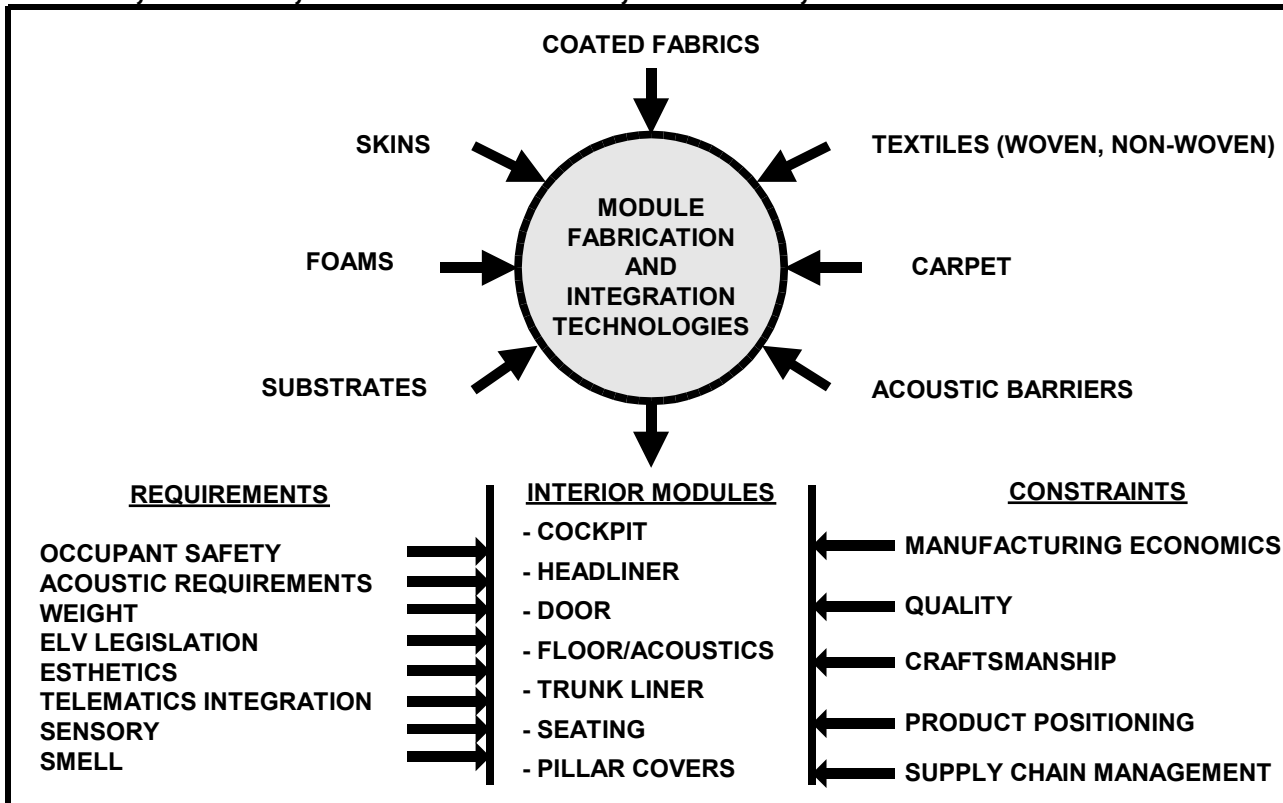
Completed January 2006

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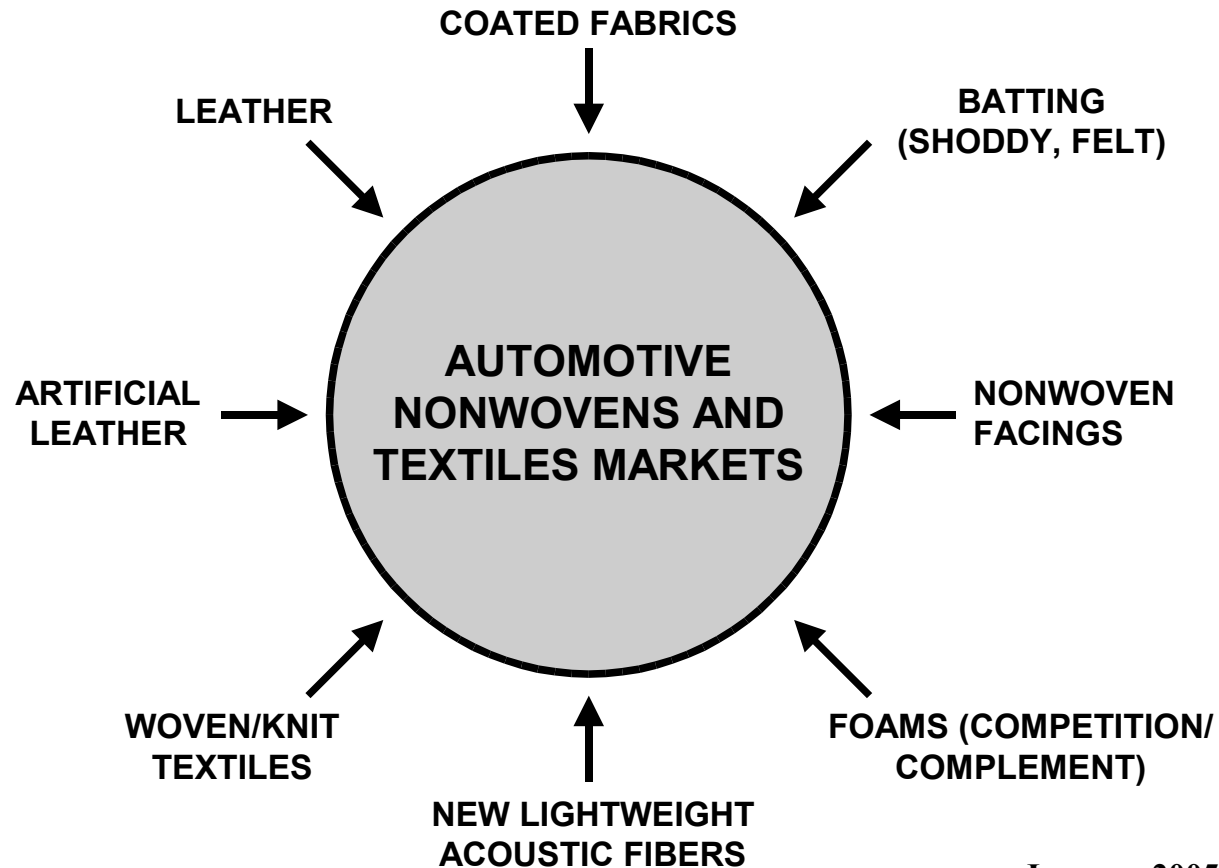


Automotive Interior Soft Trim: Skins, Foams, Coated Fabrics, Textiles, and Acoustic Barriers



Opportunities for Advanced Technology Nonwovens for Automotive Surface and Construction Applications in N. America and Europe

