

PN-ACB-687
95975



®

ROMANIA

WASTE MINIMIZATION IMPACT PROGRAM

**EVALUATION OF THE WASTE MINIMIZATION
PROGRAM**

AT

SIGMOB S.A.

JUNE 23 - 24, 1997

**USAID/WEC COOPERATIVE AGREEMENT
NO. ANE-0004-A-00-0048-00**

**World Environment Center
419 Park Avenue South
New York, New York 10016**

OCTOBER 1997

A

REPORT DISTRIBUTION:

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

Melody Bacha	Bureau for Europe and New Independent States
Alexandra Burke	Bureau for Europe and New Independent States
Angela Crooks	Bureau for Europe and New Independent States
Patricia A. Swahn	Document Acquisitions

USAID MISSION, BUCHAREST, ROMANIA

Peter B. Lapera	USAID Representative
Roberto Figueredo	Environmental Director

POLLUTION PREVENTION CENTER

Vladimir Gheorghievici	Director
------------------------	----------

PROJECT CONSULTANTS

Louis Gilde
Robert Locke

WORLD ENVIRONMENT CENTER

Antony G. Marcil
Thomas J. McGrath
Romuald Michalek
Bohdan Aftanas
Valerie Sepe
Ernest Bolduc
Raymond L. Feder
P. Breese/File (2)

SIGMOB S.A.

Valentin Petrache	General Director
Dan Socaciu	Technical Director

Project Description: N/A

Project Type: Waste Minimization Impact Program Assessment

Country: Romania

Industrial Sector: Furniture

Date: June 23 & 24, 1997

Funding Source: United States Agency for International Development

Participants: Sigmob Staff and WEC/PPC Team

Project: N/A

Business Development: N/A

TABLE OF CONTENTS

Section	Page
I. Introduction	1
II. Executive Summary	2
III. Findings	3 - 7
IV. Addendum	8 - 9
V. Appendix I (Catalog)	10
Appendix II (List of Material Forwarded to Sigmob)	11 - 12
Appendix III (Business Cards of Contacts)	13

d

I. INTRODUCTION

A joint WEC/PPC team including Louis Gilde, Project Consultant, Robert Locke, Project Consultant, Vladimir Gheorghievici, Pollution Prevention Director, and Frank Szymborski, WEC Project Manager, visited Sigmob which had participated in the WEC Waste Minimization Seminar.

The plant visit was to:

- Provide guidance and assistance in establishing an effective waste minimization program; and
- Ascertain the progress in the identification and implementation of the WMIP project.

During discussions with the plant's technical staff, it became evident that Sigmob is interested in developing a formal waste minimization program. However, due to a lack of funds, the plant proposed to concentrate their efforts on those projects that could contribute to reducing their production costs and/or improving product quality. In this regard, the plant requested WEC to provide additional expertise to improve manufacturing/process procedures.

WEC acknowledges the contribution made by the volunteer project consultants, Messrs. Louis Gilde and Robert Locke, who gave freely of their time and energy in assisting WEC in its Waste Minimization Impact Program in Romania.

II. EXECUTIVE SUMMARY

A WEC team visited S.C. Sigmob S.A. June 23 and 24, 1997. This report identifies potential projects for improvements in this furniture factory. Problems are listed with suggested solutions and benefits. Efforts to undertake solutions should reduce operating costs, reduce energy costs and reduce air pollution. It was not possible on this brief trip to obtain details on costs and thereby develop estimates of savings.

The Sigmob management has indicated an interest in a waste management program as evidenced by requesting the WEC to visit this factory. Conservation is practiced by recapturing wood waste of every type such as defective product, sawdust, packaging and scrap, most of which is transported to Enmec for use as boiler fuel.

Although there are no current major environmental impacts from the Sigmob operation, management recognizes that measures may have to be taken to ensure that the company remains in compliance with future changes in regulations.

Development of an internal environmental management team is expected to result in adopting WEC's 10 Step Waste Minimization Program following receipt of this report. Such an effort will also result in developing detailed cost analysis of savings to be realized. A follow-up visit to encourage and assist in furthering the factory's accomplishments should be considered if results are to be optimized.

Besides information on wood furniture, variable speed drives and hood design to be provided by WEC, the team visiting developed information on wood adhesive use and improved application techniques from a U.S. company. The cut sheets attached describe the Lord Corporation, Chemical Products Group, Adhesives System.

