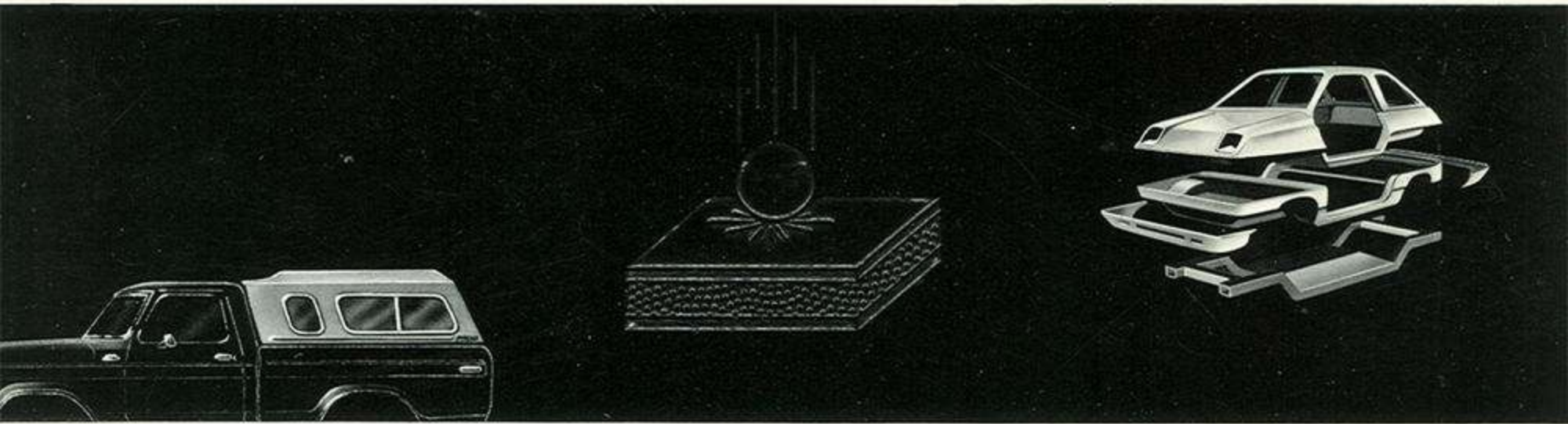


THE SHAPE OF THINGS TO COME
COMPOSITE TECHNOLOGY CORPORATION



ERM™...AN INNOVATIVE PROCESS FOR THE PRODUCTION OF PLASTIC COMPOSITES

**LESS WEIGHT...
MORE STRENGTH...
MORE COMPOSITE VARIETY...
LOWER COST TOOLING...
LESS CAPITAL INVESTMENT.**

Advantages of ERM™ composites, when compared with traditional laminates, include dramatically reduced weight, far greater impact resistance, the increased ability to make composites, lower cost tooling and less capital investment.

Elastic Reservoir Molding, or ERM, has come of age as an alternate to conventional reinforced plastic. As a result, the design engineer may now choose from a greatly expanded selection of fiber reinforced materials for the production of components in low volume runs that do not justify matched metal tools or hand lay-up...in prototype parts...for flooring and structural

components, such as the underbodies of cars and trucks...and in mass transit vehicles.

For low volume and high volume runs, ERM may be used to provide the benefits of low molding pressures, less press investment and easily handled materials.

**ERM™...LOW PRESSURES +
LOW COST TOOLS =
LARGE PARTS**

ARMY TRUCK BED MADE OF STEEL AND WOOD WEIGHS 3,600 POUNDS. WITH ERM, THE SAME COMPONENT DESIGN WEIGHS 2,600 POUNDS.

FIBERGLASS CORE
FIBERGLASS

COMPRESSION SKIN ▼

TENSION SKIN ▲

FIBERGLASS-HIGHER DENSITY
CORE-LOWER DENSITY

ERM SAMPLE STICK

ERM stiffness is superior to SMC.

	FLEXURAL MODULUS	SPECIFIC GRAVITY	STIFFNESS TO WEIGHT RATIO
SMC	1.8 x 10 ⁶	1.85	66
ERM™	2.0 x 10 ⁶	1.32	95

STIFFNESS TO WT. RATIO = $\frac{\sqrt[3]{\text{FLEXURAL MODULUS}}}{\text{SP. GRAVITY}}$

The key element in ERM is the open-cell urethane foam that is used as an elastic reservoir for a thermosetting resin.

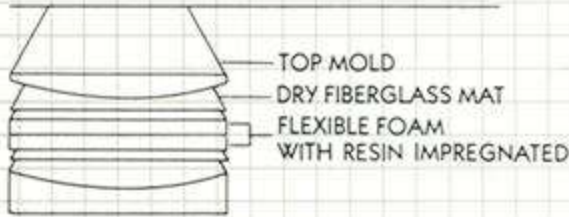
- Flexible, open-cell urethane foam is impregnated with a thermoset resin, such as epoxy, polyester or vinyl ester.
- A dry reinforcement is placed on each side of the impregnated foam sheet.
- The resulting sandwich is placed into a heated, matched metal molded tool.
- The die is closed and compressed at pressures below 150 psi. When the part has cured, the laminate is taken from the die and trimmed.

