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

Requirements
- Occupant Safety
- Acoustic Requirements
- Weight
- ELV Legislation
- Esthetics
- Telematics Integration
- Sensory
- Smell

Interior Modules
- Cockpit
- Headliner
- Door
- Floor/Acoustics
- Trunk Liner
- Seating
- Pillar Covers

Constraints
- Manufacturing Economics
- Quality
- Craftsmanship
- Product Positioning
- Supply Chain Management

Prospectus for a Global Multiclient Industry Analysis
Oct., 2002
Robert Eller Associates, Inc.
CONSULTANTS TO THE PLASTICS AND RUBBER INDUSTRIES

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USA · EUROPE · JAPAN · MEXICO · LATIN AMERICA
EXAMPLES OF MULTICLIENT EXHIBITS

GROWTH OF PVC AND TPU SLUSH IN EUROPEAN IP SKINS FLEET

INTERIOR SKIN AND COATED FABRIC SUPPLIERS (EXAMPLES ONLY)

<table>
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<tr>
<th>SHEET SUPPLIER</th>
<th>IP</th>
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<th>SEAT</th>
<th>FLOOR</th>
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<td>FIRST NA COMMERCIAL TPO SKIN</td>
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<td>BENECKE</td>
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(A) INCLUDES ATHOL

EPP BEAD FOAM PRODUCER INDUSTRY STRUCTURE (EXAMPLES ONLY)

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<th>BEAD SUPPLY</th>
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Robert Eller Associates, Inc.
Automotive Interior Soft Trim:
Skins, Foams, Coated Fabrics, Textiles, and Acoustic Barriers

Robert Eller Associates, Inc. (REA) is pleased to present, for your consideration, this prospectus for an analysis of automotive soft trim and its role in interior module technology, economics, and markets.

BACKGROUND

Soft trim materials present the interior module to the automotive customer. They play a key role in determining the choice of module manufacturing technology and associated costs. The range of potential soft trim candidates has broadened in response to new driving forces including acoustic performance, occupant protection (energy absorption), PVC substitution mandates, ELV legislation, telematics integration, and shifting esthetic requirements as illustrated by our prospectus cover logo.

Intense cost pressure has driven down materials costs, while quality, efficient interior packaging, and craftsmanship constraints have increased. The remaining cost reductions will be made on the module manufacturing floor with technologies capable of integrating soft trim materials, foams, and the acoustic function into a simplified process flow and mono-materials construction (where feasible).

New raw materials are emerging to challenge the dominant incumbent soft trim choices. These include, for example:

- Coated fabrics with non-PVC alternatives (styrenic, olefinic)
- Acoustic constructions based on polyurethanes and polyolefins capable of meeting new tuning and cost requirements
- New slush molded and thermoformed skin candidates (TPU, TPO)
- New foams with energy absorbing, acoustic, and fabrication process benefits
- Microfiber non-wovens technology.

At the same time as these materials and fabrication process technology changes are occurring, the automotive interior module supplier industry is undergoing rapid structural change, globalization, and intense consolidation which will affect supplier/customer relationships, paths to market, and material selection criteria.
The overall objectives of the proposed multiclient study are to characterize and quantify the global automotive interior soft trim and module sector with respect to:

- Intermaterials competition and demand evolution
- Driving forces for material and process substitution
- Impact of new textile and plastics materials and process technology
- Fabrication processes and intermaterials competition for underlying substrates as they affect soft trim material selection parameters
- Manufacturing economics for components and finished modules
- Effects of structural changes in interior module supplier industry.

The study updates and extends REA's widely subscribed 1997 Automotive Interior Skins and Foams multiclient study.

**SCOPE**

**Regional Coverage:** Europe, North America, and Japan.

**Market Definition:** REA will develop demand forecasts for the interior soft trim materials and the processes used to fabricate modules in the three target regions. Fleet share and demand estimates by material type, material and module supplier, and fabrication process will be developed. Constructions will be compared for key models in each fleet.

**Interior Components:** The interior modules to be evaluated include:
- Door Trim
- Cockpit
- Sunvisors
- Pillar Trim
- Consoles
- Headliners
- Seating
- Floor/Acoustic Systems

**Soft Trim Types:** The soft trim materials to be evaluated include:
- Skins (slush molded, vacuum formed, RIM, sprayed)
- Coated Fabrics
- Textiles (woven, non-woven)
- Foams (sheet, bead, poured)
- Acoustic Barriers and Constructions

**Industry Structure:** Supplier shares of the soft trim materials markets and their key customer relationships will be identified and quantified. Profiles of major suppliers, their product lines, new materials, and processes will be developed.
**Constructions:** Current and potential soft trim structures and their associated foam layers (integral, laminated, back foamed) will be included and diagrammed. Esthetic design considerations and their effects on material selection will also be analyzed.