III. FINDINGS

Introduction

We were impressed with the professionalism of the employees and management at Sigmob, S.A., Sighetul Marmatiei. It was obvious that the lack of financial resources limited what could be accomplished.

We were provided with concerns in various areas of the factory and processes. These are briefly outlined in Addendum A.

Although there are steps taken to reduce waste through recycling, frequently limitations of finances handicaps improvements in operations.

There was an expressed interest in adopting the WEC 10 step program of waste minimization. The formation of a committee to involve every worker in the factory was still in the planning stages at the time of our visit.

Potential Projects

FURNITURE

Problems:

1. Management realizes that there is an energy drain during winter conditions due to exhaust from dust collector systems. This is an unavoidable situation with the existing design since sawdust from sanding and cutting operations must be removed.
2. Organic solvents are used in the various finish coatings applied to finished products. These fumes can be a problem for employees.
3. There is a waste water contamination problem arising from the use of a falling film scrubbing system in the lacquer spray booths. This is to coalesce the over-spray. Conservation of this water usage is warranted.
4. In the wood forming process of bending components, heat, particularly during summer operations, can be detrimental to employees. Better venting is warranted.
5. Adhesives are used during the assembly of components. There is a reported uncontrolled wastage and shelf-life problem. Alternatives to each of these problems is recommended.
6. Plywood from Sigmob has periodically internal voids. These become apparent during forming operations and result in material wastage, lost time and unwarranted financial losses.

Solutions:

1. Better control of the exhaust system at each source of sawdust is necessary to avoid excessive air discharge. This can be accomplished with motorized dampers interlocked with each particular machine. The function is to only exhaust a machine when in productive use. To avoid excessive exhaust rates from other machines because of an unbalanced exhaust condition, variable speed motors are recommended to replace the constant speed drives currently in use. This will also result in a savings in electrical energy.

During winter conditions, recirculation of the exhaust air from the dry sawdust cyclones is recommended to supplement the heated make-up required for factory heating. This could be a by-pass line from the cyclones passing through a second high efficiency air filter before entering the factory. During summer conditions, the exhaust air would go directly to atmosphere.

Another source of electrical energy demand is the lighting of the factory. Because of high overhead ceilings, higher illumination is necessary to assure adequate light at each work station. Substitution of high intensity lighting at each work station, interlocked with equipment use, and reduction in overall factory lighting should further reduce electrical energy demand.

2. Investigation of alternative finish coatings, such as water based, is recommended to replace the solvent based coatings now being used. The cost of water based coatings may be greater than the solvent based coatings. However, there will be no need for solvents cleanup chemicals thus providing a savings in the overall operations. Potential organic toxicity exposure to personnel will be reduced.

Regardless of finish coatings substitution, improvements to the spray booth operations is warranted. This requires a redesign to the booth opening to increase the draft so that any over spray is directed to the exhaust fan rather than drifting back into the adjacent work areas. This condition will be aggravated if the entire room is under negative pressure. In addition to this improvement, better illumination within the booth is recommended so that these changes do not become self defeating.

3. A pressure pot type of cartridge filter is recommended for the over spray booth water. This will require a medium pressure recirculation pump to draw off the reservoir water and return it to the falling film distributor after passing through the filter. The filter should be the pleated paper throw away type.

4. It appears the kilns used for the bending process are not directly vented to the atmosphere. A hood arrangement with medium speed exhaust fan is recommended to be erected over the kiln. The exhaust side of the fan should be fitted with a damper so that, during winter conditions, the heated air can be redirected back into other portions of the factory to take advantage of recycling the heated air.

5. To conserve adhesive use, a two component system of either epoxy or urethane adhesive is recommended. A system in use in the U.S. by Lord Adhesives could be considered (see attached catalog information in Appendix I). Their system meters and mixes the two components on demand at the use point, thereby the worker not only controls the application rate, but no longer has to be concerned about the pot life of the adhesive mixture.

6. A means for examining the raw plywood before forming operations could be with a variation of either a sonic or low intensity x-ray system. Equipment such as this is used in other types of industry and may be applicable for this purpose.

Benefits:

1. A change in the lighting in the factory can affect electrical energy usage and can be controlled by making a relatively minor capital expenditure. This will be offset by the savings in electrical energy costs and provide each employee with better lighting conditions.

Control of the dust collector exhaust at each machine on as-needed basis and the use of a variable speed drive on the exhaust fan to the cyclones will provide an additional electrical energy savings.

Recirculation of the dry cyclone air during winter conditions can reduce the heat requirement for make-up air. There will be a resultant savings in heat energy costs.

