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OPTIMIZING POSITION IN THE INTERIOR SOFT TRIM VALUE CHAIN TO ENSURE PROFITABLE GROWTH

Prepared for:
PLASTICS IN AUTO INTERIORS
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Presented by: Robert Eller

ABSTRACT

This paper reviews the interaction between the global economic situation, the automotive market, the dynamics of the auto OEM/Tier 1 interior supplier interface, and the ability of Tier 1 suppliers to obtain profitable growth via new technologies in automotive interior trim. Europe/N. American differences are reviewed and specific value added strategies are identified along with current examples of the implementation of those strategies. The analysis is based on REA's recently completed automotive interior soft trim multiclient study (Reference 1- Automotive Interior Soft Trim: Skins, Foams, Coated Fabrics, Textiles, and Acoustic Barriers – see Appendix 1).

OPERATING HYPOTHESES

Some of the operating hypotheses upon which the conclusions reached in this paper are based include:

- Current market conditions have pushed some automakers and their interior suppliers into a confrontational interface.
- The structure of the auto interior value chain must change in order to ensure profitable survival of interior module suppliers.
- There are a number of value added opportunities in automotive interiors, which are currently under-exploited.
- Both materials and process cost savings are possible.

- There are substantial differences between automotive interior technologies in Europe and N. America, and global economic pressures will force technology convergence.
- Acoustic properties, energy absorption, control of V.O.C.s, and ELV legislation effects will be major technology shift drivers.
- Current constructions and manufacturing methods are inefficient and wasteful of both materials and labor.
- Foams are a key technology shift element.
- Non-structural composites will grow in importance.

CURRENT AUTOMOTIVE SITUATION

The implementation of new technologies and shift in the structure of the automotive interior soft trim sector will be affected by:

- The current global economy, which shows weak signs of emerging from a recessionary phase.
- Vehicle prices, which have and will continue to decline, causing further severe downward price pressure from OEMs on Tier 1 suppliers.
- Price changes in the past fifteen months, which have put Tier 1 suppliers in an unusually severe profitability squeeze between downward price pressures from OEMs and upward cost pressures from raw materials suppliers.
- The consolidation among Tier 1s, which will continue and will intensify the purchasing power of Tier 1 interior soft trim suppliers.

Only some automotive manufacturers are profitable in the current environment (see Exhibit 1), and this will affect the intensity of price pressures on Tier 1 interior suppliers.

OEM/Supplier Dynamics -- The dynamics of the relationship between automotive OEMs and their suppliers are represented in Exhibits 2 and 2A. Among the strategies potentially available to automotive OEMs are the creation of platforms serving several models, and therefore capable of reaching high production volumes as shown by the examples in Exhibit 3. Demands for refunds from cost savings over the product life cycle clash with the cost management and profitability requirements of the Tier 1s.

Driving Forces for Materials Substitution -- The major forces driving material and process substitution in automotive interior soft trim are:

- Systems cost savings (possible with new automotive interior fabrication technologies)
- Weight savings (recently increased importance in NAFTA in order to protect profitability of SUVs)
- Oil resistance
- Odor-free interiors (initiated in Germany)
- Elimination of coatings (possible with new polyolefin compounds)
- Molded-in color

- Noise, vibration, harshness control (important role for foams and lightweight fibers)
- Acoustic performance (competition between lightweight fibers and foams)
- Energy absorption (occupant safety)
- Recyclability (at zero cost penalty)
- Increased craftsmanship requirements
- Broadening the range of decorative surface effects.

VALUE ADD STRATEGIES

Several strategies are possible for adding value:

- Shifting position in the value chain
- Materials cost savings
- Process cost reduction
- Adding both value and functional capabilities (ideally with a cost saving)

Value Chain Shift -- Some examples of the possibility for shifting position in the value chain are:

VALUE CHAIN SHIFT STRATEGIES FOR ADDING VALUE

STRATEGY	EXAMPLE
Forward/Backward Integration	- Textile suppliers → confection - Tier 1 → skin fabrication and radiation crosslinking
Outsourcing	- Foaming seat pads - Flame lamination of textiles
Reduce Development Time	- Rapid prototyping
Sandwich Layer Consolidation	- TPO skin/PO foam laminates - On-board acoustics
Reduce Secondary Operations	- In-mold airbag door scoring - In-mold trim - In-mold assembly

SOURCE: ROBERT ELLER ASSOCIATES, SOFT TRIM MULTI-CLIENT STUDY, 2003

Material Cost Savings -- Shifting of manufacturing method and construction can result in material cost savings as indicated in the table below:

MATERIAL COST SAVINGS STRATEGIES FOR ADDING VALUE IN AUTOMOTIVE INTERIORS

STRATEGY	NOTE/EXAMPLE
Thin Wall	- Door trim
Decorative Films	- Avoid painting
Scrap Reduction	- Monomaterials construction
PVC Slush Skins	- Recently improved low temperature properties
Direct Compounding	- In-use (JCI, Faurecia) - Use for talc/PP, TPEs
Masterbatch	- Glass reinforced substrates
Reactor Grade PP resins	- Saves compounding
Molded-in Color	- Substrates - Saves paint

SOURCE: ROBERT ELLER ASSOCIATES, SOFT TRIM MULTI-CLIENT STUDY, 2003

Process Cost Savings -- Current module fabrication methods are inefficient as illustrated by the schematic diagram in Exhibit 4 and the conceptual future module fabrication scheme shown in Exhibit 4-A. Some examples of value added processes are:

ADDING VALUE VIA PROCESS COST SAVINGS IN AUTOMOTIVE INTERIOR SOFT TRIM

STRATEGY	EXAMPLE
In-line Negative Forming	- EPP foam/textile - Door trim medallions - Decorative films
Hinterspritzen	- Widely used (Europe), starting in N. America
In-mold Assembly	- HVAC louvers
Sandwich Consolidation	- Floor acoustics - Door trim acoustics - Headliner energy absorption
Rubber Replacement	- Body seals
Co-processing	- Extrusion, injection - Blow molding

SOURCE: ROBERT ELLER ASSOCIATES, SOFT TRIM MULTI-CLIENT STUDY, 2003

Sandwich Consolidation -- Several sandwich consolidation methods are available. An example of combining textile with expanded polypropylene (EPP) bead foam molding is given in Exhibits 5 and 6.

Adding Value/Improving Function -- It is possible to add both value and improve the functional performance characteristics of automotive interior soft trim. Some examples of strategies for achieving this are given below:

ADDING VALUE WITH IMPROVED FUNCTIONAL PERFORMANCE

STRATEGY	EXAMPLE
In-mold Decoration	- Metallics - Patterns
Lightweight Fibers	- Floor/Acoustics
Surface Esthetics	- New nonwovens - Negative forming
Micro-denier Nonwovens	- Better acoustics - Improved drape
Craftsmanship	- JCI CrafTec® process
Luxury Fabrics	- Seat → door trim, IP
Soft Touch	- Buttons - Door pulls and door trim surfaces via 2 shot molding

SOURCE: ROBERT ELLER ASSOCIATES, SOFT TRIM MULTI-CLIENT STUDY, 2003

In-mold Decoration -- An example of adding value with multi-layer decorative film structures is given in Exhibit 7.

ADDING VALUE VIA DECORATION

The interior surface is a cost and competitive decoration battleground. Decorative films, coextruded sheet, and molded-in decorative effects are adding value and in some cases saving cost on the modules on which they are used, as illustrated in Exhibit 6. Apart from molded-in color, the lowest cost of these approaches is the use of molded-in particles to achieve a decorative effect (for example in non-carpet flooring).

THE ROLE OF AUTOMOTIVE FOAMS

Interior soft trim constructions are usually based on a sandwich of:

- Surfacing material (skin, textile, leather, artificial leather)
- Foam (polyurethane, polyolefin, PVC)
- Substrate (polypropylene or engineering thermoplastic)

Foam plays a key role in determining the manufacturing technology and costs of the module structure. The increased importance of acoustic energy absorption properties is stimulating the growth of foam demand and the emergence of new materials and process combinations. Polyurethanes are the dominant incumbent foams, which are currently being challenged by polyolefin foams in several forms. The families of automotive foams and their respective locations are shown in Exhibits 7 and 8. The role of foams is discussed in more detail in our companion paper presented at this conference (see Reference 5).