A Multiclient Study

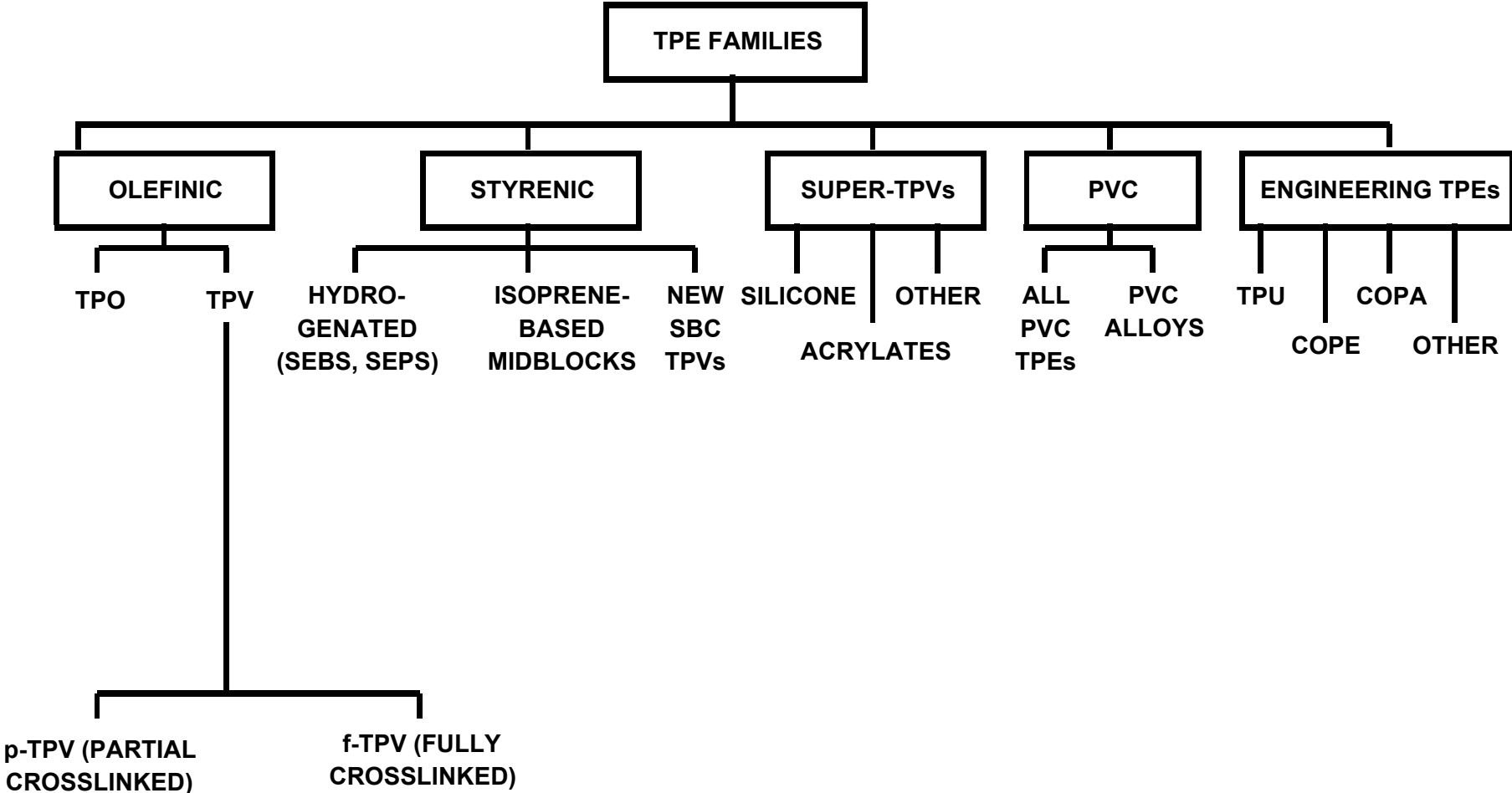


January 2005

REA BACKGROUND

- **ANALYSIS IN SUPPORT OF MANAGEMENT DECISIONS IN: PLASTICS, TPEs, ELASTOMERS, COMPOUNDING**
- **MULTICLIENT AND PRIVATE STUDIES; MERGER/ACQUISITION**
- **OPERATIONS IN US/EUROPE/ASIA**
- **MOST STUDIES ARE GLOBAL IN SCOPE/GLOBAL PERSPECTIVE**
- **ESTABLISHED IN 1991**
- **MOST ANALYSES ARE AT ADVANCED R+D/EARLY COMMERCIALIZATION INTERFACE**
- **AUTO IS SPECIALTY BUT OPERATE IN ALL MARKET SECTORS**
- **EXTENSIVE EXPERIENCE WITH JAPANESE CLIENTS**
- **ETIC IS JAPANESE PARTNER**

THE TPE FAMILIES



SOURCE: ROBERT ELLER ASSOCIATES, INC., TPE MULTICLIENT STUDY 2006

REA EUROPE/N. AMERICA STUDY– KEY FEATURES

- **TARGETS OLEFINIC AND STYRENIC TPEs**
- **ANALYZES INTERMATERIALS COMPETITION**
 - IMPROVED TPOs (METALLOCENE, PLASTOMERS, NANO)
 - PVC
 - ENGINEERING TPEs
- **COVERS N. AMERICA AND EUROPE EQUALLY**
- **EXAMINES ALL MARKETS (AUTO/NON AUTO)**
- **ROLE OF AUTOMOTIVE SUPPLY CHAIN SHIFT**
- **QUANTITATIVE DEMAND MODELS BY SECTOR/APPLICATION**
- **LONG TERM PERSPECTIVE (5 YEARS)**
- **ROLE OF NEW FABRICATION TECHNOLOGIES (2 SHOT, FOAMS, ETC.)**
- **PROFILES OF KEY RESIN AND COMPOUNDER SUPPLIERS**
- **INDUSTRY STRUCTURE SHIFTS**
- **IMPACT OF CHINA/ASIA ON TPE DEMAND**
- **COMPLEMENTS REA CHINA TPE STUDY**

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(REA TPE EURO/N. AMERICA MULTICLIENT)

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10	INDUSTRY STRUCTURE/SUPPLIER STRATEGY

APPENDICES (ABBREVIATIONS, PHOTOS, DATA TABLES)

SUMMARY OF KEY GENERAL CONCLUSIONS

- **TPE DEMAND GROWTH (ALL SECTORS):**
 - OVERALL 5-6%/YR. (EUR/NA)
 - MAJOR RUBBER BREAKTHROUGH COULD ACCELERATE GROWTH
- **AUTOMOTIVE: 7%/YR. GROWTH BETWEEN 2005-2010**
- **FASTEST TPE GROWTH SECTORS WILL BE:**
 - THERMOFORMED SHEET
 - AUTOMOTIVE
 - BUILDING/CONSTRUCTION
 - FOOD/PHARMACEUTICAL PACKAGING
- **PROFITABILITY:**
 - CONTINUED EROSION
 - MARKET SEGMENTING INTO COMMODITY/SPECIALTY

ASIA EFFECTS

- **TPE DEMAND GROWTH REDUCED BY CHINA SHIFT**
 - APPLIANCE/TOOL
 - CONSUMER/HOUSEWARES
 - PERSONAL CARE
 - SPORTS/LEISURE
 - ELECTRICAL- ELECTRONIC/PERSONAL COMMUNICATIONS
- **COMPOUNDER SHIFT TO CHINA ACCELERATING (RECENTLY)**
- **PLASTICS INVESTMENT STARTING TO FLOW FROM CHINA**
- **AUTO EXPORT: STARTING SLOWLY**
- **INDIA SHIFT: SLOWER THAN CHINA, STRONG CURRENT INTEREST**

TPE INDUSTRY STRUCTURE SHIFTS

- **TECHNOLOGY CONVERGENCE:** (EUROPE/US/JAPAN)
- **SHARE SHIFT IN US MARKET:** EUROPEANS, JAPANESE, KOREANS
- **JAPANESE TPE COMPOUNDERS:** MAJOR SHARE GAIN IN N.AMERICA (o-TPEs)
- **PRIVATE EQUITY GROUPS ENTERING**
- **REACTOR TPO/METALLOCENES:** CAUSE MARKET SHARE SHIFT
- **COMPOUNDER PRODUCT LINES:** BROADENING
- **s-TPVs:** ATTRACTING NEW SUPPLIERS
- **SBC-TPV:** COULD SHIFT COMPETITIVE POSITIONS
- **IN HOUSE COMPOUNDING:** WILL CHANGE INDUSTRY STRUCTURE AND PATH TO MARKET

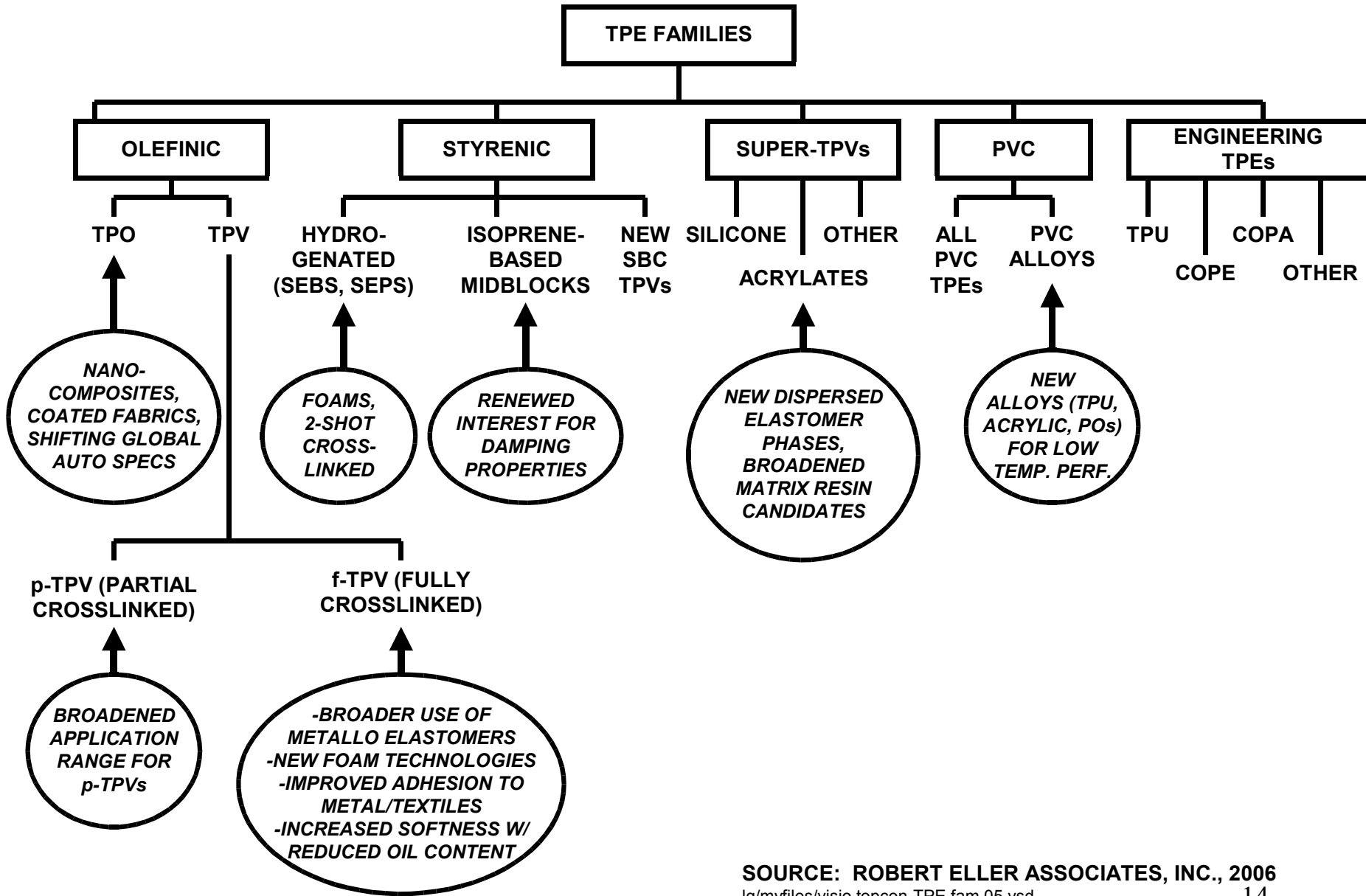
NEW TPE MATERIALS TECHNOLOGIES

- **s-TPVs:**
 - ACRYLIC, NITRILE, AND SILICONE BASED
 - VERY SMALL CURRENT VOLUMES (ZEON AND DUPONT ARE LEADERS)
 - MODERATE GROWTH POTENTIAL
 - AUTO UNDERHOOD IS MAIN TARGET
 - HIGH PRICE LIMITS APPLICATION POTENTIAL
- **r-TPOs:** BROADENING PROPERTY RANGE, NEW COMPETITORS
- **PLASTOMER/HMS PP:** POOR MAN'S CROSSLINKING
- **SBC-TPVs:** KURARAY IS CLEAR LEADER, WILL SHIFT SUPPLIER STRUCTURE, ADDS VALUE, WILL ATTACK EPDM AND O-TPVs
- **SEBS/TPU ALLOYS:** NEW POTENTIAL IN BODY/GLAZING SEALS
- **NANO-TPEs:** SLOW GROWTH, FASTER IN US THAN EUROPE, TALC COMPETES

NEW TPE FABRICATION TECHNOLOGIES

- **2-SHOT MOLDING:**
 - DOOR TRIM/INSTRUMENT PANELS(LARGE AREA/THIN CROSS-SECTION)
 - SBC-TPV VS O-TPV BATTLEGROUND
- **FOAMING:** (SHEET, MOLDED PARTS, BODY SEALS)
- **PLASTOMER/HMS PP:** POOR MAN'S XLINKING
- **COPROCESSING:** CO (BLOW, EXTRUDE [FOAM/SOLID], PROFILES)
- **THERMOFORMING:** MAJOR NEW TPE MARKET
- **DIRECT COMPOUNDING:** START IN TPEs?