2. By changing to a water based coating system(s), the direct affect will be the reduction of potential personnel exposure to toxic fumes. This health affect alone warrants this consideration. Side benefits may be a savings in solvent costs, which will no longer be necessary for viscosity control and equipment clean-up.

3. Water recirculation for the spray booth falling film coalescing system will result in savings for potable water costs. The use of a disposable filter will remove any contaminants to permit this reuse.

4. The capture of heat from the kiln will improve the work place conditions and removes the potential heat stress on personnel.

5. Adhesive costs can be greatly reduced by using measured quantities at the point of application without concern for pot life control and mixing. The initial cost for the system will be greatly offset during the first year of use.

Remarks:

1. Institute the WEC 10 step waste minimization program.
2. The WEC 10 step program only works if everyone from top management to the lowest employee is totally dedicated to the effort in action and deed.
3. This concept should not only be employed on existing operations, but should be incorporated in the design and construction of new systems in the years ahead. Each employee needs to have the opportunity to suggest changes and experience the thrill of contribution to the overall company welfare and economic benefit.

Action Required:

SIGMOB

1. Modify the factory lighting system to provide high intensity lights at each specific operation and interlocked to the equipment use. Reduce the high ceiling lighting intensity to provide just general overall illumination at the floor, but not for production conditions.
2. Reduce the exhaust fan rate through replacement with variable speed drives and to balance the system to exclude any equipment not in use.
3. Determine if water based coatings systems are: 1) available for the furniture industry and type of product being produced by Sigmob; and 2) acceptable to the consumer base purchasing this product with this type of finish. Trial samples should be produced and displayed beside product using the current coatings for comparative purposes.
4. Purchase the Lord Adhesive "Lord-Pak" cartridge configuration adhesive systems or its equivalent.
5. Reconfigure the heat exhaust system for the bending kilns so that excessive heat build-up during summer conditions can be controlled. Capture of this exhaust heat in winter conditions can be useful to supplement factory heat requirements.

W.E.C.

1. Provide information on variable speed drives and ancillary equipment for proper control. Information regarding savings opportunities will be included.
2. Provide information on the wood furniture products industry and in particular on how invisible plywood voids are detected.

IV. ADDENDUM

S.C. Sigmob S.A. Management has provided a listing of identifiable project concerns. The apparent lack of adequate funding may prevent carrying out solutions to many of those listed below. Our report has included descriptions for some and potentially low cost solutions:

- a) Timber (plank) cutting losses;
- b) Dried plank cracking;
 - I. ends;
 - II. internal of plank area;
- c) Plywood quality;
 - I. splitting;
 - II. invisible core voids;
- d) Adhesive losses;
 - I. mixes;
 - II. application;
- e) Abrasives;
 - I. recycle;
 - II. clogging;
- f) Lacquers;
 - I. spray applications;
 - II. vapor recovery - solvents;
- g) Energy-Electrical;
 - I. idle equipment;
 - II. exhaust systems;
- h) Energy-Thermal;
 - I. optimize drying system;
 - II. kiln controls;
 - III. vent losses;

IV. local boiler system;

- i) Environmental Management Organization;
- j) Industrial vs. Potable Water System.

APPENDIX I
(CATALOG)

LORD® ADHESIVES

More Than A Common Bond

From their use on sleek, aerodynamic automobiles to the tiniest hearing aid, Lord® adhesives do far more than simply hold products together.

Unlike mechanical fasteners, Lord adhesives actually improve the structural dynamics of a product. And, they create strong bonds — in less time and with less expense than welds, bolts, rivets and other mechanical fasteners.

In fact, the potential benefits of Lord adhesives are significant. They enhance structural integrity by eliminating or reducing fatigue at contact points and uniformly distributing loads over an entire bond line. They make products less susceptible to sudden, damaging loads.

Lord adhesives also resist harsh environments like temperature extremes, humidity and salt spray. The adhesive layer adds cushioning and creates a moisture barrier between substrates.

By replacing unsightly welds, bolts and other mechanical fasteners, engineered adhesives improve the aesthetics of a product.

And they offer the potential to reduce finishing costs, improve assembly time and increase your manufacturing output.

Lord adhesives can trim weight from a product and reduce noise and vibration. And in some cases, Lord acrylics, epoxies, urethanes and cyanoacrylate adhesives may be the only way to effectively join dissimilar or difficult-to-fasten materials.