**Module Fabrication Processes:** Changes in fabrication processes (e.g., low pressure molding, S-RIM) or substrates (e.g., bead foams, natural fiber composites) for the modules on which soft trim materials are used.

**Driving Forces for Material Substitution:** A broadened range of forces is driving material substitution and creating opportunities for new materials and processes. The requirements illustrated by the design on the cover of this prospectus will be examined for their impact on materials selection, manufacturing process evolution, module construction, and economics.

**Skins:** The materials and process technology options for producing skins have evolved since the pioneering 1997 REA mult clientele analysis. The new technologies (TPU/TPO slush, vacuum formed TPO, Spray, RIM) will be documented. Commercial status, suppliers, constructions, and the implications for module economics and technology will be quantified.

**Textiles:** Textiles represent a major automotive materials market. Changes in performance requirements (acoustic performance, recyclability, monomaterials construction) and the need to offer cost effective module constructions are driving these changes. The textile industry is responding with new non-woven technology (e.g., microfibers) and new laminate constructions.

**Coated Fabrics:** PVC is the dominant incumbent in coated fabrics used in seat and other interior modules. Anticipation of inclusion in future PVC substitution mandates by GM, Honda, Toyota, and others has stimulated the development of PVC alternatives (ESI, specialty TPOs) which are starting to penetrate this sizable auto interior materials segment.

**Foams:** All types (poured, sheet, and bead foams) as they participate in passenger safety, structures, textile support, and esthetics will be included. The intermaterials competition, role in module manufacturing costs, implications for soft trim material selection, and integration into module construction will be examined.

**Acoustics:** Acoustic performance will be a driver for soft trim material selection. Acoustic solutions were previously an afterthought designed to "fix" problems. Acoustic materials will be incorporated into design and process selection to fabricate cost-effective modules with on-board acoustics.

**Economics of Intermaterial and Interprocess Competition:** System economics will ultimately determine material and process selection. REA will develop manufacturing cost cases to quantify systems manufacturing costs for key modules. These cost cases will be suitable for the analysis of strategy and product positioning.

**Time Horizon:** Forecasts and analyses will be developed from the base year of 2001 through 2006.

**New Soft Trim Technology:** Driven in part by PVC substitution pressures, materials and process technologies for skins, foams, coated fabrics, textiles, and acoustic materials are changing. The new technologies will be identified and their implications for module construction, process technology, and manufacturing economics will be quantified.

Robert Eller Associates, Inc.
REA QUALIFICATIONS

REA is a strategic, technology, and market consulting resource specializing in providing decision-quality analysis in support of management decisionmaking in the global autoplastics sector from offices in the U.S. and Europe.

REA has carried out pioneering technical, economic, and market multiclient and single client studies of all major autoplastic components including instrument panels, headliners, door trim panels, interior trim, seating, skins, electrical components, acoustic barriers, structural components, weather stripping, bumper fascia, and exterior trim. Recent strategy, market, technology, and acquisition studies have included:

- European instrument panels/cockpits photo/supplier database (multiclient study 2000, 2001)
- TPEs in automotive applications (multiclient study -- 2000)
- Automotive polypropylene resins and compounds in the U.S. and Europe
- Supplier industry structure and globalization implications on autoplastics
- Several acquisition analyses in the skins, coated fabrics, and Tier 1 sectors in the U.S. and Europe.

The study will be directed by Robert Eller working in close coordination with REA associates in the U.S., France, and Japan. In addition to directing the plastic consulting activities of REA, Mr. Eller currently serves as Consulting Editor (Plastics) for Automotive and Transportation Interiors magazine, where he writes a periodic column and feature articles analyzing the technology, economics, and structure of auto interior plastics. Prior to establishing REA, he directed plastics consulting studies at Arthur D. Little, Inc. in the U.S. and Europe.