EXHIBIT 1: THE TPEs -- NEW FAMILY MEMBERS/BROADENED PERFORMANCE ENVELOPE



DEMAND FOR TARGET TPE COMPOUNDS BY SECTOR (N. AMERICA, 2005)

SECTOR	DEMAND, kT					2005, TOT. kT	SHARE, %	NOTE/MAJOR APPLICATIONS
	SEBS	m-PO (a)	s-TPO (b)	TPV	s-TPV (c)			
AUTO								-GROWTH DRIVEN BY UNDER-THE-HOOD AND BODY SEALS -SEE EXH. 3-A-4 FOR DETAILED ANALYSIS
FOOTWEAR								-SOLES, INSTEPS -SHIFT TO CHINA COMPLETED
BLDG/CONSTR								GLAZING SEALS, SOME WEATHER STRIPPING; NOTE: TPO ROOFING GROWING, BUT ONLY IN r-TPOs (NOT s-TPOs); 30-40 kT OF r-TPO ROOFING IN 2005
CONSUMER/ HSWR								KITCHEN GRIPS DECLINING DUE TO ASIAN PROD'N SHIFT, BUT DIAPER FILM INCREASE W/SEBS
WIRE/CABLE								NO SUCCESS IN NON-HALOGEN COMP'DS; PVC STILL GROWING
FOOD/PHARMA PKG								GROWTH SECTOR, CAP LINER, SYNTHETIC CORK
MEDICAL								GASKETS, CONNECTORS, CONTROLS; NO PENETRATION INTO TUBING OR BAGS
APPLIANCE/ TOOLS								HANDLES, GRIPS, SEALING; INCREASING PENETRATION BUT SHIFT TO ASIAN/INDIAN PROD'N
PERS CARE/ COSMETICS								-RAZORS, TOOTHBRUSHES
FLUID HANDL'G/ INDUSTRIAL								SEALING GROWTH, DOWN-HOLE PIPE GROWTH
SPORTS/ LEISURE								SWIM FINS, CYCLE GRIPS, SADDLES
COATED FABRICS								NO TPO OR SEBS COATED FABRIC PENETRATION
E/E & COMM								INCREASING SOFT TOUCH; GASKET PENETRATION BUT SEVERE SHIFT TO CHINA.
SHEET								SEE CHAPTER 4-N FOR MORE DETAIL
OTHER								
TOTAL, kT								

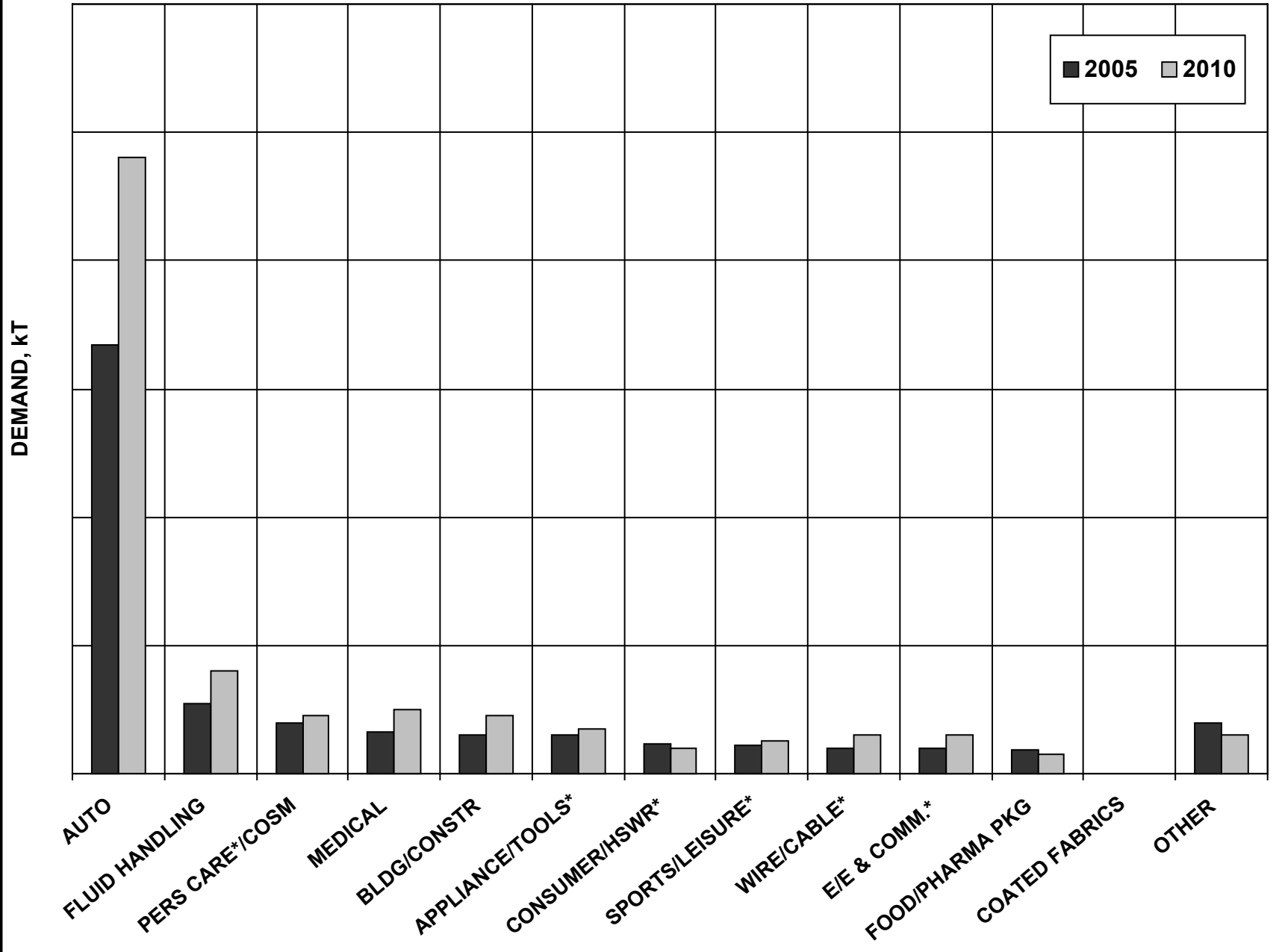
SOURCE: ROBERT ELLER ASSOCIATES, INC., 2006

DEMAND FOR TARGET TPE COMPOUNDS BY SECTOR (EUROPE, 2005)

SECTOR	DEMAND, kT					2005, TOT. kT	SHARE, %	NOTE/MAJOR APPLICATIONS
	SEBS	m-PO (a)	s-TPO (b)	TPV	s-TPV (c)			
AUTO								SEE EXHIBIT 3-A-4A FOR DETAILED ANALYSIS
FOOTWEAR								SOME RESIDUAL MFG. IN EUROPE
BLDG/CONSTR								WINDOW SEALS GROWTH SLOWED BY PVC
CONSUMER/HSWR								INCLUDES DIAPERS
WIRE/CABLE								-JACKETING AND PLUGS -PENET vs. PVC HAS BEEN SLOW
FOOD/PHARMA PKG								-TPV IN CAP LINERS -SEBS, m-PO CORKS, HIGH GROWTH
MEDICAL								-GASKETS, CONNECTORS, CONTROLS -EUROPE EXPORTING TPE COMP'DS
APPLIANCE/TOOLS								HANDLES, GRIPS, GASKETS, HOSE FOR MAJOR APPLIANCE
PERS CARE/COSM								-RAZORS, HAIR DRYERS, TOOTHBRUSHES -SHIFT TO E. EUROPE
FLUID HANDL'G/ INDUSTRIAL								PIPE SEALS, TUBING, BELTING
SPORTS/LEISURE								-SWIM FINS, CYCLE GRIPS, SADDLES -GROWTH DECREASED BY SHIFT TO CHINA
COATED FABRICS								NO TPE PENETRATION
E/E & COMM.								-CELL PHONES, PAGERS, PALM PILOTS -STRONG IMPACT OF SHIFT TO CHINA
SHEET								SEE CHAPTER 4-N FOR MORE DETAIL
OTHER								
TOTAL, kT								