ROLE OF ACOUSTIC MATERIALS

Acoustic materials are used throughout the vehicle, either in modules whose function is primarily acoustic in nature, or as a portion of other interior modules as illustrated in Exhibit 12. The dash mat construction typically consists of a heavy layer and a foam or lightweight fiber layer and carpet, as illustrated in Exhibit 10.

Acoustic performance is currently imparted by a combination of heavy layer (typically highly filled soft plastic [SEBS, TPO, EVA]) and a foam or fiber layer. All of the major acoustic module suppliers are developing lightweight fiber constructions capable of either reducing or eliminating the heavy layer with minimal sacrifice in acoustic performance. An example of the lightweight fibers available from Collins & Aikman is given in Exhibit 11.

ROLE OF TEXTILES

Textiles play a key role in determining surface quality and acoustics properties. A number of materials compete for position in the $7 billion NAFTA/Europe automotive textile market as illustrated in Exhibit 12. Nonwovens are competing with knitted and woven textiles. The penetration of nonwovens into headliner constructions varies substantially between regions as illustrated in Exhibit 12. As indicated, the use of tricot is high for headliners in NAFTA. A recently developed generation of advanced nonwovens brings a range of properties to this intermaterials competition. The potential of the advanced nonwovens is under-utilized. REA estimates that only 17% of the potential penetration has been realized to date.

The penetration of advanced nonwovens in the automotive interior sector is the subject of a multiclient study being carried out by REA (Reference 3).

Advanced Nonwovens – Current and potential benefits of the advanced nonwovens are in:

- Improved performance with respect to softness, tactile, conformability/drape, durability
- Breathability/controlled porosity (improves acoustic performance)
- Acoustic/thermal insulation, filtration
- UV resistance
- Printing, embossing, dyeability
- Non-fraying (vs. textiles)
- Micro-denier
- Filtration

EUROPE/N. AMERICA DIFFERENCES

For a variety of reasons, European automotive interior suppliers have introduced many technologies earlier than their N. American counterparts. With the evolution of the global automotive market, world platforms, and interpenetrating markets, the technological boundaries are becoming more transparent, and the technologies are converging. Nevertheless, as indicated in Exhibit 14, there remain substantial differences in the technologies used to fabricate automotive interior modules.

SUMMARY

Intense price pressure is being exerted on automotive interior Tier 1s and will result in:

- A shift in the positions of suppliers in the value chain
- The implementation of new technologies
- Further consolidation or exit by weak suppliers.

It is possible to add value to automotive interior soft trim while achieving cost reductions. Some of the key target growth sectors include:

- Foams (EPP bead foams, sheet foams, body seals)
- Advanced nonwovens
- PVC/spray skins
- Acoustics
- Surface decoration
- Rubber replacement (TPVs in body seals)

The differences in technology between Europe and NAFTA are converging as a result of pricing pressures and globalization of the automotive supply chain.

AUTHOR'S BIO

Robert Eller is President of Robert Eller Associates, Inc. (REA), a consulting company providing analysis and support of management decision-making in the automotive plastics and rubber industries. REA has offices in North America (Akron, Ohio), France, Switzerland, and Spain. His coordinates are: 4000 Embassy Parkway, Suite 230, Akron, Ohio 44333, USA; Phone: 330-670-9566; E-mail: bobeller@prodigy.net; Home Page: http://www.robertellerassoc.com.

His firm has completed numerous single-client studies in automotive plastics and multi-client studies (see References) of:

- Automotive interior soft trim in Europe and N. America
- The role of advanced nonwoven textiles in automotive interiors (study underway)
- Automotive instrument panels (photo/supplier databases for Europe and N. America)

REFERENCES

1. Multiclient Study, "Automotive Interior Soft Trim . . . Skins, Foams, Coated Fabrics, Textiles, and Acoustic Barriers," Robert Eller Associates, Inc. (June 2003)

2. Multiclient Study, "SEBS, TPV, and TPO-type Thermoplastic Elastomers… Markets, Economics, Technology, Intermaterials Competition, and the Role of Metallocene Resins," Robert Eller Associates, Inc. (2000)

3. Multiclient Study, "Opportunities for Advanced Technology Nonwoven Fabrics for Automotive Interior Surface and Construction Applications in NAFTA and Europe," Robert Eller Associates, Inc./John Starr, Inc. (Study in process)

4. "European Instrument Panel Compact Disc -- 2002," REA's Photo/Supplier Database

5. "Driving Forces for Foam Substitution in Automotive Interior Soft Trim" Plastics in Auto Interiors," Frankfurt; October 9, 2003; R. Eller

6. "Olefinic and Styrenic TPEs: Markets, Economics, Intermaterials Competition, and the Role of Plastomers," RAPRA TPE 2001, Amsterdam; June 18, 2001; R. Eller

7. "Globalization de L'industrie automobile . . . Implications pour les fournisseurs Europeens de plastiques et les equipmentiers d'interieurs," JEMA, February 1998; R. Eller

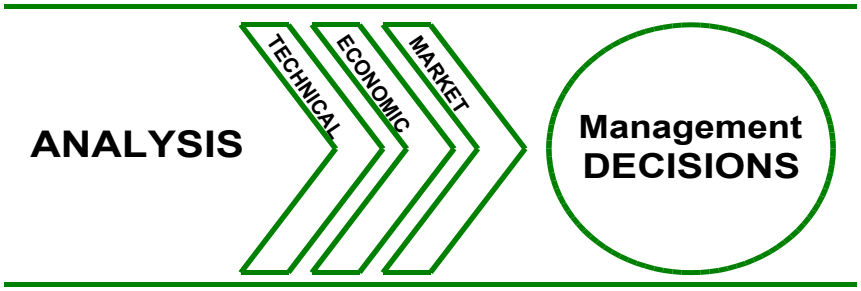
8. "Matériaux d'habitacle Automobile et Approche Sensorielle," Comfort Automobile et Ferroviaire; Le Mans, France; November 15, 2000; D. Nesa; S. Couderic; S. Crochmore

9. "Acoustic Barriers -- Material Substitution and Industry Structure Drivers," *Automotive and Transportation Interiors*, November 1999, p. 46; R. Eller

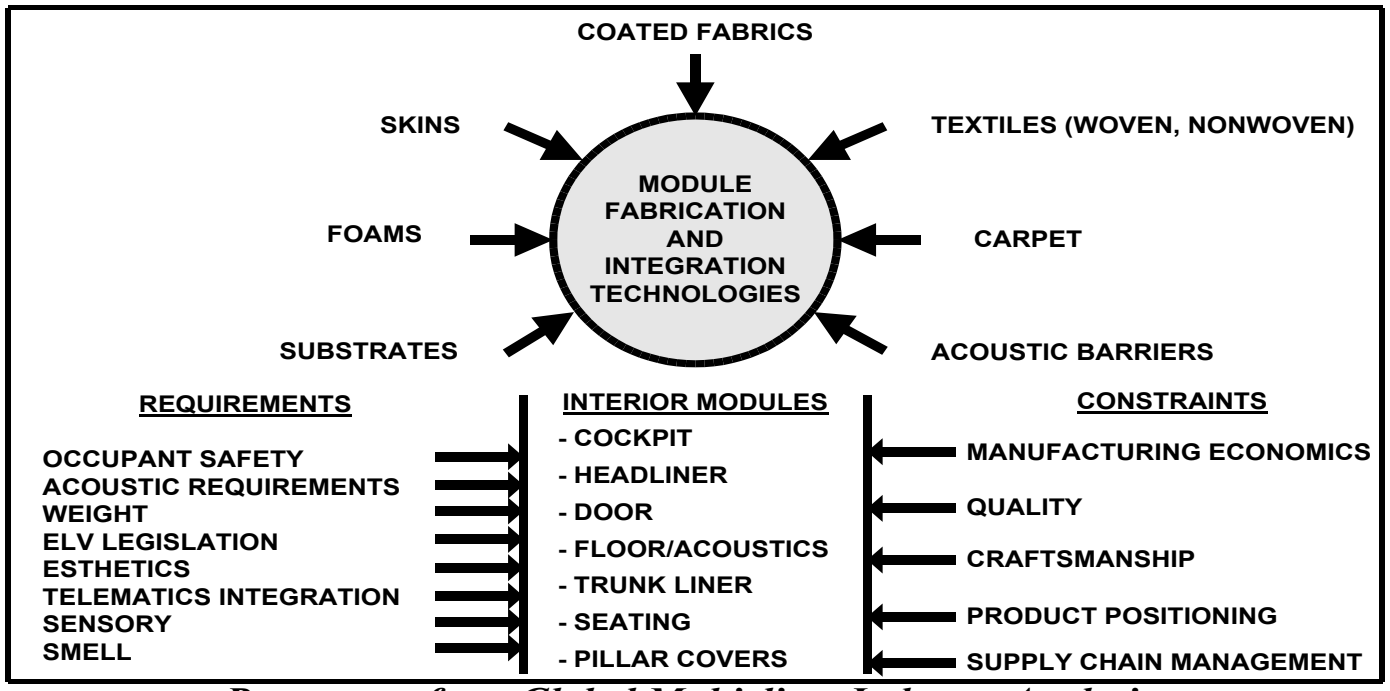
10. "New Options in Soft Trim Surfaces," Auto Interiors, March/April 2002; R. Eller