More manufacturers are now using Lord adhesives to assemble products as diverse as boats and audio speakers; outdoor signs and snowmobiles; and, golf clubs and windsurfers.

And they're turning to Lord Corporation, their single source for a full range of high-performance engineered adhesives.



LORD CORPORATION OFFERS
A FULL LINE OF ACRYLIC,
EPOXY, URETHANE AND
CYANOACRYLATE ADHESIVES.

LORD ADHESIVES ARE
AVAILABLE IN CONVENIENT
LORD-PAK™ CARTRIDGE
CONFIGURATIONS.

(See page 8)



YOUR SINGLE SOURCE FOR ADHESIVES

Lord Corporation can be your single source for high-performance adhesives.

Use the opposite chart as an aid in determining the right adhesive for your application. The chart summarizes key considerations in each step of the adhesive selection process — from pre-application factors to application and post-application considerations.



produce strong, flexible bonds that add structural integrity to assemblies made of plastic, primed metal, foams and elastomers.



Epoxy Adhesives

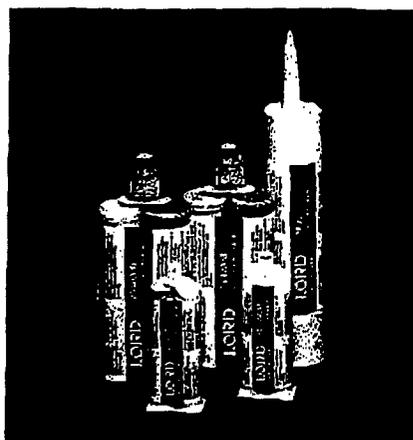
Lord® Epoxy Adhesives have been trusted to bond body panels on more than 10 million cars and light- and heavy-duty trucks worldwide. Ideal for rubber, SMC, plastics and metal applications, these adhesives provide high-strength adhesion that often has greater load-bearing capability than the substrates they bond.

Cyanoacrylate Adhesives

Instant bonds. Immediate handling strength. In just seconds, Lord® Cyanoacrylate Adhesives produce super-strong bonds that offer excellent resistance to weathering and aging. These adhesives are especially well-suited for trim attachment and light assembly.

Acrylic Adhesives

Because they adhere to a variety of substrates — including plastics, SMCs and unprepared metals — Lord® Acrylic Adhesives have become known as *the* versatile bonding agents. These adhesives are easy to apply and bond with minimal surface preparation.

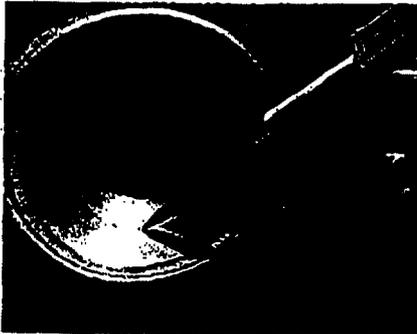


Urethane Adhesives

Lord® Urethane Adhesives are the logical choice if you're bonding today's high-performance thermoplastics and thermoset plastics. These one- and two-component systems

-12-

LORD® EPOXY ADHESIVES



Lord® Epoxy Adhesives create superior bonds for rubber, SMC, plastics and metals. Our epoxy adhesives are widely used in the automotive industry — over 10 million cars and light- and heavy-duty trucks feature body panels bonded with Lord Epoxy Adhesives.

Key benefits of Lord Epoxy Adhesives are:

- **High strength bonds.** Their load-bearing properties are equal to, or exceed, many of the substrates that they bond.

- **Excellent environmental and chemical resistance.** They resist the effects of dilute acids, alkalis, solvents, greases, oils, moisture, sunlight and weathering. Lord Epoxy Adhesives provide optimal performance in service temperatures up to 400° F (204° C).
- **Improved aesthetics for bonded assemblies.** Lord Epoxy adhesives eliminate the distortion, discoloration and surface marring common to mechanical fastening methods such as screw heads, bolts and welds.