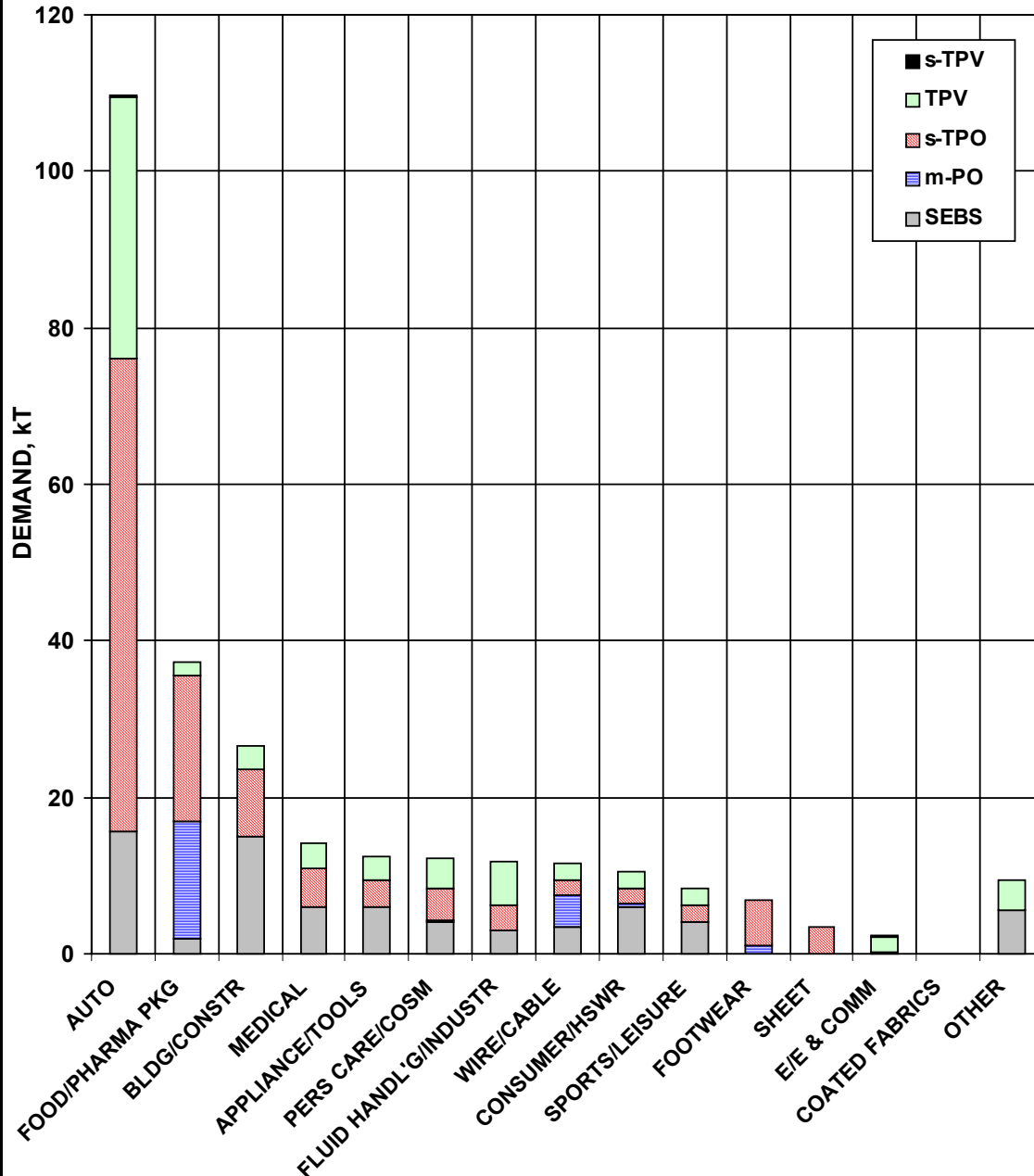
SOURCE: ROBERT ELLER ASSOCIATES, INC., 2006

TPV DEMAND BY MARKET SECTOR (EUROPE, 2005-2010)



SOURCE: ROBERT ELLER ASSOCIATES, INC., TPE MULTICLIENT STUDY, 2006

**DEMAND FOR TARGET TPE COMPOUNDS BY SECTOR
(EUROPE, 2005)**



SOURCE: ROBERT ELLER ASSOCIATES, INC., TPE MULTICLIENT STUDY, 2006

COMPOUNDER MARKET SEGMENT SHARES, 2005 (EXAMPLE ONLY)

SUPPLIER	MKT SHR, %	TPE TYPE					DEM, KT, TGT TPEs (a)	MARKET SEGMENT							
		TPU	SBS	SEBS	TPO	TPV		AUTO	APPL/ TOOL	SPORT/ LEIS.	FL HNDL/ IND	CONS/ HSWR	FOOD/ PHARMA	B/C	PERS. CARE
								KT	KT	KT	KT	KT	KT	KT	KT
So.F.TeR															
BRITISH VITA															
AES/EXXON															
CTS															
DSM															
TECNOFILM															
DUPONT															
ATOFINA/ ARKEMA/ HUTCHINSON															
API															
GOTER THERMO- PLASTIC CMPDS															
KRAIBURG TPE															
TOTAL	100%						277								

SOURCE: ROBERT ELLER ASSOCIATES, INC., TPE MULTICLIENT STUDY 2006

COMPOUNDER PROFILE FORMAT

COORDINATES:

KEY CONTACTS:

OWNERSHIP:

GENERAL COMPANY INFO:

EST. CORP. SALES	EST. TPE SALES	EMPLOYEES	EST. ANNUAL TPE PROD'N., kT
€48MM	€24MM(a)		

TPE SUPPLY CHAIN ROLE:

TPE TYPES/GRADES:

GRADE NAME	SBS	SEBS	SEPS	SIS	TPV	TPO	TPU	COPE/COPA	E-TPE	OTHER TPE
	X			X						

SECTORS SERVED:

AUTO	MED	PERS CARE/ COS	FLUID HNDL/ IND	SPRT/ LEIS	B/C	W/C	CONS PROD/ HSWR	APPL/ TOOL	E/E & PERS COMM	FOOD/ PHARM PKG	ELAST FILM, SHT, FIB
		X		X	X		X	X			X

TPE COMPOUNDING SITES:

ASIA PRESENCE:

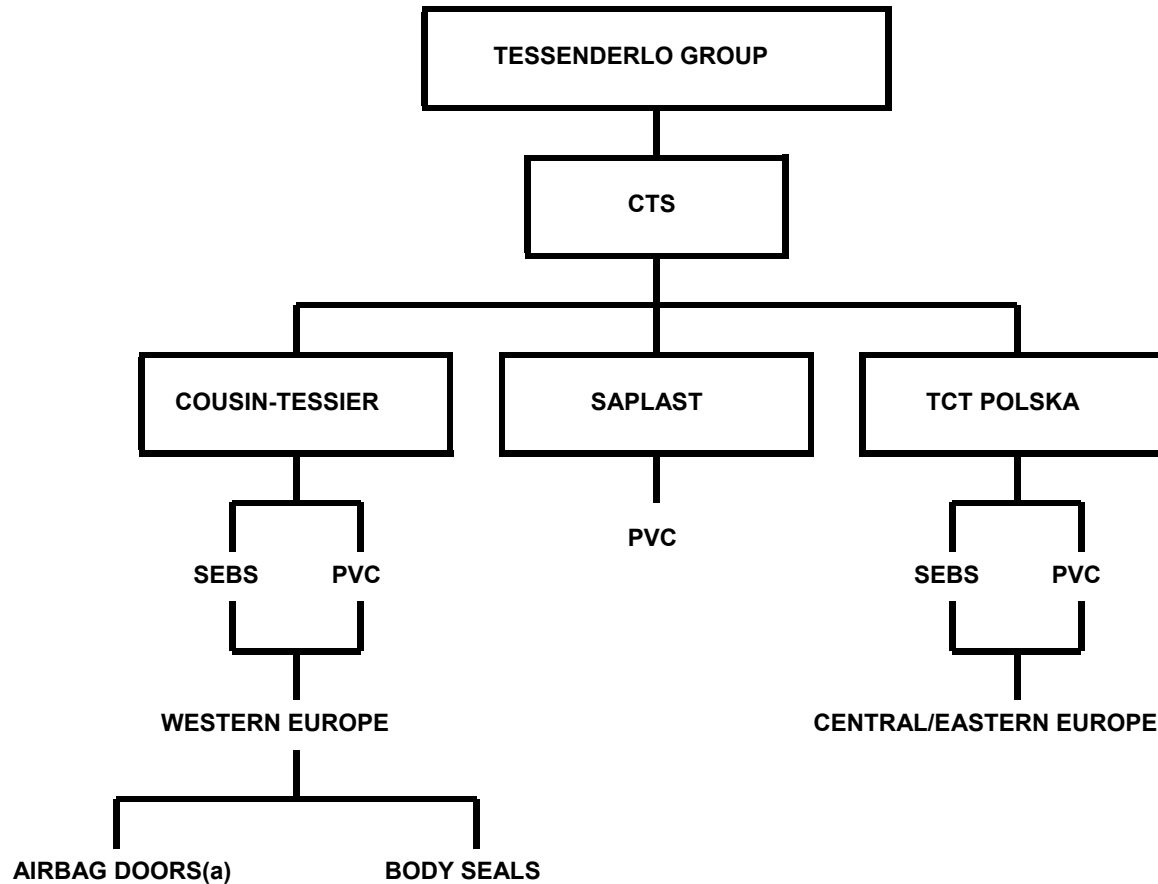
KEY STRATEGIES:

EXAMPLE TPE APPLICATIONS:

KEY TPE INVESTMENTS:

EXHIBIT 10-E-17B

ORGANOGRAM OF COMPOUND TECHNOLOGY SERVICES



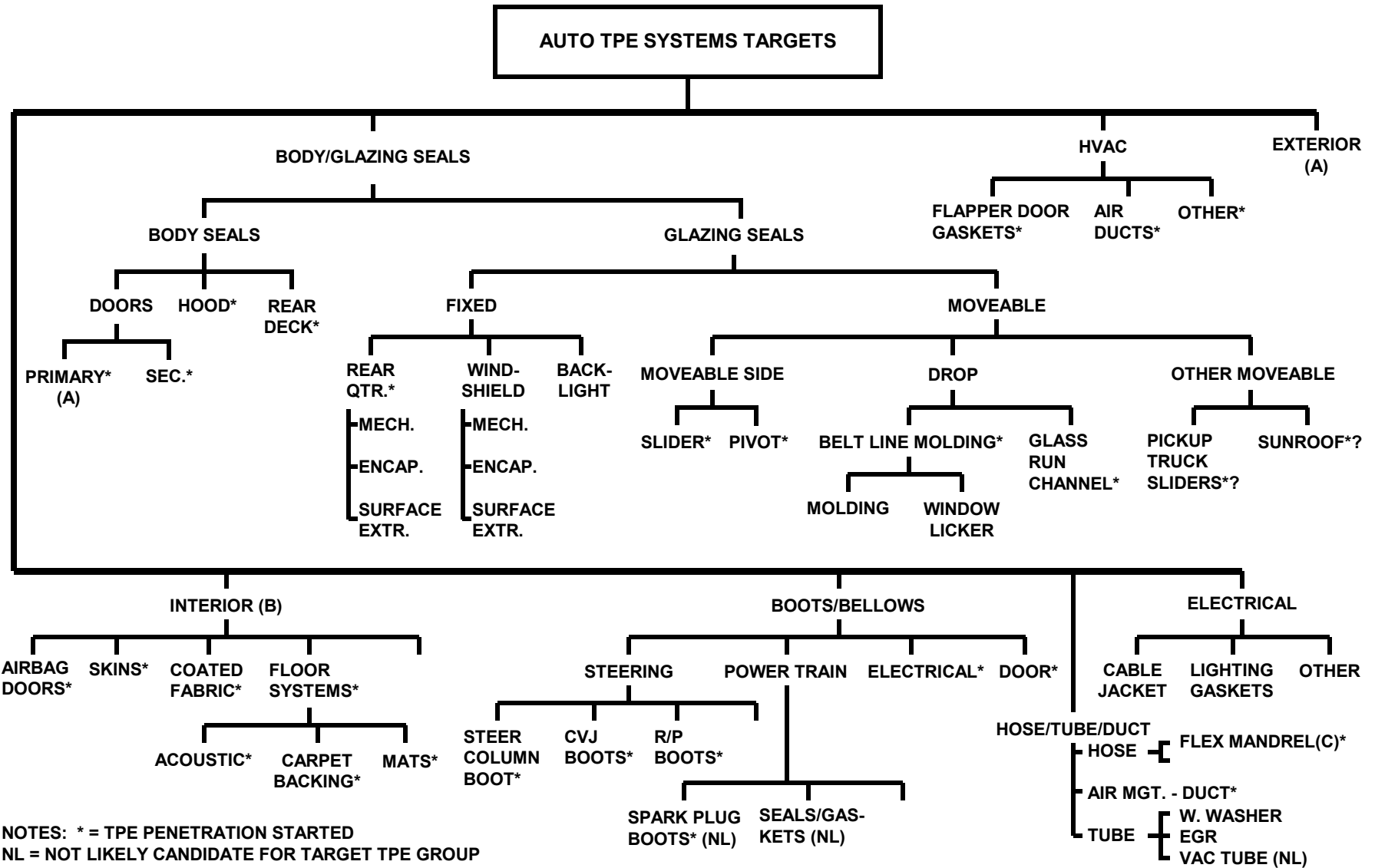
NOTE:

(a) LIKELY TO ENTER N. AMERICAN SEBS MARKET VIA AIRBAG DOORS AND BODY SEALS. STRONG EUROPEAN RELATIONSHIP WITH COOPER, AUTOLIV, AND DEMO WILL HELP.

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2005

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**EXHIBIT 3-A-2
AUTOMOTIVE TPE TARGETS**



NOTES: * = TPE PENETRATION STARTED

NL = NOT LIKELY CANDIDATE FOR TARGET TPE GROUP

(A) DOES NOT INCLUDE COMMODITY TPOs USED IN EXTERIORS

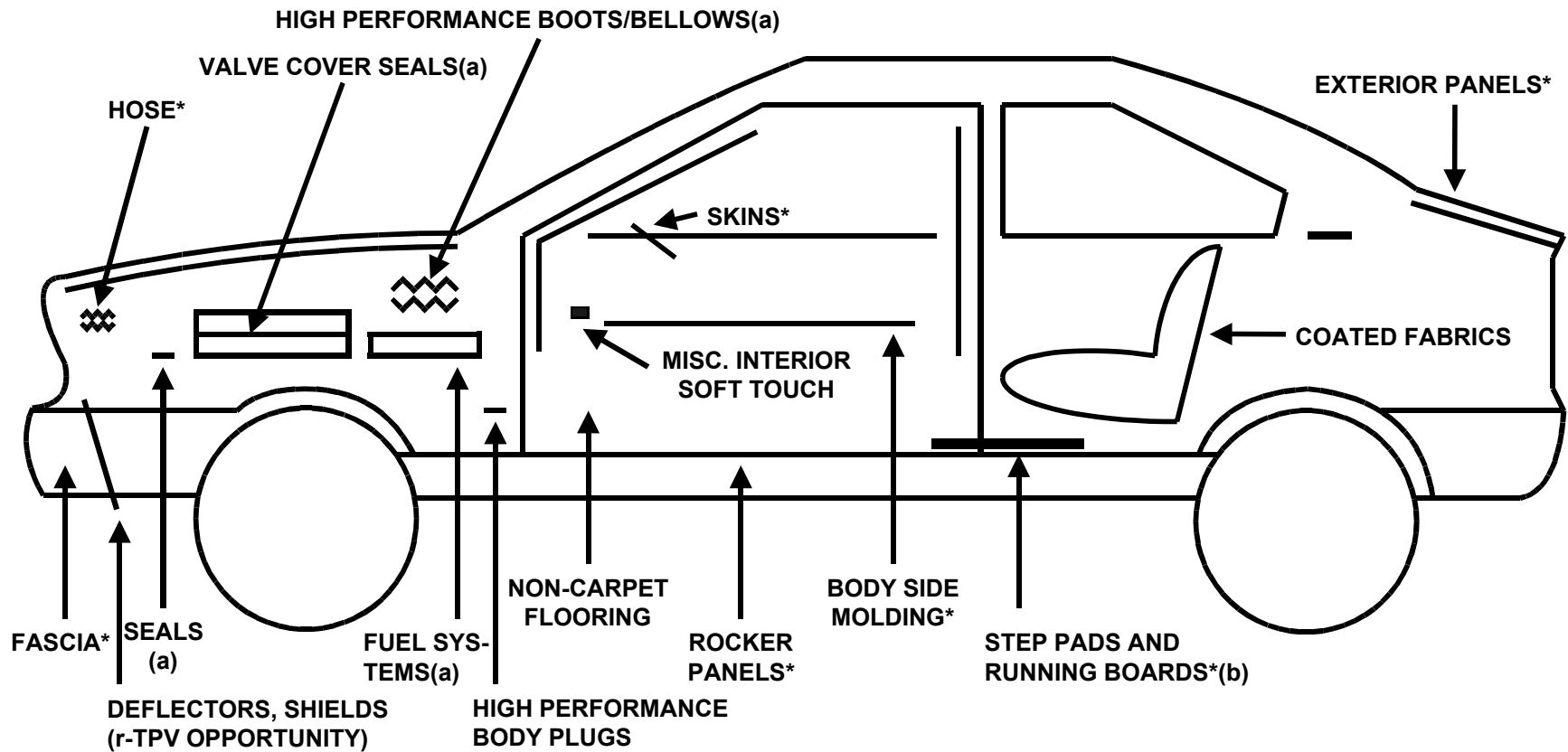
(B) DOES NOT INCLUDE RIGID-FILLED TPOs USED IN INTERIORS

(C) RE-USABLE MANDREL TO MFR. HOSE (TPVs COMPETING WITH NYLON)

(D) E.G., FUEL, COOLANT, OILS, OTHER HOSE -- NOT LIKELY CANDIDATE GROUP FOR TARGET TPES

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2005

EXAMPLE APPLICATIONS FOR RECENTLY DEVELOPED TPEs



NOTES:

-DOES NOT SHOW BODY/GLAZING SEALS, A CONTINUING GROWTH OPPORTUNITY

* INDICATES NANO-TPE OPPORTUNITY

(a) s-TPV TARGET

(b) NOTE COMPETITION WITH LGF-PP

SOURCE: ROBERT ELLER ASSOCIATES, INC., TPE MULTICLIENT STUDY, 2006

AUTOMOTIVE TPE GROWTH OPPORTUNITIES

- **SBC-TPV VS o-TPV TO CHALLENGE EPDM (BODY/GLAZING SEALS)**
- **o-TPVs START IN BELT/HOSE?**
- **s-TPVs IN UNDER HOOD APPLICATIONS**
- **2 SHOT MOLDING (INSTRUMENT PANEL, DOOR TRIM)**
- **SKIN/FOAM COEXTRUSION STARTING**
- **NEW FOAM TECHNOLOGIES (SEBS,TPV?)**
- **LAYER CONSOLIDATION/MONOMATERIALS**
- **AIRBAG DOOR GROWTH/TPE SHARE SHIFT**
- **ENERGY ABSORBING RESINS GROWTH**
- **THERMOFORMED SHEET GROWTH**
- **DIRECT COMPOUNDING**
- **SMART SURFACES**
- **HARD TPO SHARE GAIN (CLASS B SHARE GROWTH**
- **PLASTOMER/HMS-PP SHARE GAIN**

ESTIMATE OF AUTOMOTIVE TPO DEMAND (N. AMERICA -- 2005/2010)

APPLICATION	TOTAL DEMAND, kT		AAG, %/YR.	TPO TYPE (kT)				ELAST. CONC., % (b)	NOTE
	2005	2010		r-TPO		c-TPO			
				2005	2010	2005	2010		
INTERIOR:									
ENERGY MGT.(a)								SOME RUBBER CONC. AT 22%	
IP SUBSTRATES								SOME SHIFT TO r-TPO BY 2010	
AIRBAG DOORS								NOTE ABD GROWTH AFFECTED BY DESIGN	
DT SKIN*								PLASTOMER PENETRATION	
IP SKIN*								PLASTOMER PENETRATION	
TOTAL INTERIOR									
EXTERIOR:									
BUMPER FASCIA*								r-TPO SHARE GAIN; SOME 22%	
AIR DAM*								NO GROWTH	
CLADDING								TREND AWAY FROM CLADDING	
WHEEL ARCH FLARES								USAGE DECLINE	
MISC.									
RUNNING BOARD/ STEP ASSIST*								SOME ICP COMPETITION	
ROCKER PANELS								SOME SEBS PENETRATION?	
BODY SIDE MOLDING									
FRONT GRILLE									
BODY PANELS								NO SIGNIFICANT BODY PANEL GROWTH < 2010	
TOTAL EXTERIOR									
UNDER-HOOD:									
TOTAL UNDER-HOOD									
GRAND TOTAL									