re/mydox/papers/ffsupply 03.doc

APPENDIX 1



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



Prospectus for a Global Multiclient Industry Analysis

Robert Eller Associates, Inc.

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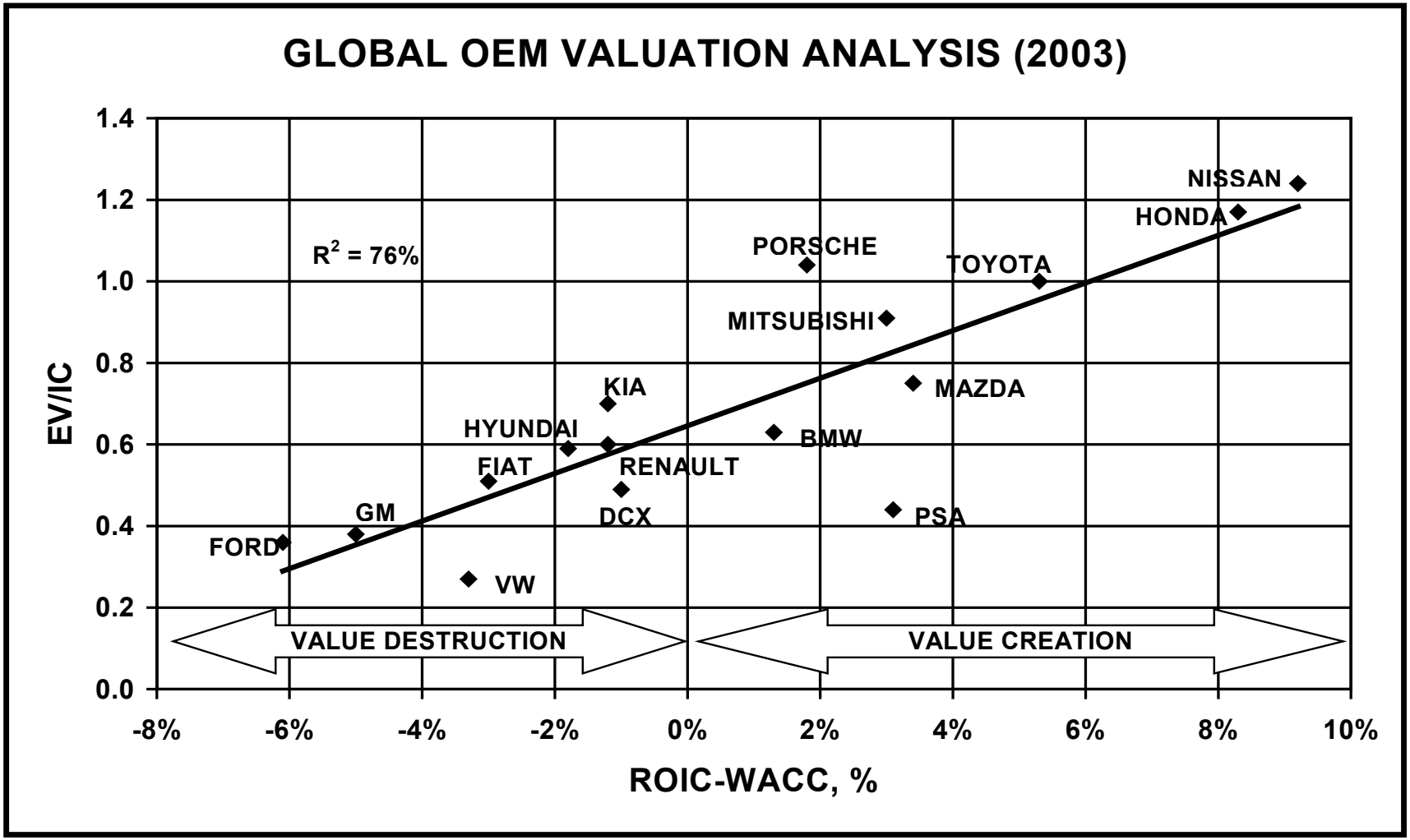
EXHIBIT 1