LORD® EPOXY ADHESIVE SELECTION GUIDE

Product	Description	Mixed Appearance	Working Time*	Handling Time*
304	General purpose, high viscosity epoxy adhesive.	Gray paste	1-2 hrs.	8 hrs.
305	General purpose, medium viscosity epoxy adhesive.	Blue syrup	1-2 hrs.	8 hrs.
306	High viscosity, epoxy adhesive formulated for MIL-A-24456 (ships).	Gray paste	1-2 hrs.	8 hrs.
307	General purpose, medium viscosity hardener for use with Lord 305-1.	Clear syrup	1-2 hrs.	8 hrs.
309	General purpose, non-sag, thixotropic, epoxy adhesive.	Blue paste	1.5-2 hrs.	8 hrs.
310	High-strength epoxy adhesive for SMC, FRP and general purpose bonding.	Gray paste	30-60 min.	8 hrs.
312	General purpose, low viscosity epoxy adhesive.	Yellow to amber liquid	1.5-2.5 hrs.	8-16 hrs.
320	Toughened, high viscosity, epoxy adhesive for SMC, FRP and general purpose bonding.	Gray paste	10-20 min.	4 hrs.
360	Sag-resistant, high-performance, 5-min adhesive. Sandable and paintable when cured.	Gray paste	2-4 min.	15-30 min.
370	Two-component adhesive. Safe for painted surfaces.	Black paste	20-30 min.	8 hrs.

* Working time is defined as the time allowed before bonding surfaces must be mated.

** May be accelerated with heat.

*** Treated with Lord 7701 surface treatment.

LORD® EPOXY ADHESIVES

• **Uniform contact between substrates.** They fill irregular contours, ensuring uniform contact where substrate surfaces do not mate — critical to many combinations of wood, fabric, rubber, ceramic, glass and foams.

- **Flexible cure rates.** They cure at room temperature or elevated temperatures (which provides the highest possible bond strength and impact resistance).
- **Low shrinkage and good creep properties.**
- **100% solids formulation to meet VOC regulations.**

LORD® EPOXY ADHESIVE SELECTION GUIDE

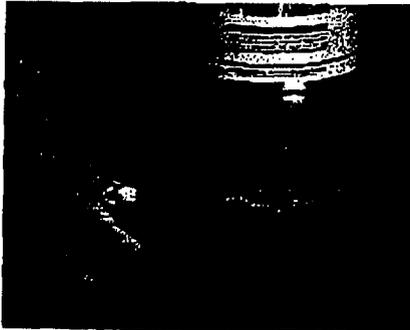
Mix Ratio By Wt.	Mix Ratio By Vol.	Component Description	Typical Viscosity (cps)	Density lbs/gal	Flash Point °F (°C)	Suggested Uses
4:3	1:1	304-1 Resin	5MM-25MM	11.2 ± 3%	185 (85)	General purpose for bonding to many types of natural and synthetic rubber,*** prepared metals, ceramic and wood.
1:1	1:1	305-1 Resin	10,000-18,000	9.7 ± 3%	>200 (93)	General purpose for bonding to many types of natural and synthetic rubber,*** prepared metals, ceramic and wood.
		305-2 Hardener	20,000-45,000	8.1 ± 3%	>200 (93)	
5:3	1:1	306-1 Resin	5,000-25,000	11.9 ± 3%	185 (85)	Dampening tiles to steel per Mil Spec and general purpose.
		306-2 Hardener	1MM-10Mm	8.8 ± 3%	>200 (93)	
1:1	1:1	305-1 Resin	10,000-18,000	9.7 ± 3%	>200 (93)	General purpose for bonding rubber prepared with Lord 7701 or 7707 surface treatment.
		307-2 Hardener	20,000-57,000	8.1 ± 3%	>200 (93)	
1:1	1:1	309-1 Resin	300,000-1MM	10.6 ± 3%	>200 (93)	General purpose; many types of rubber,*** prepared metals, ceramic and wood.
		309-2 Hardener	300,000-1MM	8.5 ± 3%	>200 (93)	
1.2:1	1:1	310-A Resin	500,000-800,000	12.1 ± 3%	171 (77)	General purpose, resists temperatures to 400°F (204°C) formulated for bonding SMC, FRP and other composites.
		310-B Hardener	230,000-700,000	10.5 ± 3%	>200 (93)	
2:1	2:1	312-A Resin	650-1,950	9.4 ± 3%	171 (77)	General purpose bonding and potting.
		312-B Hardener	750-2,500	8.2 ± 3%	>200 (93)	
1:1.3	1:1	320 Resin	300,000-1MM	12.3 ± 3%	>200 (93)	General purpose, SMC, FRP and prepared metals; for applications requiring a "toughened" adhesive with high peel strength and resistance to cracking and impact.
		322 Hardener	400,000-2MM	10.3 ± 3%	>200 (93)	
5:3	1:1	360-A Resin	130,000	11.8 ± 3%	>200 (93)	Excellent adhesion to scuffed SMC, FRP, wood & other plastics. Resistant to humidity, water, salt spray and high temperatures.
		360-B Hardener	170,000	9.0 ± 3%	>200 (93)	
3:5	1:2	370-A Resin	150,000-260,000	10.8 ± 3%	>200 (93)	Resistant to thermal shock and humidity.
		370-B Hardener	160,000-380,000	9.7 ± 3%	>200 (93)	

The above data represents typical values and is not to be used for specification purposes.