ESTIMATE OF AUTOMOTIVE TPO DEMAND (WEST EUROPE, 2005/2010)

BASIS:	2005	2010
PRODUCTION (MM VEH.)		
% WEIGHT OF NA VEH.		
% TPE vs. CURRENT NA TPE USAGE		

APPLICATION	TOT. DEMAND, kT.		AAG, %/YR.	TPO TYPE				ELAST. CONC., % ^(b)	NOTE
	2005	2010		r-TPO		c-TPO			
				2005	2010	2005	2010		
INTERIOR:									
ENERGY MGT.(a)									
IP SUBSTRATES									
AIRBAG DOORS									
DT SKIN*									
IP SKIN*									
TOTAL INTERIOR									
EXTERIOR:									
BUMPER FASCIA*									
AIR DAM*									
CLADDING									
WHEEL ARCH FLARES									
MISC.									
RUNNING BOARD/STEP ASSIST*									
ROCKER PANELS									
BODY SIDE MOLDING									
FRONT GRILLE									
BODY PANELS									
TOTAL EXTERIOR									
GRAND TOTAL, MM LBS.									
GRAND TOTAL, kT									

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2006

AUTOMOTIVE TPO SALES BY SUPPLIER, kT (N. AMERICA -- 2005)

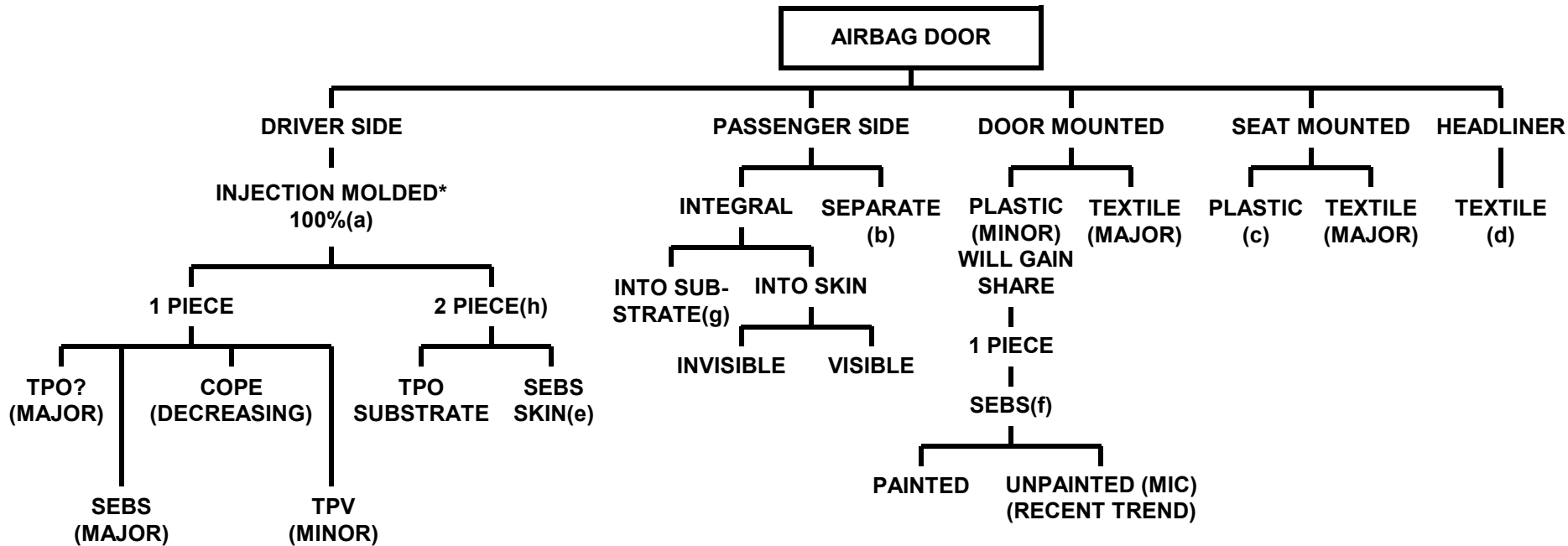
APPLICATION	BASELL	SEP (f)	ADV COMP. (b)	MYTEX/ JPP	INNO- VENE	EXXON MOBIL	WP	DOW	A SCHUL- MAN (e)	FERRO	LAMIN- ATORS (a)	HUNTS- MAN (c)	RHE- TECH	PHIL- LIPS	SPAR- TECH	BORE- ALIS (d)	TOTAL
INTERIOR:																	
HEAD IMPACT/ENERGY MGT.																	
IP: STRUCTURE																	
TPO SKIN-DOORS																	
TPO SKIN: IP																	
AIRBAG DOORS (g)																	
TOTAL INTERIOR																	
EXTERIOR:																	
BUMPER FASCIA																	
AIR DAM																	
CLADDING																	
FLARES																	
RUNNING BOARDS/STEP PADS																	
BODY SIDE MOLDING																	
FRONT GRILLE																	
BODY PANELS																	
ROCKER PANELS																	
OTHER																	
TOTAL EXTERIOR																	
TOTAL ALL																	

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2006

AUTO BODY/GLAZING SEAL MARKET

- **GLOBAL POTENTIAL IS 600 KT**
- **A TARGET FOR MAJOR TPE COMPOUNDERS**
- **GLASS RUN CHANNEL/BELT LINE MOLDING PENETRATED**
- **U.S. HAS BEEN SLOWEST TO SHIFT TO TPEs (ACCELERATING)**
- **o-TPV AND RECENTLY SBC-TPV COMPETE WITH EPDM**
- **CTS (EUROPE) IS EARLY SBC-TPV LEADER**
- **EPDM WILL LOSE SHARE**
- **PVC COULD RETAIN SHARE**
- **SOME BODY SEAL TIER 1s WILL COMPOUND IN-HOUSE**
- **OPPORTUNITY FOR MASTERBATCH**
- **START OF GLOBAL JOINT VENTURES (JYCO/INOAC)**
- **NEW FOAM TECHNOLOGY WILL ACCELERATE PENETRATION**
- **OPPORTUNITY FOR SURFACE COATING TECHNOLOGY**

**EXHIBIT 3-C-1
AIRBAG DOOR MARKET POSITIONS**



NOTES:

* PRIMARY MARKET FOR TARGET TPES

- (a) INTEGRATED STEERING WHEEL/AIRBAG DOOR IN PU HAS NOT BEEN SUCCESSFUL
- (b) USUALLY HINGED, BASED ON MORE RIGID COMPOUNDS, TREND TOWARD INTEGRATION INTO IP SKIN, WILL TEND TOWARD 2-PIECE (SEBS SKIN/TPO SUBSTRATE, COPE, TPO SHARE GAIN)
- (c) SOME COPE AIRBAG DOORS ARE SEAT MOUNTED, USE EXTRUSION GRADE r-TPO CLAMSHELL (E.G., NISSAN, HONDA, GM); ABOUT 200 GRAMS/VEHICLE
- (d) PRIMARILY CURTAIN TYPE SUPPLEMENTED BY ENERGY ABSORBERS
- (e) SEBS SKIN
- (f) SCRATCH RESISTANT SEBS
- (g) HARD IPs (E.G., WITHOUT SKIN) CAN CONTAIN AN INTEGRAL ABD (OFTEN INVISIBLE).
EXAMPLES ARE OPEL CORSA AND SEVERAL VW MODELS.
- (h) SHARES VARY U.S./EUROPE; SEE TEXT

SOURCE: ROBERT ELLER ASSOCIATES, INC., TPE MULTICLIENT STUDY, 2006

AIRBAG DOOR/ENERGY MANAGEMENT RESIN DEMAND MODEL BY POSITION

COMPONENT	N. AMERICA												
	2005												
	FLEET PEN., %	NO./ VEH.	PART WT., GMS.	TPE SHARE, %	TOT. DEMD., kT	TPE DEMAND, %				TPE DEMAND, kT			
COPE						SEBS	TPO	OTH	COPE	SEBS	TPO	OTH	
DRIVER ABD													
PASS ABD(e)													
CURTAIN(b)													
SCABBARDS(f)													
SIDE ABD(a)													
KNEE ABD													
SEAT BACK(c)													
NITE VISION(d)													
OTHER													
TOTAL													

COMPONENT	WEST EUROPE												
	2005												
	FLEET PEN., %	NO./ VEH.	PART WT., GMS.	TPE SHARE, %	TOT. DEMD., kT	TPE DEMAND, %				TPE DEMAND, kT			
COPE						SEBS	TPO	OTH	COPE	SEBS	TPO	OTH	
DRIVER ABD													
PASS ABD(e)													
CURTAIN(b)													
SCABBARDS(f)													
SIDE ABD(a)													
KNEE ABD													
SEAT BACK(c)													
NITE VISION(d)													
OTHER													
TOTAL													

THE SUPER-TPV CANDIDATES

GRADE NAME	ELASTOMER TYPE	MATRIX RESIN(S)	SUPPLIER
TPSiV	SILICONE	PA, TPU	DOW CORNING
	SILICONE	SEVERAL	WACKER
ZEOTHERM	POLYACRYLATE (ACM)	PP, PA, POLYESTER	ZEON
E-TPV	ETHYLENE ACRYLATE (AEM)	COPE	DUPONT
FLUORO-PRENE	FLUORO-ELASTOMER	FLUORO-POLYMER	FREUDENBERG-NOK