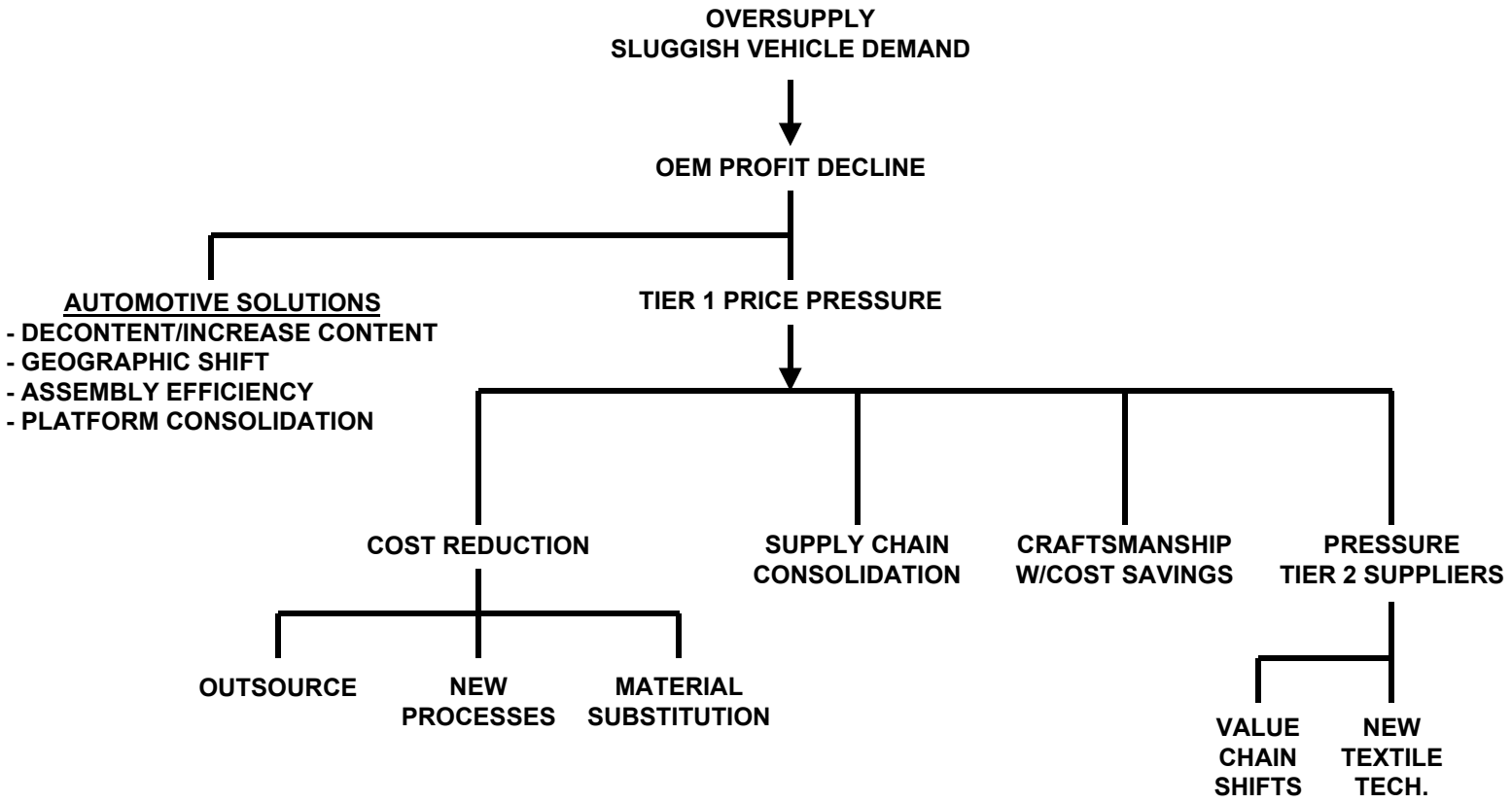


SOURCE: GOLDMAN SACHS

slide-global oem val 03.doc

EXHIBIT 2

OEM/SUPPLIER DYNAMICS



SOURCE: ROBERT ELLER ASSOCIATES, INC., 2003

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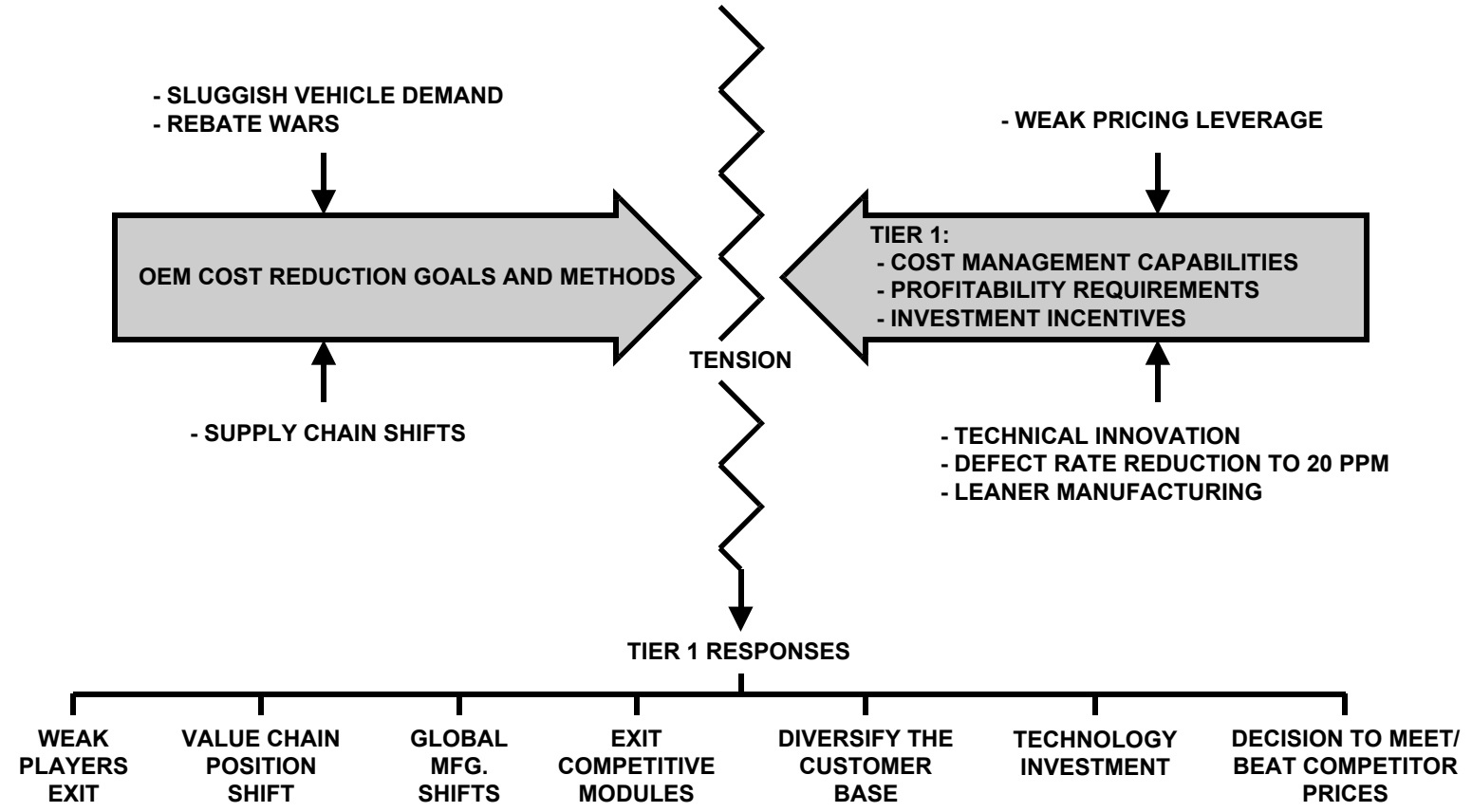
EXHIBIT 2A

THE AUTO MAKER/TIER 1 STRUGGLE



SOURCE: ROBERT ELLER ASSOCIATES, INC., 2003

ffsupp-03-automkr tr1 03.vsd

EXHIBIT 3

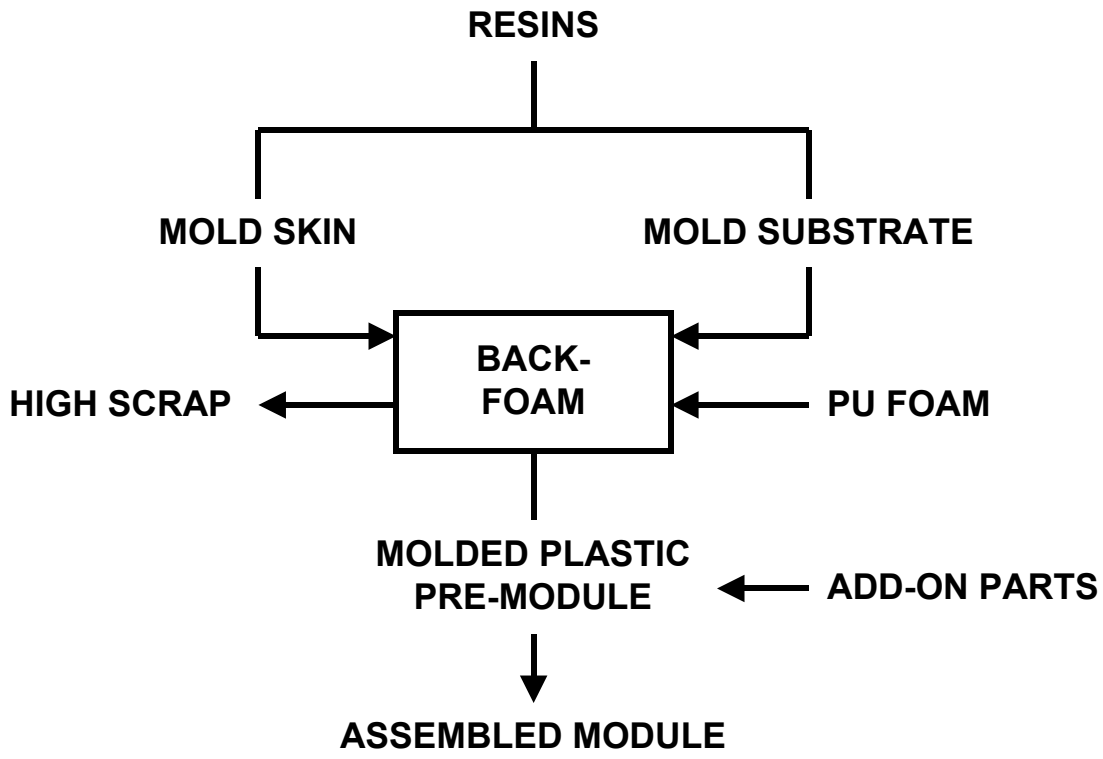
HIGH VOLUME PLATFORM EXAMPLES

OEM	PLATFORM	MODEL	MM UNITS
VW	PQ35	GOLF	2.4
	PQ24/25	POLO	1.2
FORD	F-SERIES	LT. TRUCKS	1.1
	MAZDA 6	FUTURA FORD 500 FREESTYLE	0.8
	C1	FIESTA	1.6
GM	EPSILON		1.0
	GMT800/900	LT. TRUCKS	1.5
TOYOTA	COROLLA		1.5
PSA	PFI	206	1.7