310

360

LORD® URETHANE ADHESIVES



Lord® one- and two-part Urethane Adhesives provide superior bonds with minimal surface preparation for today's high-performance thermosets and thermoplastics. They offer primerless adhesion for sheet molded compounds (SMC) and are ideal for prepared metals, rubber and fiber reinforced plastics (FRP).

Lord Urethane Adhesives are available in several formulations:

- Two-pack 100% solids
- Single-pack 100% solids
- Single-pack high solids

LORD® URETHANE ADHESIVE SELECTION GUIDE

Product	Description	Appearance	Component Description	Working Time *
7412	100% solids. Single-component, moisture-cure adhesive.	Wax-like paste	7412	—
7420	Flexible, moisture-cure adhesive. Single-component.	Blue liquid	7420	—
7432	100% solids. Low viscosity. Single-component, moisture-cure adhesive.	Amber liquid	7432	—
7500	100% solids, two-component adhesive. Cures at room temperature or with heat.	Paste	7500-A Resin 7500-B Curative 7500-C Curative	— 20-30 min. 6-10 min.
7504	100% solids, two-component, sprayable adhesive.	Liquid	7504-A Resin 7504-B Curative 7504-C Curative	— 1.5-2 hrs. 15-30 min.
7520	100% solids. Two-component, equal-mix non-sagging adhesive.	Paste	7520-A Resin 7520-B Curative	— 5-10 min.
7540	100% solids. Two-component, equal-mix adhesive.	Paste	7540-A Resin 7540-B Curative	— 5-10 min.
7542	Two-component adhesive bonds FRP, SMC and other plastics with little surface preparation.	Paste	7542-A Resin 7542-B Curative	— 4-5 min.
7602	Single-component, moisture-cure adhesive/sealant.	Paste	7602	—
7650	Single-component, moisture-cure, high tack adhesive.	Liquid	7650	—
7660	Single-component, moisture-cure, high tack adhesive.	Liquid	7660	—

*Working time is defined for this document as the time allowed before bonding surfaces must be mixed.
 ** May be accelerated with heat.
 All values are determined at 77°F (25°C), 50% relative humidity.

LORD® URETHANE ADHESIVES

Benefits of Lord Urethane Adhesives:

- **Cure at room temperature.** One-component systems can be accelerated with a catalyst. Two-component systems can be accelerated with heat.
- **Strong, flexible bonds.** They bring excellent structural integrity to assemblies made of plastic, metal, foams and elastomers.

- **Outstanding hot strength to 250° F (121° C).**
- **Ideal for meter/mix/dispense equipment.**
- **Environmentally friendly, 100% solids systems.**
- **Gravity feed.** They require no special pumping equipment.

