PETROCHEM, INC.
SPECIALTY LUBRICANTS

CONTINUOUS PRECISE AUTOMATED LUBRICATION APPLICATORS

Approved/Recommended Fluid:

PETRO-GARD® 220 & HT-2000™
***Extreme* High Temperature Oven Chain Lubricants**

"Provides the right amount of lubricant at the right location at the right time by delivering a small amount of lubricant on a continual and controlled basis"

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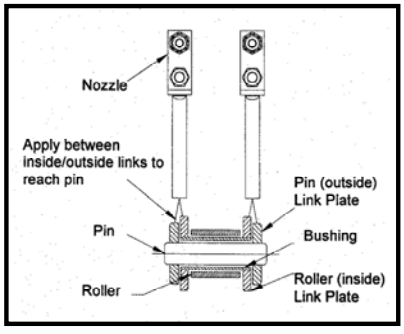
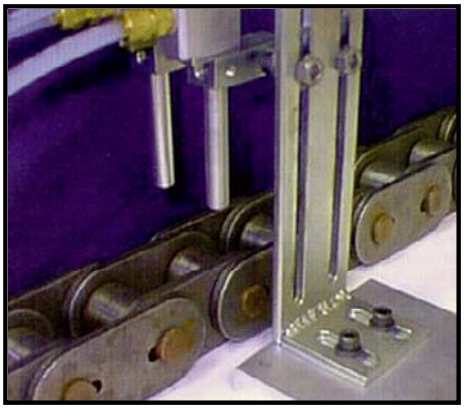
PRECISE NOZZLE DELIVERY SYSTEM:

The New Technology Approach





The spray nozzle tips should be located no more than 1" from the spray surface.

The more you are able to minimize this distance, the better your results will be.

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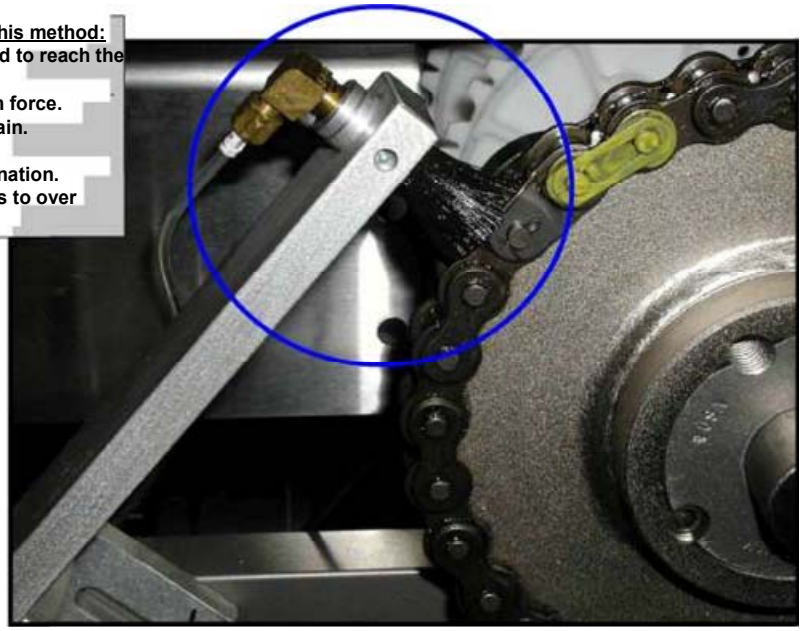
Brush Type Delivery Systems:

Lubricating the "Old Fashioned" Way

Disadvantages with this method:

1. **Poor application method to reach the pin area**
2. **Lube is not applied with force.**
3. **Brush doesn't clean chain.**
4. **Brush wears out.**
5. **Brush collects contamination.**
6. **This methodology tends to over lubricate.**



Why use Petrochem's PC-1000 Series Automated Lubrication Applicators?