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2003, SOFT TRIM MULTICLIENT

EXHIBIT 4

CURRENT MODULE FABRICATION (INEFFICIENT)



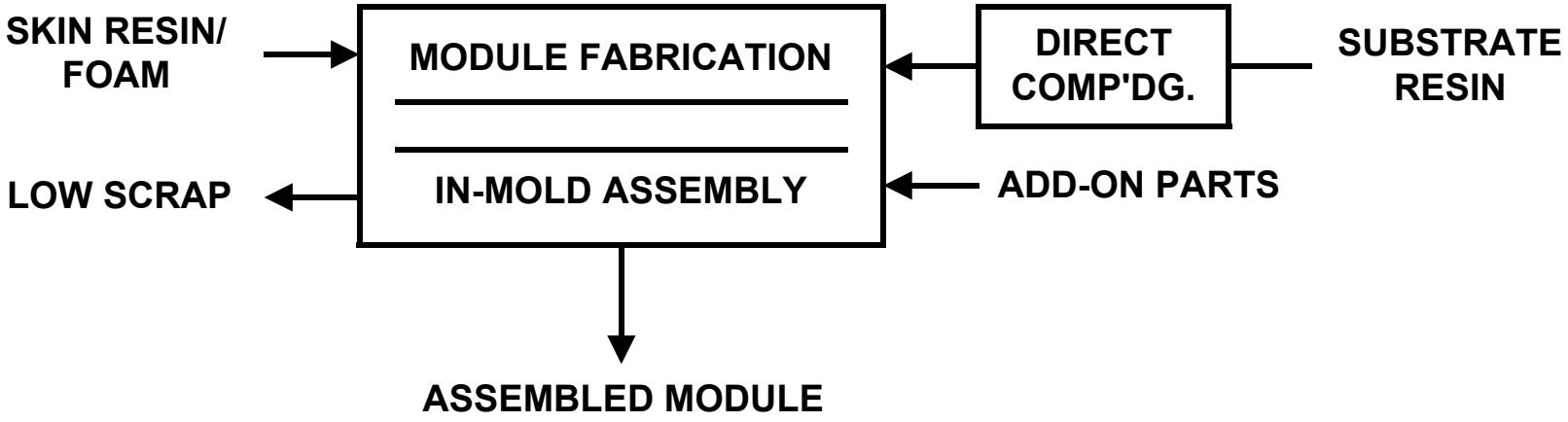
4-STEP OPERATION

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2003

ffsupp-03-mod fab 03.vsd

EXHIBIT 4A

FUTURE MODULE FABRICATION (IDEAL)



(IDEAL) 1-STEP OPERATION

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2003

ffsupp-03-one step 03.vsd

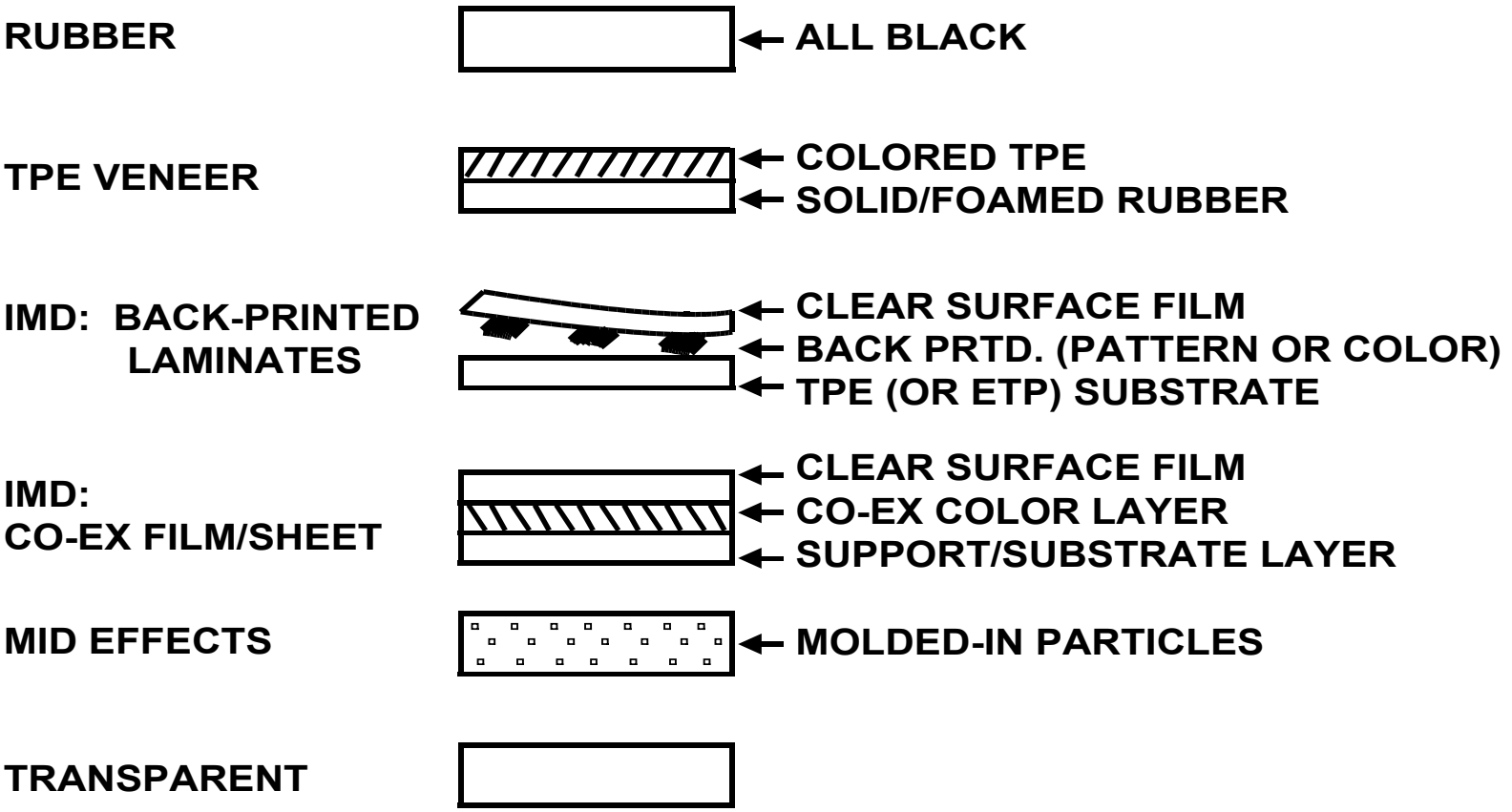
EXHIBIT 5

EPP SEMI-STRUCTURE/TEXTILE COVERING CONCEPT (TEXTILE DETAIL)