NEW SUPER-TPV TECHNOLOGIES

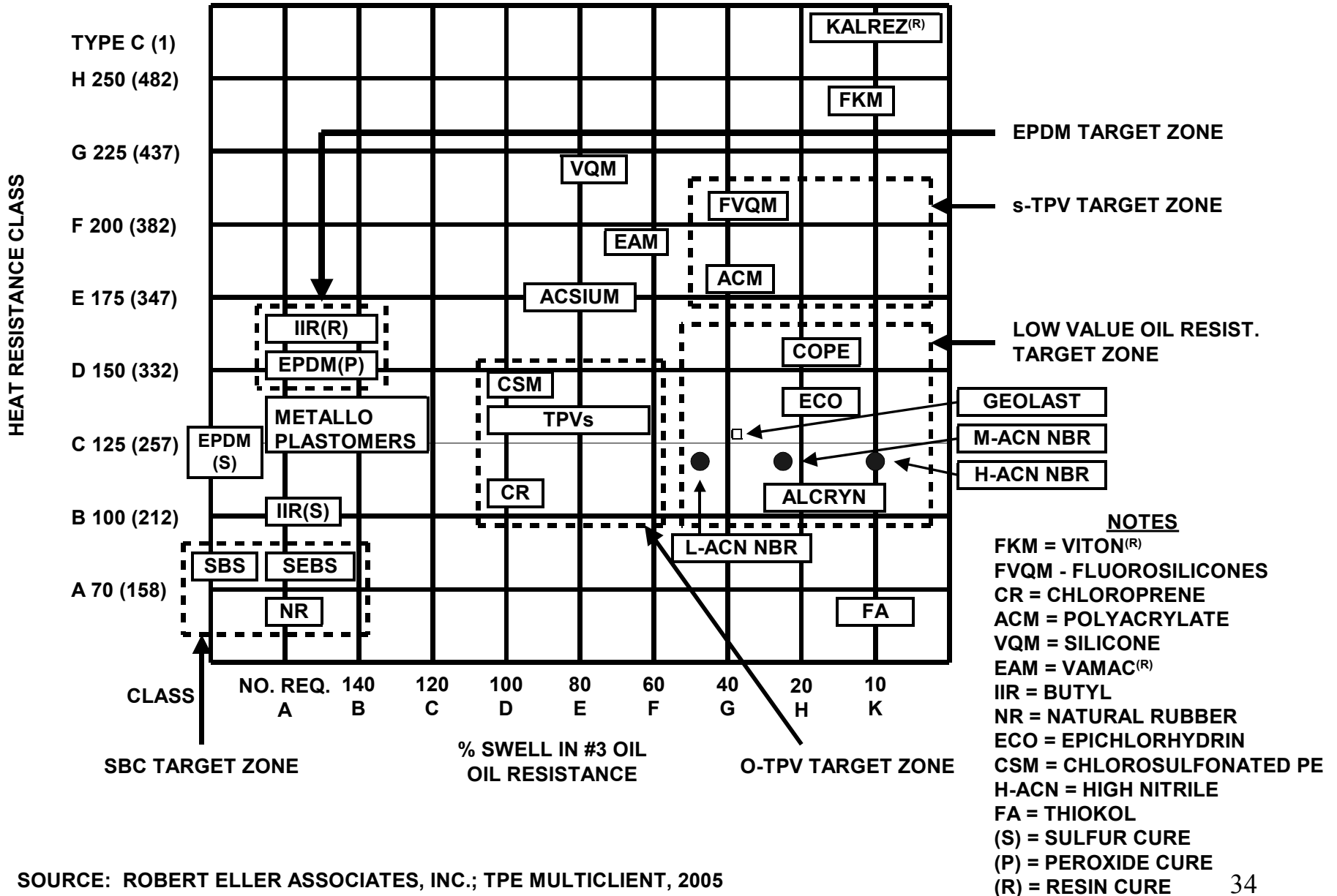
- **ZEON AND DUPONT ARE STRONG LEADERS**
- **SILICONE TPV (MULTIBASE)- NO SIGNIFICANT SHARE**
- **AUTO UNDERHOOD IS KEY TARGET MARKET**
- **PENETRATION REQUIRES (HEAT, OIL RESIST, UV?)**
- **HIGH PRICES LIMIT PENETRATION POTENTIAL**
- **SOME COMPETITION WITH o-TPVs, CHLOROPRENE**
- **CV JOINTS, OIL FILTER, SOME HOSE APPLICATIONS**

NEW SUPER-TPV TECHNOLOGIES (CONT'D.)

**THE DRIVING FORCES FOR TPE SUBSTITUTION
INCLUDE:**

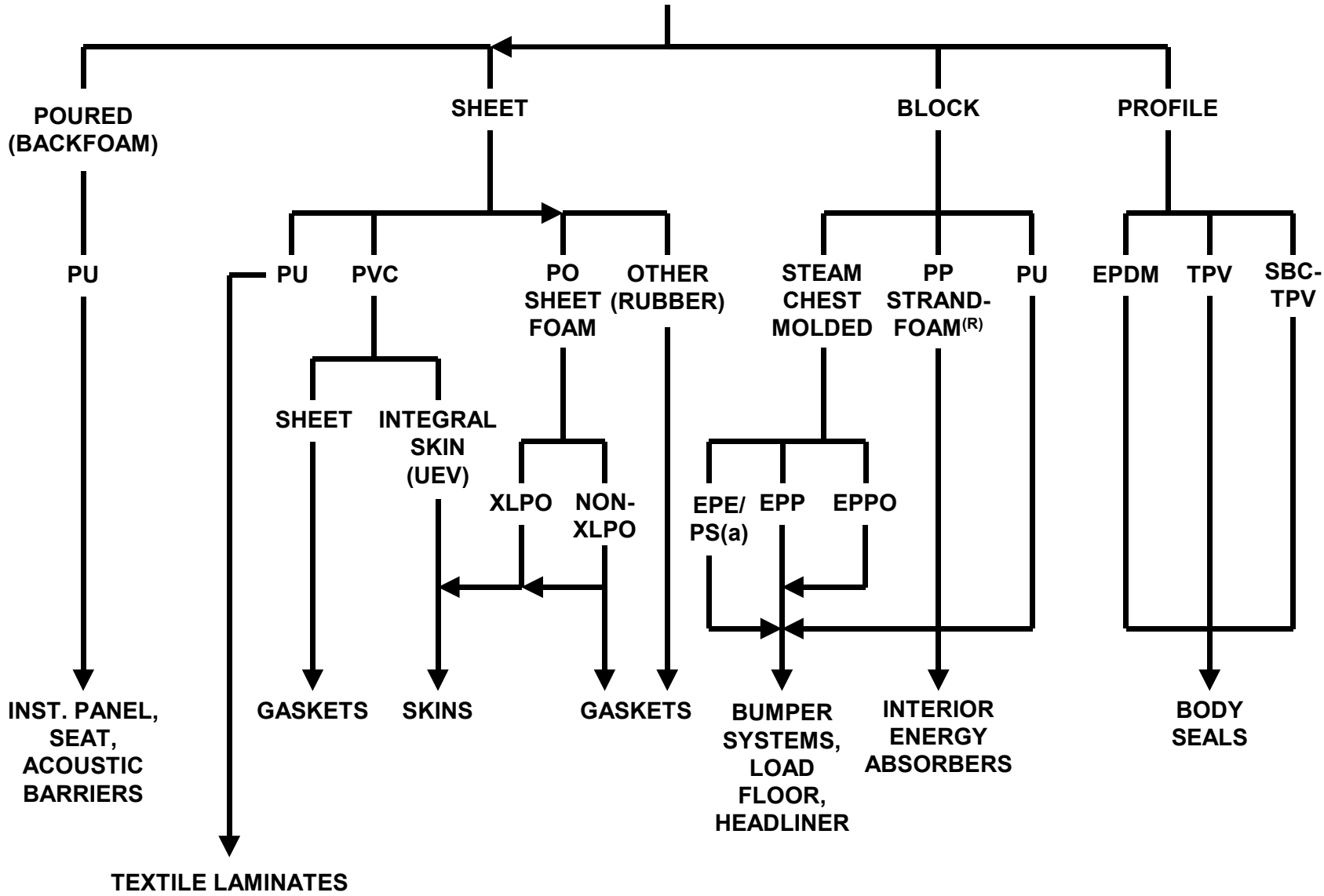
- **INCREASED UNDER-HOOD TEMPERATURES**
- **INCREASED FUEL EMISSIONS CONTROL
REGULATIONS**
- **INCREASED REQUIREMENTS FOR DYNAMIC SEAL
PERFORMANCE AS WARRANTY PERIODS ARE
EXTENDED**
- **POTENTIAL COST SAVINGS VIA INTEGRATION OF
THE CONNECTOR FUNCTION WITH THE BODY OF
THE PART**

EXHIBIT 3: OIL RESISTANCE/HEAT RESISTANCE OF TPEs AND THERMOSET RUBBERS



AUTOMOTIVE FOAM FAMILIES /EXAMPLE APPLICATIONS

AUTOMOTIVE FOAMS



SOURCE: ROBERT ELLER ASSOCIATES, INC., 2005

NOTE:
 (a) SEKISUI ESTABLISHING POSITION FOR THESE BEAD FOAMS IN ASIA/U.S.

NON-AUTOMOTIVE MARKETS

INCLUDED IN REA STUDY (EUROPE/N.AMERICA) ARE:

- APPLIANCE/TOOL**
- BUILDING/CONSTRUCTION**
- CONSUMER PRODUCTS/HOUSEWARES**
- ELECTRICAL/ELECTRONICS-PERSONAL COMMUNICATIONS**
- FOOTWEAR**
- FOOD PHARMACEUTICAL PACKAGING**
- MEDICAL**
- PERSONAL CARE/COSMETICS**
- SPORTS/LEISURE**
- WIRE/CABLE**
- SOFT TOUCH (ALL MARKETS)**
- FILM/SHEET**
- COATED FABRICS**

NON-AUTOMOTIVE MARKETS (CONT'D.)