LORD® URETHANE ADHESIVE SELECTION GUIDE

Handling Time**	Mix Ratio		Density lbs/gal	Flash Point °F (°C)	Suggested Uses
	By Wt.	By Vol.			
24 hrs.	Single-component		8.7-9.3	>200 (93)	For various thermoplastic substrates and fabrics. High-performance hose, Hytrel, TPU, polyester, Kevlar and nylon.
24 hrs.	Single-component		10.0-10.2	>200 (93)	For bonding Hytrel, chlorinated polyethylene (CPE), TPU, nylon 11 and other thermoplastics to polyester and Kevlar for high-pressure hose.
24 hrs.	Single-component		9.0-9.4	>200 (93)	For bonding foam, fabric, wood, thermoplastic and rubber. Adheres reinforcement yarn to thermoplastic tubing and to thermoplastic protective hose covering.
—	1.7	1.4	11.6-12.2	>200 (93)	For bonding a wide variety of plastics, prepared metals and elastomers.
24 hrs.	1	1	9.7-10.3	>200 (93)	
1 hr.	1	1	9.7-10.3	>200 (93)	
—	1	1	10.0-10.6	>200 (93)	For bonding wood, metal, plastic, foam and various honeycomb structures.
18 hrs.	2	2	11.0-11.6	>200 (93)	
9 hrs.	2	2	11.0-11.6	>200 (93)	
—	1	1	9.9-10.2	>200 (93)	For bonding assemblies made of wood, Hytrel, primed metals, foams (open- and closed-cell) and elastomers.
40 min.	1.2	1	8.7-9.0	>200 (93)	
—	1.2	1	11.7-12.1	>200 (93)	For bonding polycarbonate, ABS, thermoplastics and primed metals.
1-2 hrs.	1	1	10.0-10.4	>200 (93)	
—	1.1	1	11.5-11.7	>200 (93)	For bonding SMC, FRP, composite materials, other plastics and primed metals.
1-2 hrs.	1	1	10.3-10.6	>200 (93)	
24 hrs.	Single-component		8.6	44 (7)	Adhesive/sealant for various plastics, wood, fabrics, cured elastomers and pre-coated metals.
24 hrs.	Single-component		8.2	26 (-3)	For bonding open-cell polyethylene foam, styrofoam, urethane foams, plastics, fabrics, rubber and prepared metals.
24 hrs.	Single-component		8.7-9.3	42 (6)	For bonding open-cell polyethylene foam, styrofoam, urethane foams, plastics, fabrics, rubber and prepared metals.

7542

Hytrel and Kevlar are registered trademarks of DuPont. The above data represents typical values and is not to be used for specification purposes.

P. O. BOX 10038
2000 WEST GRANDVIEW BLVD.
ERIE, PA 16514-0038

1-800-234-38767

* PAGE - 1 PRICE QUOTE DATE: 8/11/97

PREPARED FOR:

ROBERT LOCKE
5308 MAGNOLIA AVE
PENSUKEN NJ 08109-1206
PHONE: 609-665-6354

PRODUCT	QUANTITY	PRICE/UM	EFFECTIVE DATE
→ LORD 7542 A/B LP-50 1:1	1 60 120	\$8.20 EA \$6.75 \$6.55	5/08/97
LORD 7556 A/B LP-50 1:1	1 60 120	\$8.90 EA \$7.45 \$7.25	5/08/97
→ LORD 310 A/B LP-50 1:1	1 60 120	\$7.90 EA \$6.90 \$6.60	5/08/97
LORD 360 A/B LP-50 1:1	1 60 120	\$8.30 EA \$7.30 \$7.00	5/08/97
LORD 363 A/B LP-50 1:1	1 60 120	\$7.90 EA \$6.90 \$6.60	5/08/97

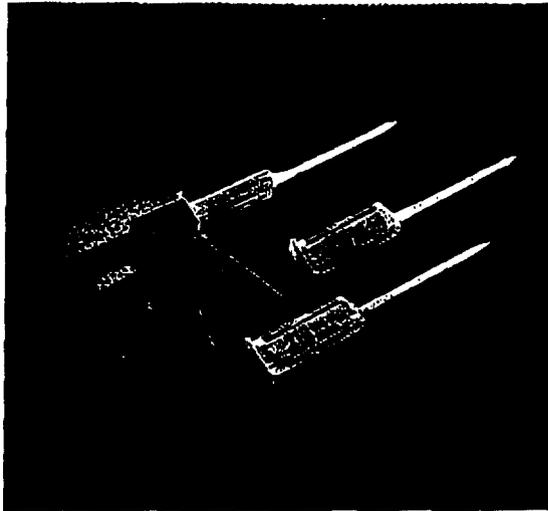
\$500.00 MINIMUM ORDER REQUIREMENT WHEN ORDERING DIRECT THROUGH LORD.
MATERIALS SOLD IN CASE QUANTITIES ONLY. (12/CASE) PLEASE CONTACT YOUR
LOCAL DISTRIBUTOR FOR YOUR LESS THAN MINIMUM REQUIREMENTS.

GINNY BEDNARO
CUSTOMER SERVICE REP. (814/868-3611 EXT 3435)

YOUR LOCAL DISTRIBUTOR IS:

AIR DRAULICS
555 WEST ANNSBURY STREET
PHILADELPHIA PA 19140-1407
215-457-1940
CONTACT: CRAIG ZELLE

LORD-PAK™ 50 Manual Adhesive Dispensing Systems consist of a hand-held, two-component adhesive dispenser, a dual-barrel cartridge and a disposable static mixer. Ideal for off-site repair and assembly. A durable, portable, affordable, well-balanced dispense gun for production situations that do not require application of long beads of material. An easy, efficient, economical alternative to manual proportioning and mixing of half pints and quarts.