SOURCE: TARACELL

EXHIBIT 6

VALUE-ADDED DECORATION WITH TPEs



IMD = IN-MOLD DECORATION; MID = MOLDED-IN DECORATIVE

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2003

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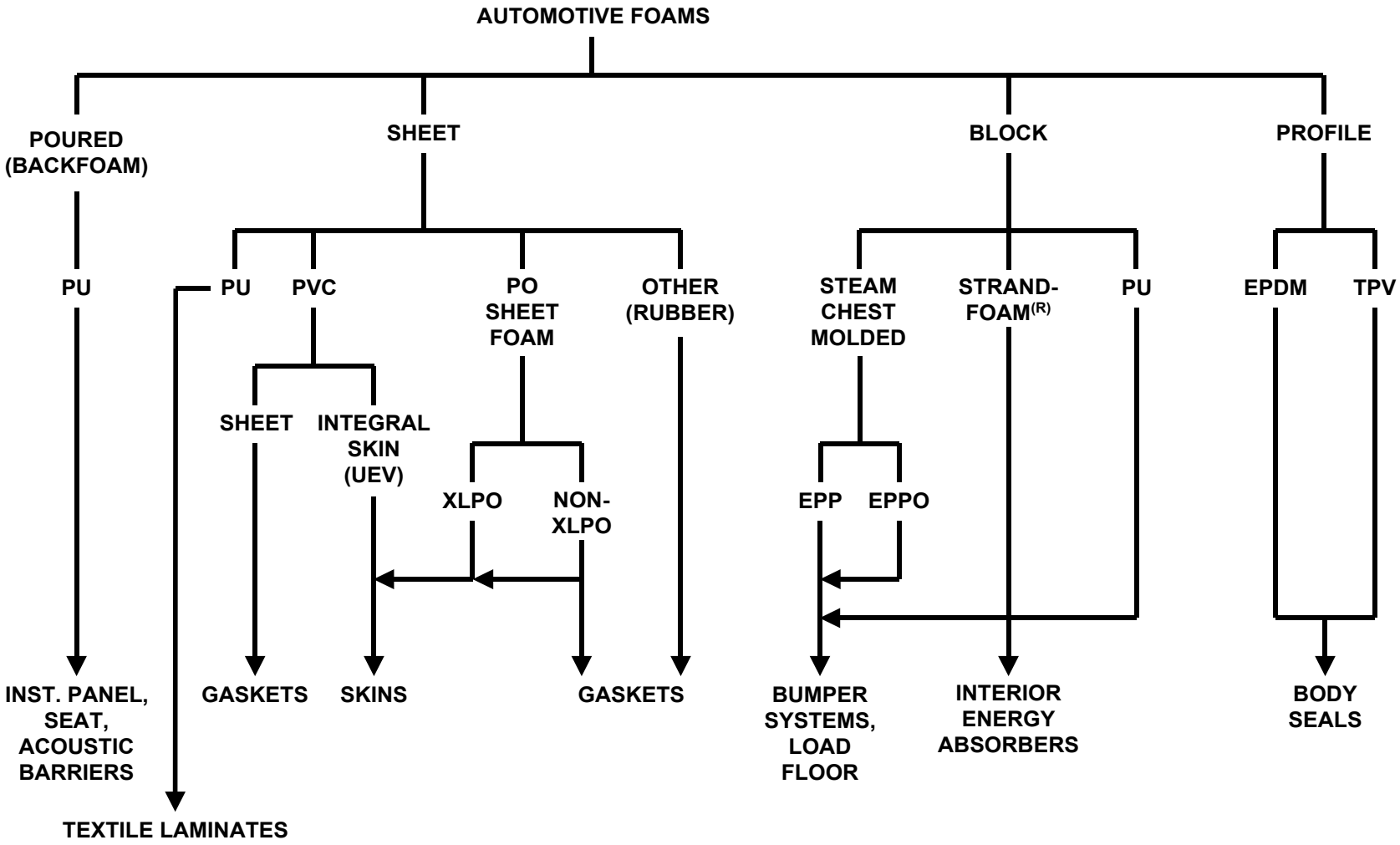
EXHIBIT 7

AUTOMOTIVE FOAM FAMILIES AND EXAMPLE APPLICATIONS



SOURCE: ROBERT ELLER ASSOCIATES, INC., 2003

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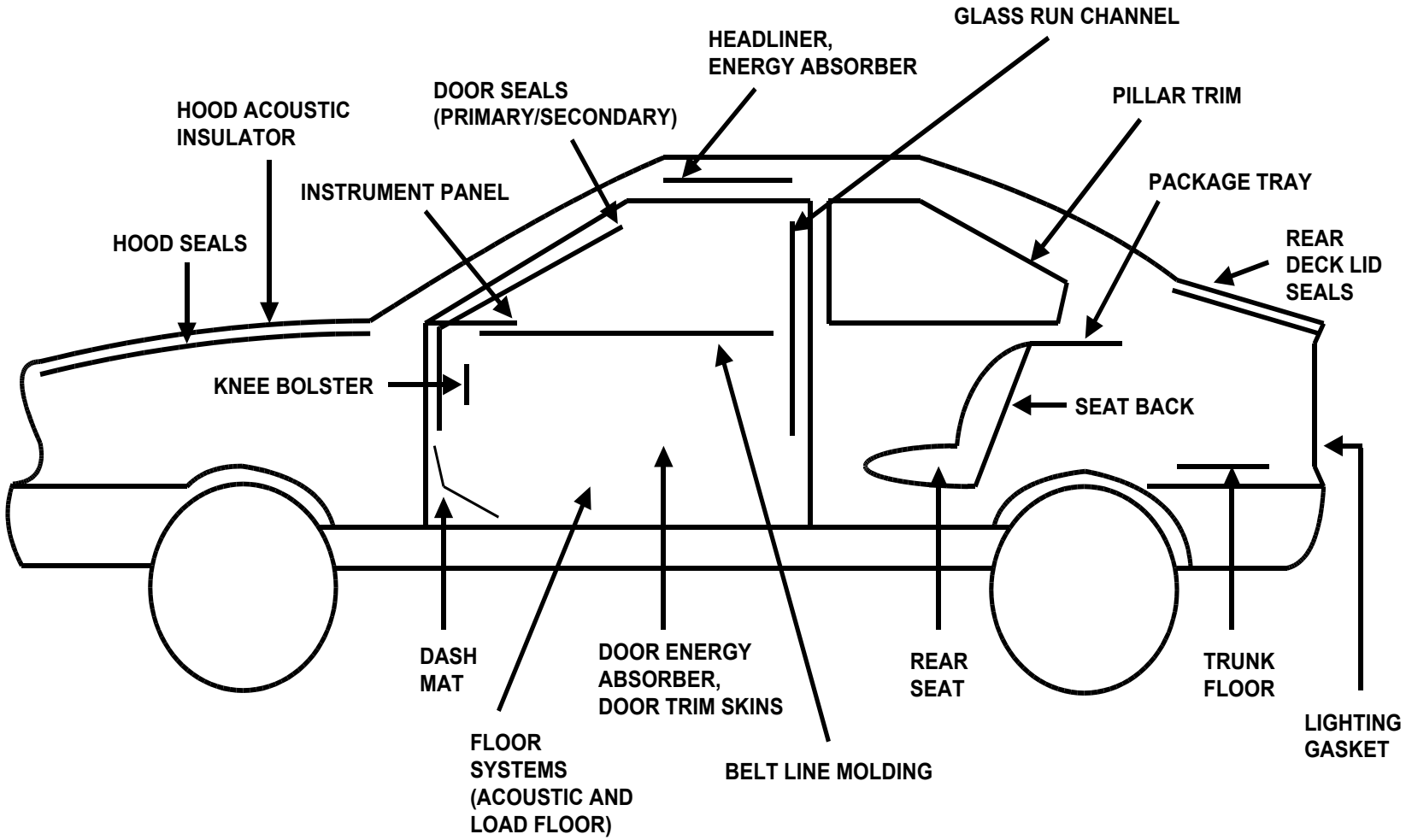
EXHIBIT 8

