Landis Plastics Maintenance Report Summary from 1991 to 1996
After MB-50 Oil Purifier Installation in 1992

OILPURE SYSTEMS
The Machine Reliability Company

Landis Plastics, Monticello, Indiana

ITEM	1991	1992 *	1993	1994	1995	96
CLAMP &/OR CENTER CYL. REBUILDS	16	18	20	8	7	
INJECTION UNIT REBUILDS	8	10	7	3	5	
EXTRUDER UNIT REBUILDS	8	8	2	3	4	
SHOOTING POT & DIST. WORK	11	13	14	4	4	
SHOT SIZE ADJUSTER	--	6	2	1	0	
DC MOTOR REBUILDS	7	13	9	13	6	
PUMP CHANGES	24	27	20	23	26	
PULLED SCREWS	30	27	53	62	39	
SERVO → VALVES SENT OUT FOR CLEANING &/OR REPAIR	160	88	104	50	45	7
LEAK → HYDRAULIC OIL USAGE	6,100	4,800	4,800	4,200	4,300	
TIE BAR	6	2	2	0	1	
INFRARED OCCURRENCES	N/A	36	8	31	22	
SAGAMORE EXPENDITURE (Maintenance Expenses)	46,537	34,612	54,048	31,349	14,689	

* OILPURE INSTALLATION

Summary Report of Maintenance Saving during 1991 to 1995

- Servo valve Reduction from **160 to 7 pieces.**
- Oil leakage Reduction from **6,100 to 4,300 gal (29.5%).**
- Cylinder Rebuild Reduction from **16 to 7 pieces**.
- Extruder Rebuild Reduction from **8 to 4 pieces**
- Subcontracted Maintenance (Sagamore Expenditure) Reduction from **$46,537 to $14,689 (68.4%).**

LANDIS PLASTICS

MAINTENANCE SUMMARY 1995

MONTICELLO PLANT

The following is a brief review of last year's activities in the Maintenance Department. Basically, most of the numbers show a slight improvement over last year's numbers and a significant improvement over numbers from five (5) years ago.

One of the more significant items for this year's report is the start and implementation of our own Plant PM program. Last year at this time, we did away with the Sagamore Heating & Cooling maintenance agreement. We have been doing our own in-house PM and maintenance on chillers, air conditioners, towers, heaters, etc. The expenditure figures show that we have reduced our cost to Sagamore by approximately two thirds (2/3). We have trimmed our PM schedule to a Spring & Fall schedule and feel that this has been sufficient to meet our needs. Emergency calls and major rebuilds were at a minimum last year.

The annual infrared scan has proven to be a useful tool. Our number of occurrences has dropped almost fifty (50) percent since our first scan. Not only has it pointed out problem areas in immediate need of repair, but it has served as an educational tool in pointing out specific areas to be on the lookout for in everyday inspections. Note that the 1993 reading was taken by a different company, and it was not consistent with readings taken before or after 1993 and are not considered as accurate.

It appears that the bolt gauge which was purchased in 1992 paid for itself in approximately one (1) year. Our tiebar loss dropped from six (6) down to less than two (2) per year. We have been able to quickly set and maintain a much closer tolerance on the stretch of the tiebars. This also reduces downtime and the amount of shim and mold work necessary to run good parts.

* Keeping our oil clean still remains a priority. Many positive results are a direct result of keeping the oil cleaner and cooler. New oil has an average ISO of 16/13. Our target was 14/10, and we have achieved as low as a 12/10 on about half of our presses. This is the finding of our last oil sampling, and we are due for another sampling in January of 1996.

Last summer was one of the hottest on record, and it sure put our cooling systems to the test. We were able to run all summer with minimal downtime associated to high oil temperature on presses.

The number of times that we pulled a screw is down approximately one third (1/3). The number of pullings has dropped from eleven (11) down to three (3) on the bucket machines. The number of pullings on the old RTE machines dropped from twenty two (22) down to eleven (11). We are now running RTE in new presses and have only had to pull screws one (1) time in each machine. Other machines average about two (2) pullings per year.

