PROFITABLE GROWTH TECHNOLOGIES IN INTERIOR SOFT TRIM

PREPARED FOR:

JORNADAS DE PLASTICOS EN AUTOMOCION
BARCELONA, SPAIN

JUNE 19, 2003
PRESENTATION HIGHLIGHTS

• OPERATING HYPOTHESES
• CURRENT AUTOMOTIVE SITUATION
• DRIVING FORCES FOR SUBSTITUTION
• EUROPE/NAFTA DIFFERENCES
• VALUE ADD STRATEGIES
• MATERIALS/PROCESS TECHNOLOGY SHIFTS → IMPLICATIONS
• UNREALIZED VALUE OPPORTUNITIES
• CURRENT EXAMPLES
Automotive Interior Soft Trim:
Skins, Foams, Coated Fabrics, Textiles, and Acoustic Barriers

Prospectus for a Global Multiclient Industry Analysis
Robert Eller Associates, Inc.
SOME OPERATING HYPOTHESES

• SEVERE PRICE PRESSURE → VALUE CHAIN SHIFTS

• VALUE-ADD OPP’YS : UNDEREXPLOITED

• BOTH MATERIAL/PROCESS COST SAVING POSSIBILITIES

• EUROPE/NAFTA TECHNOLOGIES ARE CONVERGING

• ACOUSTICS PROPERTIES WILL BE MAJOR DRIVERS

• CURRENT CONSTRUCTIONS ARE INEFFICIENT

• FOAMS ARE KEY VALUE CHAIN SHIFT ELEMENT

• NON-STRUCTURAL COMPOSITES WILL GROW
SNAPSHOT OF CURRENT AUTO SITUATION

• RECESSIONARY GLOBAL ECONOMY
• VEHICLE PRICES CONTINUE DECLINE
• SEVERE OEM DOWNWARD PRICE PRESSURE
• RESIN PRICE INCREASES(2003) → PROFIT DECLINE
• GLOBAL AUTO MFG OVERCAPACITY
• TIER 1 CONSOLIDATION CONTINUES
• TIER 1 PURCHASE POWER INCREASE
• MINOR PROCESS EVOLUTION TO DATE
• THE VALUE CHAIN MUST SHIFT
OEM/SUPPLIER DYNAMICS

OVERSUPPLY
SLUGGISH VEHICLE DEMAND

OEM PROFIT DECLINE

AUTOMOTIVE SOLUTIONS
- DECONTENT
- GEOGRAPHIC SHIFT
- ASSEMBLY EFFICIENCY
- PLATFORM
CONSOLIDATION

TIER 1 PRICE PRESSURE

COST REDUCTION

SUPPLY CHAIN
CONSOLIDATION

CRAFTSMANSHIP
W/COST SAVINGS

PRESSURE
TIER 2 SUPPLIERS

OUTSOURCE
NEW PROCESSES
MATERIAL
SUBSTITUTION

VALUE
CHAIN
SHIFTS
NEW
TEXTILE
TECH.

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2003

oem supp dyn 03.vsd
# HIGH VOLUME PLATFORM EXAMPLES

<table>
<thead>
<tr>
<th>OEM</th>
<th>PLAT</th>
<th>MOD</th>
<th>MM UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>VW</td>
<td>PQ35</td>
<td>GOLF</td>
<td>2.4</td>
</tr>
<tr>
<td></td>
<td>PQ24/25</td>
<td>POLO</td>
<td>1.2</td>
</tr>
<tr>
<td>FORD</td>
<td>F-SERIES</td>
<td>LT. TRUCKS</td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td>MAZDA6</td>
<td>FUTURA</td>
<td>0.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FORD 500</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>FREESTYLE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C1</td>
<td>FIESTA</td>
<td>1.6</td>
</tr>
<tr>
<td>GM</td>
<td>EPSILON</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>GMT800/900</td>
<td>LT. TRUCKS</td>
<td>1.5</td>
</tr>
<tr>
<td>TOYOTA</td>
<td>COROLLA</td>
<td></td>
<td>1.5</td>
</tr>
<tr>
<td>PSA</td>
<td>PFI</td>
<td>206</td>
<td>1.7</td>
</tr>
</tbody>
</table>

SOURCE: REA SOFT TRIM MULTICLIENT
DRIVING FORCES FOR INTERIORS
MATERIAL/PROCESS SUBSTITUTION

- **SYSTEMS** COST SAVINGS
- WEIGHT SAVINGS
- OIL RESISTANCE
- ODOR FREE INTERIORS
- ELIMINATION OF COATINGS
- MOLDED-IN COLOR
- NVH CONTROL
- ACOUSTIC PERFORMANCE
- ENERGY ABSORPTION(OCCUPANT SAFETY)
- RECYCLABILITY(AT ZERO COST PENALTY)
VALUE ADD STRATEGIES