AUTOMOTIVE FOAMS TARGETS



SOURCE: ROBERT ELLER ASSOCIATES, INC., 2003

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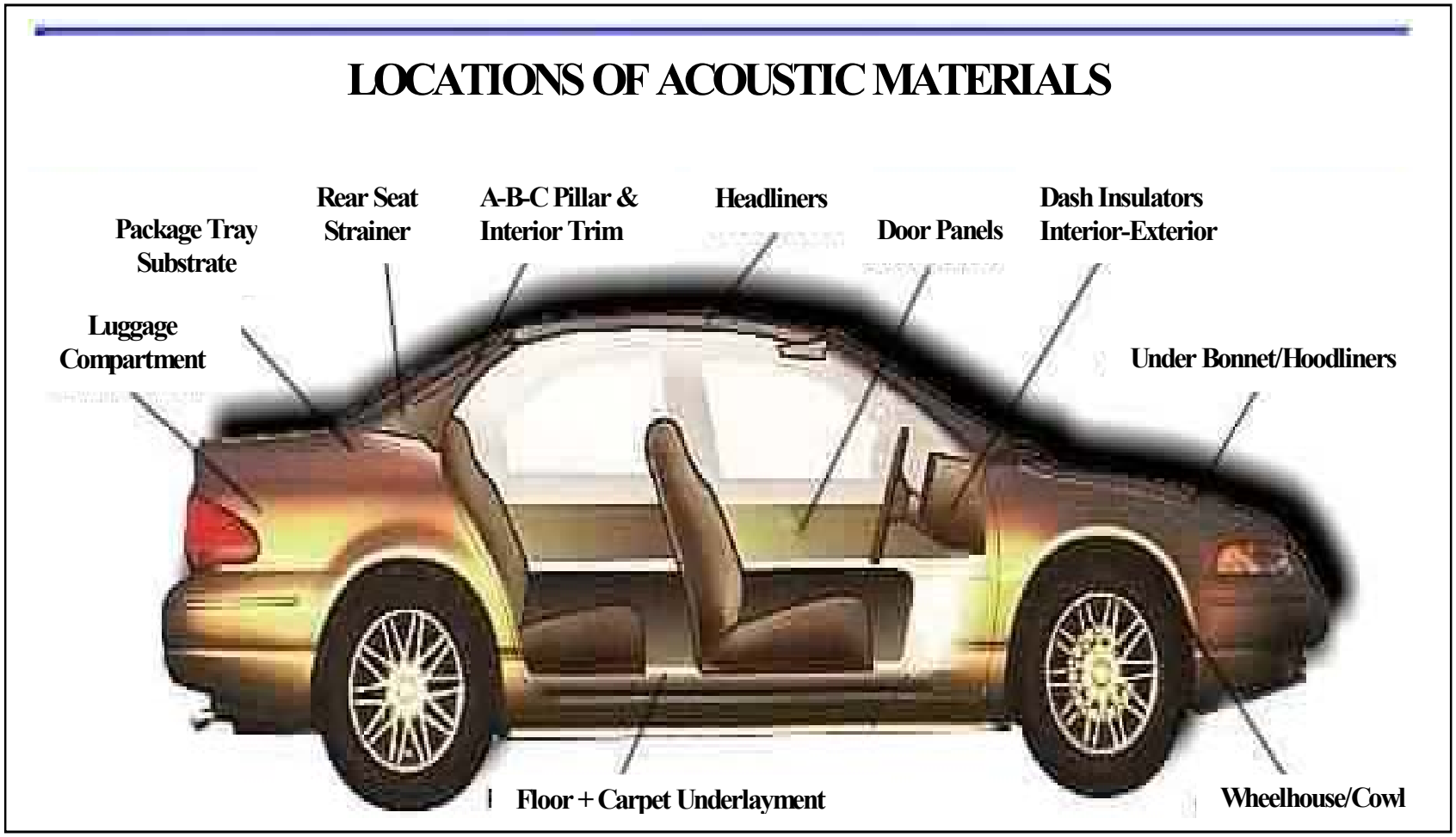
EXHIBIT 9
LOCATIONS OF ACOUSTIC MATERIALS