One disappointing figure has not changed much this year. Pump loss remains at an average of twenty four (24) for the year. We have made some changes in equipment, etc., but have seen no real positive effect at this time. This is obviously an area that needs more work and research.

The following chart reflects some numbers and trends over the last five (5) years:

Frank J Rupe

Periodic Oil Analysis Report

OILPURE SYSTEMS
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Company: Landis Plastics, Inc. Date: February 8, 1996 Page No. 1
Address: 1207 North Sixth Street Oil Type: Texaco Rando 46
City: Monticello State: IN Zip: 47960 Equip. Type: Injection Molders
Telephone: 219-583-5583 Fax: 219-583-4098 Note: 24 oil samples were submitted after one MB-50 oil purifier was installed since May of 1992.
Contact: Frank Rupe Title: Maintenance Manager

Date	Sample No.	Oil or Equip. I.D.	Sample Status	Solid Contamination Particle Count in 1 cc 5µ	10µ	15µ	25µ	50µ	75µ	ISO Code	Water in ppm	TAN mg of KOH/gm	Viscosity in SUS	OilPure Color Code
1/25/96	1	1	Since May 92	64	31	15	3	0	0	13/11	33	0.51		
1/25/96	2	2	Since May 92	37	12	4	0	0	0	12/9	41	0.31		
1/25/96	3	3	Since May 92	71	29	9	0	0	0	13/10	47	0.31		
1/25/96	4	4	Since May 92	189	61	19	0	0	0	15/11	40	0.30		
1/25/96	5	5	Since May 92	171	36	12	0	0	0	15/11	49	0.42		
1/25/96	6	6	Since May 92	226	57	21	4	0	0	15/12	36	0.29		
1/25/96	7	7	Since May 92	101	31	9	0	0	0	14/10	29	0.34		
1/25/96	8	8	Since May 92	22	14	12	10	0	0	12/11	21	0.39		
1/25/96	9	9	Since May 92	134	41	13	0	0	0	14/11	27	0.51		
1/25/96	10	10	Since May 92	67	24	11	4	0	0	13/11	30	0.29		
1/25/96	11	11	Since May 92	132	32	19	0	0	0	14/11	34	0.41		
1/25/96	12	12	Since May 92	96	35	17	6	0	0	14/11	36	0.40		
1/25/96	15	15	Since May 92	271	80	34	9	0	0	15/12	32	0.37		
1/25/96	16	16	Since May 92	108	40	20	6	1	0	14/12	26	0.38		
1/25/96	17	17	Since May 92	172	76	40	16	6	0	15/13	27	0.37		
1/25/96	18	18	Since May 92	70	30	19	14	8	0	13/11	96	0.77		
1/25/96	19	19	Since May 92	127	30	12	4	1	0	14/11	28	0.22		
1/25/96	21	21	Since May 92	104	28	17	4	1	0	14/11	32	0.26		
1/25/96	22	22	Since May 92	473	180	100	13	2	0	16/14	25	0.36		
1/25/96	23	23	Since May 92	149	56	34	22	0	0	14/12	31	0.40		
1/25/96	24	24	Since May 92	188	99	56	27	10	0	15/13	24	0.32		
1/25/96	26	26	Since May 92	60	32	21	9	3	0	13/12	27	0.48		

TEST COMPARISON FROM THIS YEAR OIL TEST REPORT ON FEBUARY 8, 1996

Landis Plastics Plant locates in Monticello, Indiana has installed a rotational MB-50 oil purifier to provide oil dialysis cleaning operation on 26 units of plastic injection molders. Frank Rupe, maintenance manager, kept good track record of his maintenance cost for **Benchmarking during 1991 to 1995**.

MB-50 oil purifier shows significant improvement in productivity and **80% overall maintenance reduction** while **production capacity is double** during this time. All of these savings happens when all hydraulic oil is kept continuously clean as shown in the Periodic Oil Analysis report. Average oil cleanliness is **ISO Code 14/11**, water content is under 19 ppm and Total Acid Number (TAN) is 0.40 mg KOH /gm that is close to the same value in new oil.

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