- **ABOUT 50% OF TPE DEMAND**
- **SOME SECTORS SHIFTING TO ASIA (CHINA)**
- **SHIFTS TPE GEOGRAPHIC DEMAND PATTERN**
- **INTRODUCES NEW COMPOUNDERS INTO TPE COMPETITION (ESPECIALLY CHINA)**
- **TWO TIER QUALITY LEVELS? (CHINA?)**
- **FRAGMENTED, SMALL ORDER SIZES**
- **TWO SHOT MOLDING WELL ESTABLISHED (SMALL PARTS)**

EACH MARKET SECTOR PROFILE INCLUDES:

- **SECTOR/SEGMENTS DEFINITION (PHOTOS)**
- **DEMAND/GROWTH ESTIMATES (2005/2010)**
- **MARKET SHARES BY TPE (2005/2010)**
- **ANALYZES KEY INTERMATERIALS COMPETITIONS**
- **KEY TRENDS/REGULATORY AFFECTING GROWTH**
- **KEY END USERS**
- **TPE COMPOUNDER SHARES**
- **TPE PRICES**
- **KEY PERFORMANCE REQUIREMENTS**
- **KEY PROCESSING METHODS**
- **GROWTH APPLICATIONS IDENTIFICATION**
- **KEY CONCLUSIONS**

CONCLUSION/SUMMARY

- **THE EUROPE/N.AMERICAN TPE MARKET WILL:**
 - EXPERIENCE MODERATE EXPANSION (UNLESS RUBBER MARKETS ARE PENETRATED)
 - SHIFT GEOGRAPHIC CENTER TOWARD ASIA
 - SHIFT COMPOUNDER/CUSTOMER RELATIONSHIPS
 - CONTINUE SHIFT TO COMMODITY AND SPECIALTY
- **MATERIALS TECHNOLOGIES WILL CAUSE MARKET SHARE SHIFTS:**
 - SBC-TPV (COMPETING WITH o-TPV)
 - r-TPO SHARE GAIN
 - PLASTOMERS (ESPECIALLY PLASTOMER/HMS-PP)
 - SEBS/TPU BLENDS

CONCLUSION/SUMMARY (CONT'D.)

- **SEVERAL FABRICATION TECHNOLOGIES WILL AFFECT MARKET POTENTIAL, TPE MARKET SHARES, SUPPLIER SHARES**
 - LARGE PART 2 SHOT MOLDING
 - DIRECT COMPOUNDING
 - SHEET THERMOFORMING
- **BOTH o-TPVs AND SBC-TPVs WILL PENETRATE AUTOMOTIVE BODY/GLAZING SEALS VIA:**
 - IMPROVED FOAMING METHODS
 - ACCEPTABLE DYNAMIC PERFORMANCE
 - SYSTEM COST SAVINGS
 - EUROPEAN AND JAPANESE INNOVATION
- **NEW ASIAN COMPOUNDERS AND BASE RESIN SUPPLIERS ENTER THE TPE MARKET**
- **PRIVATE EQUITY GROUPS CONTINUE ENTRY INTO THE TPE SECTOR**

CONCLUSION/SUMMARY (CONT'D.)

- **OWNERSHIP IN THE GLOBAL TPE MARKET WILL SHIFT:**
 - PRIVATE EQUITY GROUPS CONTINUE TO ENTER
 - ASIAN COMPOUNDERS/BASE RESIN SUPPLIERS GAIN SHARE IN THE WEST
- **CONSOLIDATION CONTINUES**
- **IN HOUSE COMPOUNDING BY TIER 1s GAINS SLOWLY (BODY SEALS)**
- **RESIN COMPANIES GAIN SHARE VIA IMPROVED RESIN TECHNOLOGY**
- **U.S. ECONOMY:**
 - GDP GROWTH SLOWS IN 2006 (3.1%)
 - STILL FASTEST GROWTH WESTERN ECONOMY
 - AUTO DEMAND APPROX. 17 MM UNITS
 - INVESTMENT BY NON U.S. TPE COMPANIES WILL CONTINUE TO INCREASE



Manufacturer: Black and Decker

TPE Type: SEBS

Bond Type: Chemical

Manufacturer Location: China



Manufacturer: P&G

Product Name: Pantene

Note: TPEs expensive vs. incumbents. Plastomers entering competition with EVA cap liners



Manufacturer: Moen

Product: Faucet Mounting Plate

TPE Type: TPV

Bond Type: Physical

Manufacturer Location: USA

Note: 2-Shot Nylon-Bonding TPV.



Manufacturer: Stanley

TPE Type: SEBS

Bond Type: Chemical

Manufacturer Location: China

Note: Two color



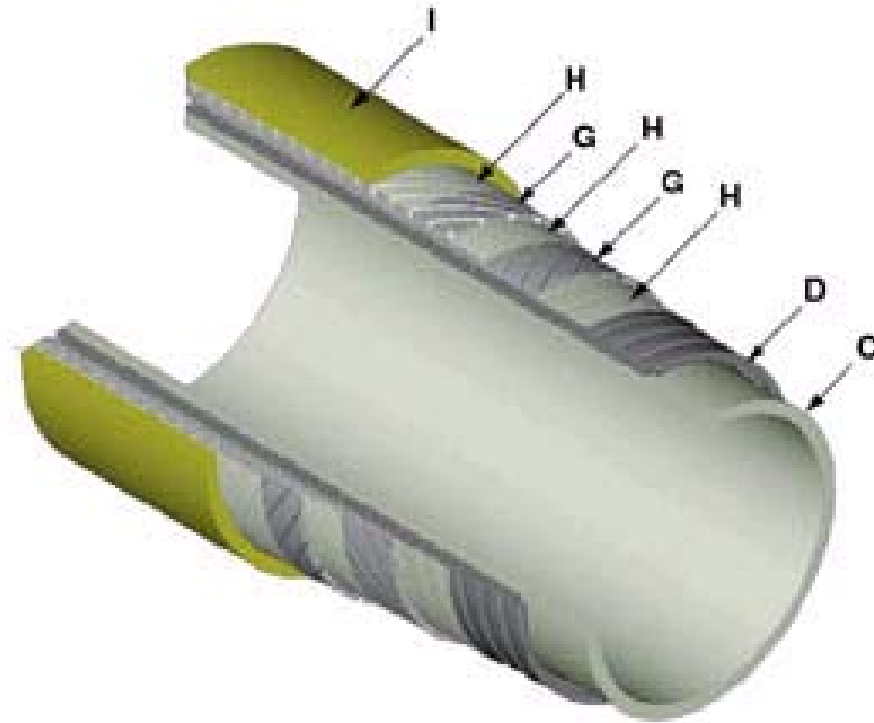
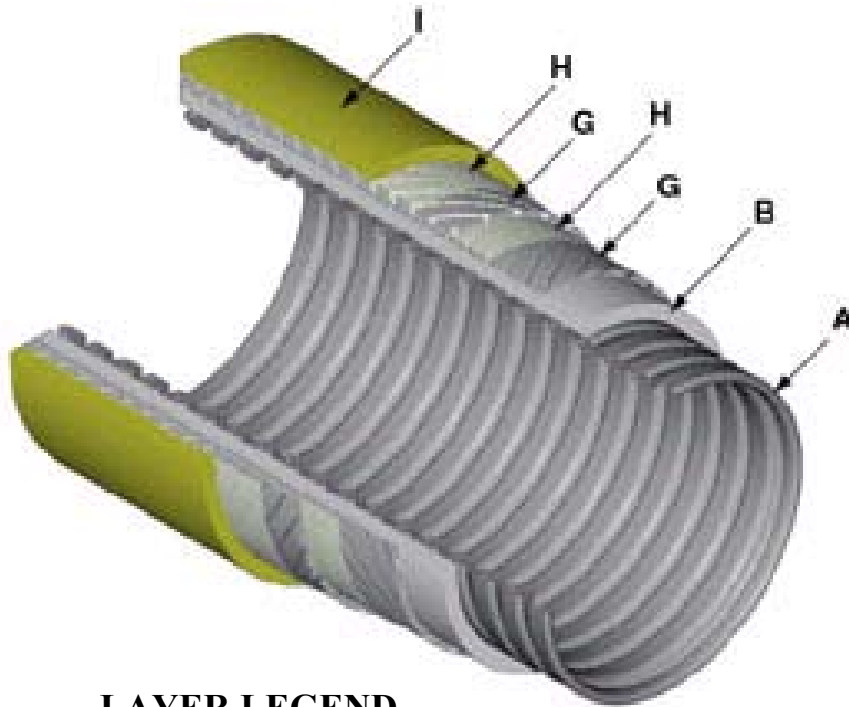
Manufacturer: Valeo

TPV Type: TPV

Manufacturer Location: Europe

Note: Example of boots/bellows and EPDM replacement.

EXAMPLE TPV USAGE IN FLEXIBLE PIPE



LAYER LEGEND

- A FLEXBODY – INTERLOCKING METAL CARCASS
- B FLEXBARRIER – POLYMER FLUID BARRIER (PVDF)
- C FLEXLINER – POLYMER FLUID BARRIER (PVDF)
- D FLEXLOK – STEEL HOOP STRENGTH LAYER
- G FLEXTENSILE – HELICAL STEEL ARMORS
- H FLEXTAPE – POLYMER TAPE LAYER (PP TAPE)
- I FLEXSHIELD – EXTRUDED POLYMER LAYER (TPV, DYMANIC ONLY; PE, STATIC ONLY)

SOURCE: WELLSTREAM, ROBERT ELLER ASSOCIATES, INC.



Manufacturer: Tupperware

Product Type:

TPE Type: SEBS

Note: Sold in Europe



Product Type: Jeep rear tailgate seal

Note: Sponge w/dense EPDM



Vehicle: Toyota Tundra (2006)

Part : Cargo Box side rails

TPE Type: Compounded TPO (Sequel 1514)

TPE Supplier: SEP

Key Features: Scratch/mar resistance(5 finger test), low CLTE

Molder: Plastikon (also have plant in China)

REA Note: Domestic US compounder/New American Mfr.



Vehicle: Toyota Tundra (2006)

Part : Tailgate cover

TPE Type: Compounded TPO (Sequel 1514)

TPE Supplier: SEP

Key Features: Surface durability, low CLTE

Molder: Plastikon (also have plant in China)

REA Note: Domestic US compounder/New American Mfr.



Vehicle: Toyota Tundra (2006), mid-sized pickup truck

REA Note:

- a. Example of New American Mfr entering US auto OEM stronghold
- b. Growth target for exterior compounded TPO

THANK YOU



Robert Eller Associates, Inc.

CONSULTANTS TO THE PLASTICS AND RUBBER INDUSTRIES