UNIQUE PRODUCTION VERSATILITY. With ERM, additional reinforcement or materials can be inserted in the composite wherever desired to obtain different properties since ERM compression flow is vertical. There is no horizontal flow and added material will not move throughout the mold as with present SMC molding. Dissimilar resins can be used on different sides of the same part. For example, epoxy can be molded on one side of a part and a different colored polyester on the other in a one-step process... you can place a conventional gel coat on the tool and mold an ERM laminate at the same time...

surface skins may be added to the reinforcement layers for decorative or protective purposes... different cores can be used to reduce weight.

Examples of different structural composites that can be obtained include laminates with cores of PVC, polystyrene foam, balsa wood and rigid polyurethane foam. The ERM process with low molding pressure and low flow provides all of these composites with better consistency and higher physical properties than SMC.

Sandwich construction of ERM composite provides greater impact resistance than comparable fiberglass reinforced materials at equivalent percentages of reinforcement.



PROPERTY COMPARISONS

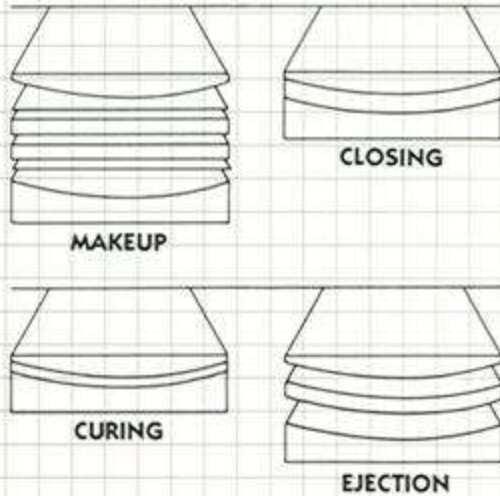
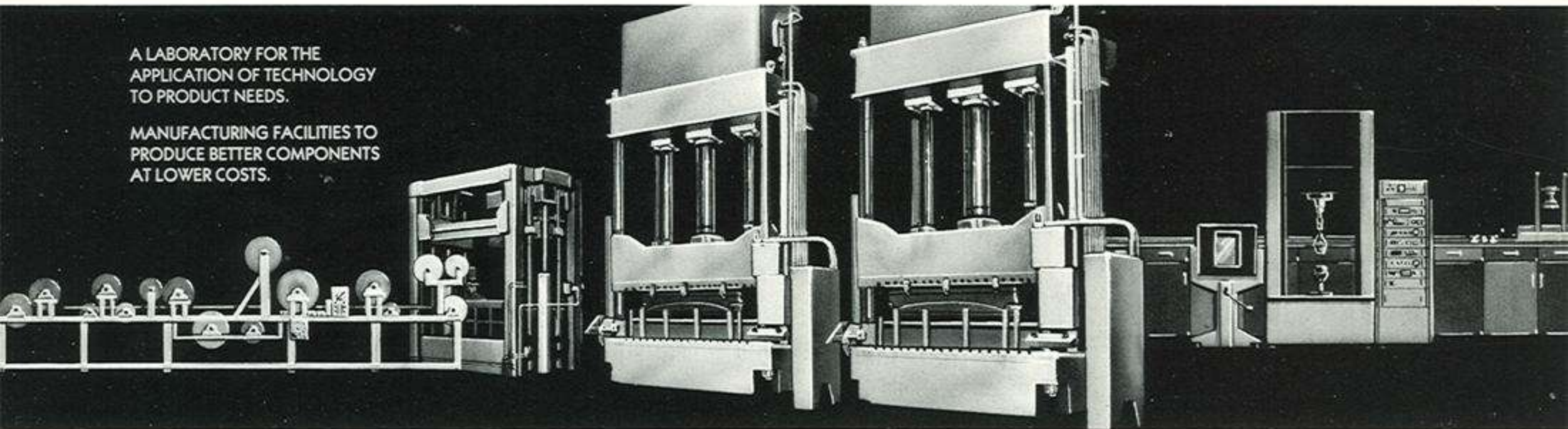
	lb/Ft ²	Tensile Strength	Flex Strength	Flex Modulus	Fire Retardancy	Cost/Ft ²
ERM	.9-1.1	13-14,500 PSI	42-44,000 PSI	2.2x10 ⁶ PSI	**	\$.70
SMC	1.5-1.8	11-12,000 PSI	25,000 PSI	1.8-2.0x10 ⁶ PSI	**	\$.55-.60
AZDEL P-100	.9-1.1	9.5-10,500 PSI	22,000 PSI	.8x10 ⁶ PSI		\$.90-1.00

*All laminate thicknesses are .157"

**Systems are comparable

A LABORATORY FOR THE APPLICATION OF TECHNOLOGY TO PRODUCT NEEDS.

MANUFACTURING FACILITIES TO PRODUCE BETTER COMPONENTS AT LOWER COSTS.



CTC ... EXPERTISE IN COMPOSITE MOLDING AND PROCESS DEVELOPMENT

Composite Technology Corporation is the sole licensee for Elastic Reservoir Molding in the United States. Its staff of trained personnel provides over 60 years of experience in fiberglass technology that can be applied to your plastic molding requirements.

A modern, fully equipped laboratory and manufacturing facilities are also available to help meet your molding and materials process development needs.

Call 313/585-6240 for information about what ERM™ and Composite Technology can do for you.

COMPOSITE TECHNOLOGY CORPORATION

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