A. VALUE CHAIN SHIFT

B. MATERIAL COST SAVE

C. PROCESS COST REDUCTION

D. ADD VALUE AND FUNCTION (WITH COST SAVE?)
VALUE-ADD OPPORTUNITIES VIA SYSTEMS

TPE SYSTEMS

MATERIALS

ALLOYS

ACOUSTIC BARRIER SANDWICH

SOFT/HARD COMBO

SOFT TOUCH

FOAM/SOLID COMBO

MASTER-BATCH

CO-PROCESSING

COEX

CO-INJECT

2-SHOT

PROCESS

IN-LINE COMP'DG./PROCESS'G

NEG. FORMING (A)

IN-MOLD DECORATION

RF SEALABILITY

FOAMING

FOAMING

NOTES:
(A) OF IP SKINS BY VISTEON AND OTHERS
(B) FOR AUTOMOTIVE APPLICATIONS; TPEs COMPETING WITH ETP FILMS

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2003
## A. VALUE CHAIN SHIFT

<table>
<thead>
<tr>
<th>STRATEGY</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FORWARD/BACKWARD INTEGRATION</td>
<td>- TEXTILE SUPPLIERS → CONFECTION</td>
</tr>
<tr>
<td></td>
<td>- TIER 1 → SKIN FABRICATION</td>
</tr>
<tr>
<td></td>
<td>- RADIATION X’LINK SKINS</td>
</tr>
<tr>
<td>OUTSOURCING</td>
<td>- FOAMING SEAT PADS</td>
</tr>
<tr>
<td></td>
<td>- FLAME LAMINATION OF TEXTILES</td>
</tr>
<tr>
<td>REDUCE DEV. TIME</td>
<td>RAPID PROTOTYPING</td>
</tr>
<tr>
<td>SANDWICH LAYER CONSOLIDATION</td>
<td>- TPO SKIN/PO FOAM LAMINATES</td>
</tr>
<tr>
<td></td>
<td>- ON-BOARD ACOUSTICS</td>
</tr>
<tr>
<td>REDUCE SECONDARY OPERATIONS</td>
<td>- IN MOLD AIRBAG DOOR SCORING</td>
</tr>
<tr>
<td></td>
<td>- IN MOLD TRIM</td>
</tr>
<tr>
<td></td>
<td>- IN MOLD ASSEMBLY</td>
</tr>
</tbody>
</table>
## B. MATERIAL COST SAVINGS

<table>
<thead>
<tr>
<th>STRATEGY</th>
<th>NOTE/EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>THIN WALL</td>
<td>DOOR TRIM</td>
</tr>
<tr>
<td>DECORATIVE FILMS</td>
<td>AVOID PAINTING</td>
</tr>
<tr>
<td>SCRAP REDUCTION</td>
<td>MONOMATERIALS CONSTRUCTION</td>
</tr>
<tr>
<td>PVC SLUSH SKINS</td>
<td>NEED LOW TEMP PROPERTIES</td>
</tr>
<tr>
<td>DIRECT COMPOUNDING</td>
<td>-IN-USE(JCI, FAUURECIA)</td>
</tr>
<tr>
<td></td>
<td>-USE FOR TALC/PP?</td>
</tr>
<tr>
<td>MASTERBATCH</td>
<td>SUBSTRATES</td>
</tr>
<tr>
<td>REACTOR GRADES</td>
<td>-SAVES COMPD’G</td>
</tr>
<tr>
<td>MOLDED-IN COLOR</td>
<td>-SUBSTRATES</td>
</tr>
<tr>
<td></td>
<td>-SAVES PAINT</td>
</tr>
</tbody>
</table>
AUTOMOTIVE TEXTILES . . .
AN ECUMENICAL PERSPECTIVE

COATED FABRICS

LEATHER

REGENERATED FIBER BATTLING (SHODDY)

ARTIFICIAL LEATHER

NONWOVENS FACINGS

WOVEN/KNIT TEXTILES

FOAMS (COMPETE/COMPLEMENT)

NEW LIGHTWEIGHT ACOUSTIC FIBERS

AUTO TEXTILES MARKET

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2003
NEW TECHNOLOGY NONWOVENS’ SUPERIOR ATTRIBUTES

• IMPROVED PERFORMANCE: SOFTNESS, TACTILE, CONFORMABILITY/DRAPE DURABILITY
• BREATHABILITY/CONTROLLED POROSITY
• ACOUSTIC/THERMAL INSULATION, FILTRATION
• UV RESISTANCE
• PRINTING, EMBOSSSING, DYEABILITY
• NON-FRAYING (VS. TEXTILES)
• MICRODENIER
• FILTRATION
• MARKET ONLY 17% PENETRATED
EXHIBIT 3

RIGID SEMI-STRUCTURAL FOAM SANDWICH STRUCTURE

BARE:

RIGID FIBER MAT SKIN

BEAD FOAM

MAY BE COLLAPSED TO FORM INTEGRAL HINGE

CARPET/NON-WOVEN/WOVEN TEXTILE LAMINATE:

CARPET OR WOVEN OR NON-WOVEN BACKING

RIGID FIBER MAT SKIN

BEAD FOAM

RIGID SKIN OR NON-WOVEN BACKING

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2002

rsfoamsandwich02.vsd
AUTOMOTIVE FABRICS MARKET VALUE (NAFTA/EUROPE), 2002

SOURCE: ROBERT ELLER ASSOCIATES, INC., SOFT TRIM MULTICLIENT
## C. PROCESS COST SAVINGS

<table>
<thead>
<tr>
<th>STRATEGY</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN LINE NEGATIVE FORMING SKINS</td>
<td>-EPP FOAM/TEXTILE</td>
</tr>
<tr>
<td></td>
<td>-DOOR TRIM</td>
</tr>
<tr>
<td></td>
<td>-DECORATIVE FILMS</td>
</tr>
<tr>
<td>HINTERSPRITZEN</td>
<td>WIDELY USED (EUROPE)</td>
</tr>
<tr>
<td>IN MOLD ASSEMBLY</td>
<td>HVAC LOUVERS</td>
</tr>
<tr>
<td>SANDWICH CONSOLIDATION</td>
<td>-FLOOR ACOUSTICS</td>
</tr>
<tr>
<td></td>
<td>-DOOR TRIM ACOUSTICS</td>
</tr>
<tr>
<td></td>
<td>-HEADLINER ENERGY ABSORB</td>
</tr>
<tr>
<td>RUBBER REPLACE</td>
<td>BODY SEALS</td>
</tr>
<tr>
<td>CO-PROCESSING</td>
<td>-EXTRUSION, INJECTION</td>
</tr>
<tr>
<td></td>
<td>-BLOW MOLDING</td>
</tr>
</tbody>
</table>
CURRENT MODULE FABRICATION (INEFFICIENT)

RESINS

MOLD SKIN  MOLD SUBSTRATE

HIGH SCRAP  PU FOAM

BACK-FOAM

MOLDED PLASTIC
PRE-MODULE

ADD-ON PARTS

ASSEMBLED MODULE

4-STEP OPERATION

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2003
FUTURE MODULE FABRICATION (IDEAL)

SKIN RESIN/FOAM

MODULE FABRICATION

IN-MOLD ASSEMBLY

ASSEMBLED MODULE

DIRECT COMP'DG.

ADD-ON PARTS

SUBSTRATE RESIN

LOW SCRAP

(Ideal) 1-Step Operation

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2003

CPE-one step 03.vsd
EXHIBIT 1

AUTOMOTIVE FOAMS TARGETS

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2002

foam tfts 02.vsd
EXAMPLE OF PU FOAM TRUNK LINER BY RIETER

SOURCE: ROBERT ELLER ASSOCIATES, INC. 2003
EXAMPLE OF EPP USAGE IN HEADLINER
(2002 PT CRUISER)