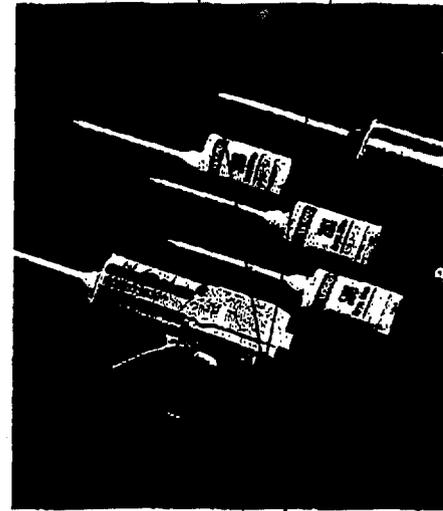
Total volume of mixed adhesive by mix ratio per cartridge:

- 1:1 50ml (1.7 oz.)
- 2:1 50ml (1.7 oz.)
- 4:1 40ml (1.4 oz.)
- 10:1 35ml (1.2 oz.)

Maximum dispense pressure: Manual
Length 7.25" with plungers fully retracted
Height 5.5"
Width 2.125"
Weight 0.55 lbs.

Linear coverage of 50 ml mixed adhesive:
 per 1/4" bead: 4.5 ft. per cartridge

LORD-PAK™ 200 Pneumatic and Manual Adhesive Dispensing are adhesive dispensing systems consisting of a dispensing gun, dual cartridge, retaining nut and disposable static mixer. The systems are available in pneumatic and manually operated versions. The manual version is ideal for field repairs; the pneumatic dispense gun is best in production situations. The ratios are 1:1, 2:1, 4:1 and 10:1 by volume.



Total volume of mixed adhesive:
 (approximately 7/oz.) per cartridge
Maximum dispense pressure: 73
 manual

	Pneumatic	Manual
Length	15"	14"
Height	10.75"	8.75"
Width	3"	3"
Weight	3.3 lbs.	3.0 lbs.

Air requirements: Use gun with all components supplied. Maximum in-line pressure 87 PSI. Install 1/4" male adaptor to inlet port of pressure regulator. Air inlet 1/4" (female).

Linear coverage of mixed adhesive:
 per 3/16" bead: 35.5 ft. per cartridge
 per 1/4" bead: 19 ft. per cartridge

APPENDIX II
(LIST OF MATERIAL FORWARDED TO SIGMOB)

Brochures And Other Pertinent Material Forwarded to Sigmob:

1. Engineered Wood, The Right Choice
2. The New Generation of Composite Panel Products
3. What is the Heart of Today's Furniture
4. Engineering Wood

APPENDIX III
(BUSINESS CARDS OF CONTACTS)



4925 Sighetu Marmatiei
str. Unirii nr. 40
jud. Maramures
ROMANIA

tel : 0040-(0)-62/314 621
0040-(0)-62/314 626
fax: 0040-(0)-62/311 471
0040-(0)-62/316 484
telex : 33420

ing. PETRACHE VALENTIN
DIRECTOR GENERAL

☎ societate: 0040-(0)-62/311061.311574 domiciliu: 0040-(0)-62/315345



4925 Sighetu Marmatiei
str. Unirii nr. 40
jud. Maramures
ROMANIA

tel : 0040-(0)-62/314 621
0040-(0)-62/314 626
fax: 0040-(0)-62/311 471
0040-(0)-62/316 484
telex : 33420

ing. SOCACIU DAN
DIRECTOR TEHNIC

☎ societate: 0040-(0)-62/311061.311574 domiciliu: 0040-(0)-62/319502

Societatea Comerciala

SIGMOB
SIGMOB
SIGMOB S.A.

dipl. ing. EMERIC-GHEZA GALLOV
Quality Assurance Manager



SIGHETU-MARMAȚIEI
str. UNIRII nr. 40
ROMANIA 4925

Tel: 0040-62-³514621 int.¹³⁰222
Fax: 0040-62-512602
Telex: 33420

Dipl. Ing. GELU BOGDAN RUSU
Technical ~~ADVISOR~~ ADVISOR

PRIVATE
4925 Sighetu Marmatiei
Str. Popa Lupu bl. 8 ap. 32
Maramures
Tel : 99/518037
Romania

~~COMPANY
SIGMOB S.A.
Sighetu Marmatiei
Unirii 40,
Tel: 0040-62-512602~~