WHO SHOULD SUBSCRIBE

As with all REA studies, this report provides analysis in support of management decisionmaking. It is designed to provide a planning resource for:

- Automotive interior module suppliers
- Skins and coated fabric suppliers
- Textile suppliers (woven, non-woven)
- Sheet and bead foam producers
- Coating (soft touch and protective) and adhesive suppliers
- Raw materials suppliers (skin, foam, substrate, acoustic barriers, textiles)
- Automotive manufacturers (OEMs)
- Compounders
- Interior designers

TIMING AND HOW TO SUBSCRIBE

This study will be initiated in the third quarter of 2001. The target completion date is the second quarter of 2002. An order form outlining costs, terms, and conditions is enclosed with this prospectus. To order, fill out and return the enclosed form with payment or billing instructions.
1. Executive Summary
2. Demand Forecasts
   A. Summary
   B. Fleet Demand Forecast Model by Module
   C. North America
   D. Europe
3. Driving Forces
   A. Automotive
   B. Environmental/Regulatory/Legislative
4. Soft Trim Materials
   A. Candidates
   B. Skins
   C. Property Comparison
5. Textiles (Woven, Non-woven)
   A. Automotive Textile Industry Structure
   B. New Automotive Textile Technologies
   C. Role in Acoustics
   D. Japanese Textile Industry
6. Foams and Their Techno-Economic Role in Modules
   A. Foam Industry Structure
   B. Foam Technology Advances/Trends
   C. Sheet Foams
   D. Bead Foams
7. Acoustic Principles
   A. Acoustic Technology Review
   B. Acoustic Material/Performance in Soft Trim Modules
   C. Acoustic Value Assessment
8. Secondary Operations
   A. Summary
   B. New Technologies
   C. Auxiliary Processes
   D. Role of Painting in Automotive Interiors
   E. Module Effects
9. Interior Modules and Fabrication Processes
   A. Summary
   B. New Technologies
   C. Module Effects
10. Cockpit/Instrument Panel
    A. Industry Structure
    B. Materials
    C. Instrument Panel Skin Processes
    D. Instrument Panel Manufacturing Cost Models
    E. Instrument Panel Supply/Demand Models
        (Europe, N. America)
11. Door Trim Panels
    A. Door Trim Industry Structure
    B. Door Trim Materials
    C. Door Trim Processes
    D. Door Trim Manufacturing Cost Models
    E. Door Trim Supply/Demand Models (Eur., N.A.)
12. Headliners
    A. Headliner Industry Structure
    B. Headliner Materials
    C. Headliner Fabrication Processes
    D. Headliner Manufacturing Cost Models
    E. Headliner Supply/Demand Models (Eur., N.A.)
13. Seating
    A. Seating Industry Structure
    B. Seating Materials
    C. Seating Fabrication Processes
    D. Seating Manufacturing Cost Models
    E. Seating Supply/Demand Models (Eur., N.A.)
14. Acoustic Modules
    (Flooring, Dash Mat, Trunk Floor)
    A. Automotive Acoustics Industry Structure
    B. Acoustic Module Materials
    C. Acoustic Module Processes
    D. Acoustic Module Manufacturing Cost Models
    E. Acoustic Module Supply/Demand Models
        (Europe, N.A.)
15. Industry Structure
    A. Summary
    B. Skins Suppliers
    C. Supplier Profiles
        (Skins, Foams, Textiles, Coated Fabric, Acoustics)
    D. Global Effects
    E. Forward Integration Effects by Tier 1 and Tier 2 Suppliers
    F. Shift to Central and Eastern Europe

APPENDICES
Appendix A - Abbreviations
Appendix B - Fleet Production Trends
Appendix B-1 - N. American Fleet and Area Models
Appendix B-2 - European Fleet and Area Models
Appendix C - Photos
Appendix D - Module Diagrams
Appendix E - General Mfg. Cost Assumptions
Automotive Interior Soft Trim: Skins, Foams, Coated Fabrics, Textiles, and Acoustic Barriers

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This signed order form constitutes an agreement to subscribe to this multiclient study. Mail, fax, or e-mail the completed order form, and enclose your payment or billing instructions. The order form may be downloaded from the REA Home Page. Please contact REA for more information on study contents, scope, and approach.

The price of the study for subscribers is US$15,000. The subscription includes three (3) copies of the final report. Additional copies of the report are available to subscribers for US$400 each. The study will be available on compact disc at a slight additional charge to cover CD preparation costs.

Please fill out the column below if the report is to be mailed to an address other than that indicated to the left:

_________________________  __________________________
Signature/Date

_________________________  __________________________
Name/Title

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Company/Division

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Street Address

_________________________  __________________________
City, State, Zip

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Telephone

TERMS AND CONDITIONS:

1. The subscriber represents and agrees that it will hold in confidence the information and services furnished hereunder, and that it will use the information and services for its own proper use and will not make such information and services available to any other person, firm, or corporation. A subscriber may transmit information furnished under this agreement to a wholly-owned subsidiary.

2. REA reserves the right to cancel this multiclient study and refund prepayments if sufficient support is not received. The same information could be made available to the subscriber under negotiable terms as a single client study.

June, 2003

Robert Eller Associates, Inc.