SOURCE: JANESVILLE PRODUCTS

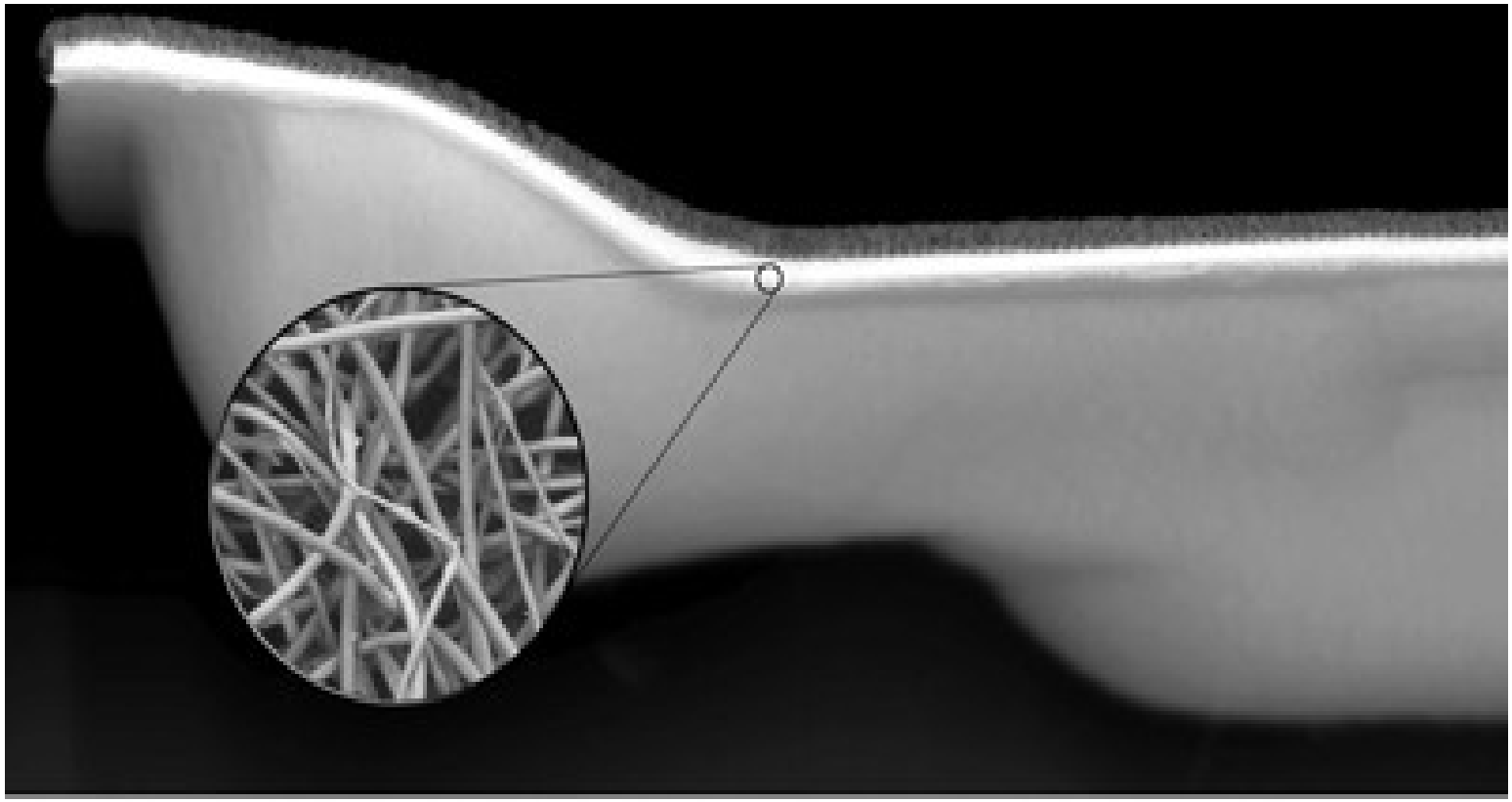
EXHIBIT 10

EXAMPLE OF DASH MAT LAYER CONSTRUCTION

SOURCE: COLLINS & AIKMAN

EXHIBIT 11

EXAMPLE OF ACOUSTICALLY TUNABLE FIBER

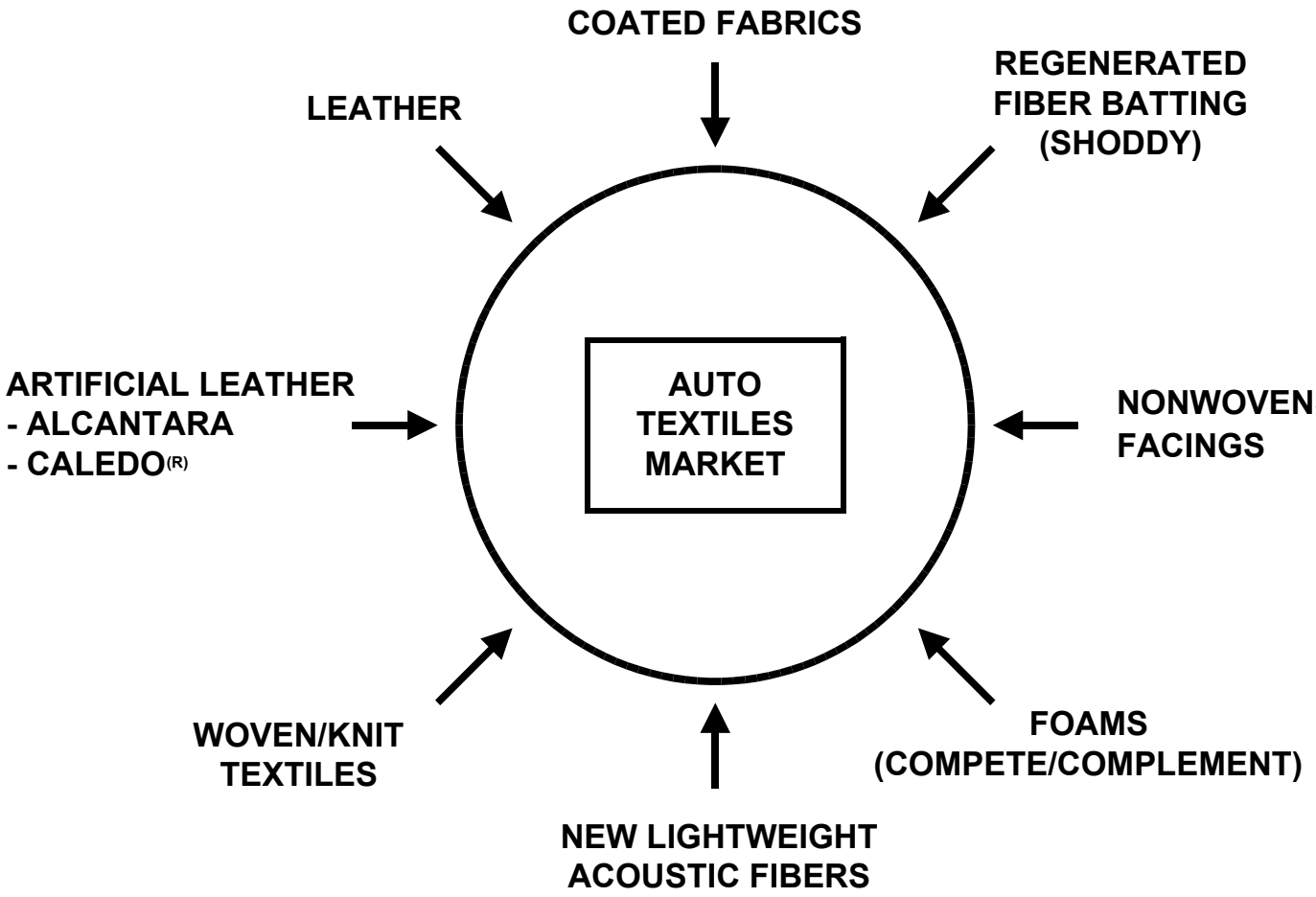


AcT*fiber* Sample of lightweight molded carpet system utilizing AcTfiber. Acoustically tuned by controlling fiber length, blend and treated to increase densification where needed.

SOURCE: COLLINS & AIKMAN

EXHIBIT 12

AUTOMOTIVE TEXTILES . . . AN ECUMENICAL PERSPECTIVE



SOURCE: ROBERT ELLER ASSOCIATES, INC., 2003

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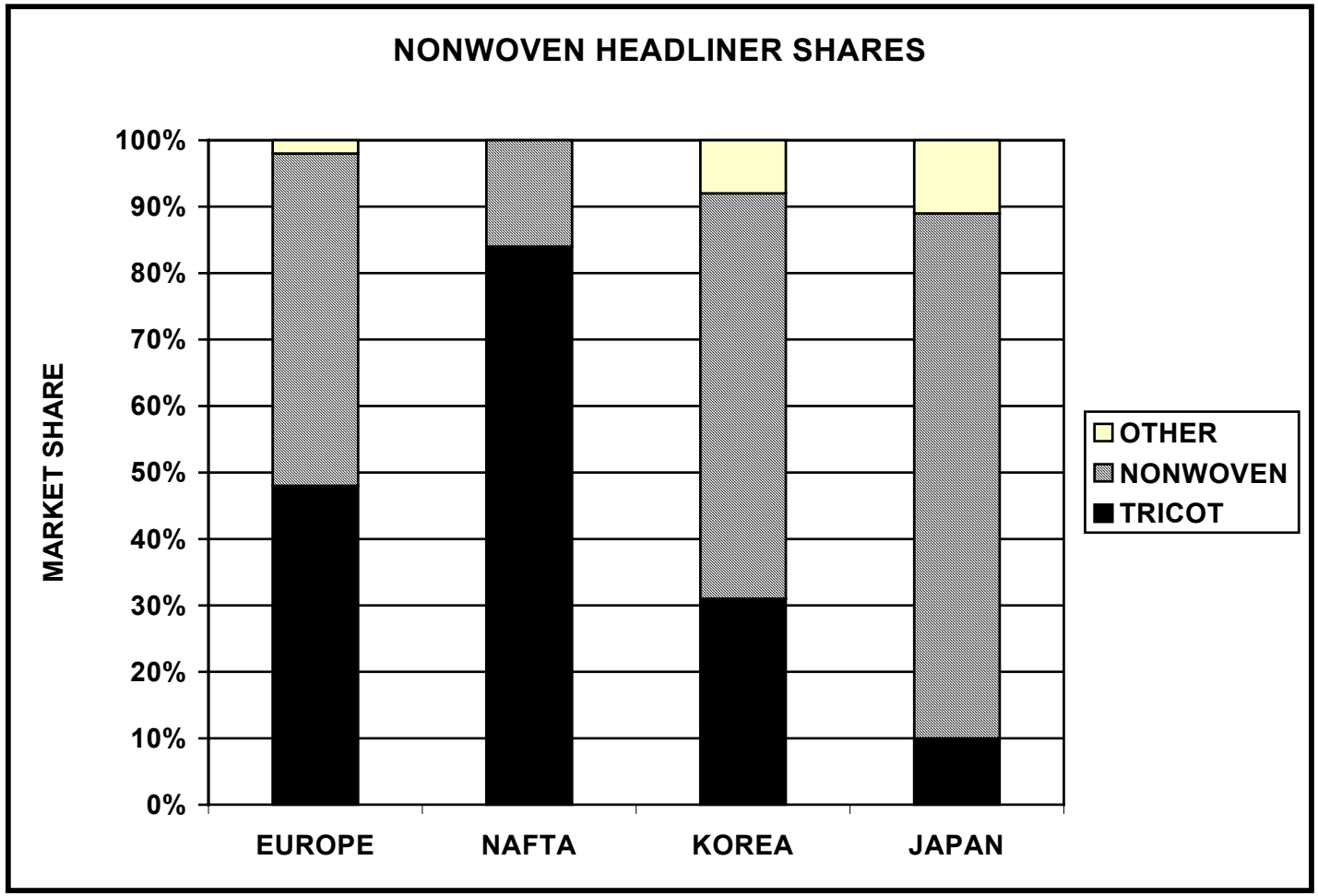
EXHIBIT 13



SOURCE: FREUDENBERG VITECH

re/mydox/papers/FF Supply/NW headliner shrs 03.xls

EXHIBIT 14
EUROPE/N. AMERICA DIFFERENCES/SIMILARITIES IN INTERIOR SOFT TRIM

MODULE	TECHNOLOGY	N. AMERICA	EUROPE
FLOOR	NON-CARPET FLOORING	STARTING (TPO GROWTH OPP'Y.)	
DOOR TRIM, HEADLINER	EA FOAMS	MORE EXTENSIVE USE	STARTING
DOOR MEDALLIONS	PO FOAM/ TEXTILE LAMINATES		STARTING
INST. PANEL DOOR TRIM	NEGATIVE THERMOFORMED SKINS	EARLIER USE	
INST. PANEL	TPO SLUSH SKINS	STARTING	
HEADLINER/DOOR TRIM	LIGHTWEIGHT SHEET EAs	MORE ADVANCED	
HEADLINER	NONWOVEN FACING	STARTING(A)	EXTENSIVELY USED
FLOOR	CARPET FACING	TUFTED	NONWOVENS (SOME TUFTING)
SEATING	ARTIFICIAL LEATHER	SLOW CATCH-UP	EARLIER START (3% PENETRATION)
HEADRESTS, SUN VISORS	EPP FOAMS		STARTING
IP	PP SUBSTRATES	STARTING	EXTENSIVE
IP, DOOR TRIM	AROMATIC PU SPRAY SKINS	STARTING	

NOTE:
(A) STIMULATED BY ENTRY OF EUROPEAN HEADLINER MANUFACTURERS

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2003