SOURCE: ROBERT ELLER ASSOCIATES, INC. 2003
LOCATIONS OF ACOUSTIC MATERIALS

SOURCE: JANESVILLE PRODUCTS, 2002
EXAMPLE OF DASH MAT LAYER CONSTRUCTION

HEAVY LAYER

ACOUSTIC BATTING

CARPET

SOURCE: COLLINS AND AIKMAN
EXAMPLE OF ACOUSTIC COMPONENTS

SOURCE: HP PELZER
RIM MOLDING OF CARPET/ACOUSTIC BARRIER BY C+A

PU-RIM MOLDING OF UNDER-CARPET BARRIER FOR ROVER FREELANDER

PHOTOS: C+A

CARPET SECTION ON LOWER HALF OF PU-RIM TOOL
EXAMPLE OF ACOUSTICALLY TUNEABLE FIBER

SOURCE: COLLINS AND AIKMAN
EXAMPLE OF RIGID/FOAM VALUE ADDED SYSTEM

20% TALC-FILLED PP RIGID FRAME

OVERMOLDED SEBS LIP

OUTSIDE

GLASS

ADHESIVE

VEHICLE INTERIOR

SOURCE: ROBERT ELLER ASSOCIATES, INC.
<table>
<thead>
<tr>
<th>STRATEGY</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN MOLD DECORATION</td>
<td>-METALLICS</td>
</tr>
<tr>
<td></td>
<td>-PATTERNS</td>
</tr>
<tr>
<td>LIGHT WEIGHT FIBERS</td>
<td>FLOOR/ACOUSTICS</td>
</tr>
<tr>
<td>SURFACE ESTHETICS</td>
<td>-NEW NONWOVENS</td>
</tr>
<tr>
<td></td>
<td>-NEGATIVE FORMING</td>
</tr>
<tr>
<td>MICRODENIER NONWOVENS</td>
<td>BETTER ACOUSTICS</td>
</tr>
<tr>
<td></td>
<td>IMPROVED DRAPE</td>
</tr>
<tr>
<td>CRAFTSMANSHIP</td>
<td>JCI CRAFTEC PROCESS</td>
</tr>
<tr>
<td>LUXURY FABRICS</td>
<td>SEAT → DOOR TRIM,IP</td>
</tr>
<tr>
<td>SOFT TOUCH</td>
<td>-BUTTONS</td>
</tr>
<tr>
<td></td>
<td>- OTHER SURFACES</td>
</tr>
</tbody>
</table>
VALUE-ADDED DECORATION WITH TPEs

RUBBER:

- ALL BLACK

TPE VENEER:

- COLORED TPE
- SOLID/FOAMED RUBBER

IN-MOLD DECORATION (IMD):
BACK-PRINTED LAMINATES

- CLEAR SURFACE FILM
- BACK PRINTED (PATTERN OR COLOR)
- TPE (OR ETP) SUBSTRATE

IN-MOLD DECORATION (IMD):
CO-EX FILM/SHEET

- CLEAR SURFACE FILM
- CO-EX COLOR LAYER
- SUPPORT/SUBSTRATE LAYER

MOLDED-IN DECORATIVE (MID) EFFECTS:

- MOLDED-IN PARTICLES

TRANSPARENT

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2003
EXAMPLE OF LEATHER (ALCANTARA) MEDALLION INSERT

SOURCE: ROBERT ELLER ASSOCIATES, INC. 2003
TARACELL IP EPP SEMI-STRUCTURE/TEXTILE COVERING CONCEPT (TEXTILE DETAIL)

SOURCE: TARACELL
TARACELL IP EPP SEMI-STRUCTURE/TEXTILE COVERING CONCEPT

SOURCE: TARACELL
TARACELL EPP ON INTERIOR OF DOOR

SOURCE: TARACELL
TARACELL DT EPP SEMI-STRUCTURE/TEXTILE COVERING CONCEPT

SOURCE: TARACELL
DEMAND TRENDS IN EUROPEAN SLUSH/ SPRAY IP SKINS

SOURCE: ROBERT ELLER ASSOCIATES, INC.,
SOFT TRIM MULTICLIENT STUDY, 2003
AUTOMOTIVE FOAM FAMILIES AND EXAMPLE APPLICATIONS

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2002
WHAT WILL DRIVE PO AUTO FOAM GROWTH?

• H20 BLOWN FOAM REPLACEMENT IN BODY SEALS
• GROWTH OF PO MICROCELL TECH.(TREXEL)
• PROLIFERATION OF RAD-XL PO TECHNOLOGY
• ENTRY OF LOW COST PO SHEET FOAMS
• PO SHEET FOAM/TEXTILE LAMINATION
• HMS PP PROLIFERATION
• EXTRUDED THICK SHEET FOAMS(STRANDFOAM)
• IN MOLD SKIN/FOAM LAMINATION(EPP/TPO SKIN)
• MULTI-DENSITY CAPABILITY(EPP BEAD FOAMS)
• I.M./EXTRUDED RIGID SHEET FOAMS(SUMITOMO)
EXAMPLE OF MAGNESIUM ON A FIAT VEHICLE

SOURCE: FIAT
SUMMARY

- INTENSE MODULE PRICE PRESSURE:
  - VALUE CHAIN SHIFTS
  - NEW MATERIALS/PROCESS TECHNOLOGY

- POSSIBLE TO ADD VALUE AT REDUCED COST

- TARGET GROWTH SECTORS:
  - FOAMS (EPP, SHEET FOAMS, BODY SEALS)
  - NEW NON WOVENS
  - PVC/SPRAY SKINS
  - ACOUSTICS
  - SURFACE DECORATION
  - RUBBER REPLACEMENT (TPVs IN BODY SEALS)

- RECYCLING - NOT U.S. DRIVER, SIGNIFICANT EUROPE DRIVER

- EURO/NAFTA USE PATTERN WILL CONVERGE
ABOUT ROBERT ELLER ASSOCIATES, INC.

• TECHNICAL, MARKET AND ECONOMIC ANALYSIS IN SUPPORT OF MANAGEMENT DECISION
• AUTOMOTIVE – ONE OF SEVERAL SPECIALTIES
• OFFICES IN US AND EUROPE
• RECENTLY COMPLETED SOFT TRIM MULTICLIENT STUDY
• INITIATING AUTO NONWOVENS STUDY
• REPRESENTATION IN SPAIN( PROTOMOLD-BARCELONA, protomold@eresmas.com)