- The major difference between Petrochem's Automated Lubrication Applicator and other lubrication technologies is the use of a continuous, ultra-fine, non-mist delivery of our lubricants. Total's applicator can spray minute quantities of lubricant for a selected duration of time; hence, not flooding the chain with large amounts of oil at one time (typically found with most applicators).
- Cuts Downtime, Improves Safety, Saves Lubricant Consumption, Extends Chain Life, Saves Electricity, Reduces energy consumption & Increases Production Hours
- The Total Applicator delivers minute quantities of oil, resulting in significant cost savings by decreasing lubricant consumption (proven 50% to 60%), reducing product contamination and eliminating under/over lubrication. *"Over 60% of mechanical failures relate directly to poor or improper lubrication practices"*
- In critical applications where cleanliness is a must, the Total applicator achieves an exceptional performance.

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How do you want your oven chain to look ?

SYNTHETIC:

GRAPHITE:

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Automated Lubrication Applicator was designed to help a customer leverage their existing capacity in control system adjacent to locations where they want to apply lube.

Also shown in this image is the spray nozzles mounted to the right of the System and above the chain seen through the cutout in the machine side.

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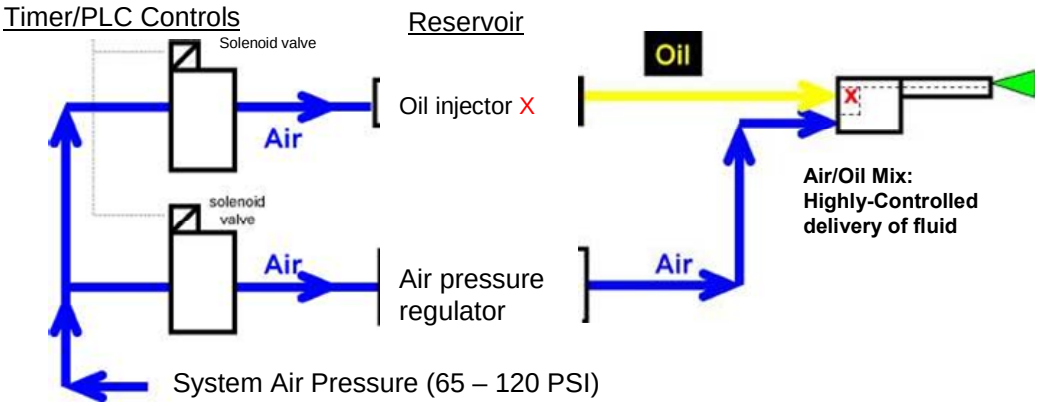
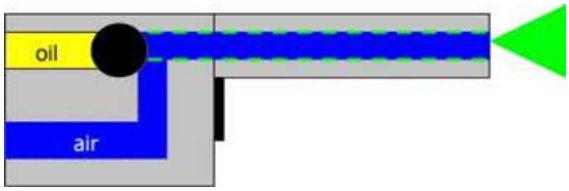
HOW IT WORKS



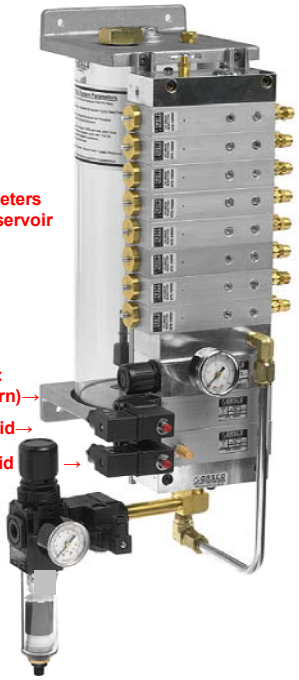
The continuous spray nozzles have the check valve in the nozzle body. This allows for a greater metering distance and provide the capability of applying the smallest amounts of lubricant. The amount of oil being applied will determine the thickness of the oil on the inside of the bore of the nozzle tip going to the exit point.

The black circle shown below is the check ball/valve in the spray nozzle.



Designed for customers who have an existing PLC to control the system

This system requires the customer to provide a control signal, usually from an existing PLC with additional I/O to control the unit. It includes a system pressure/filter switch and a (4) liter reservoir. Customers who do not have a PLC can use the Millennium Timer option to control this unit.



Set-up parameters on (4) liter reservoir

Injector Pumps

Nozzle air pressure solenoid: (controls the resulting spay pattern)→

Nozzle control solenoid→

Injector control solenoid →

Filter-regulator-pressure switch w/low air feedback→

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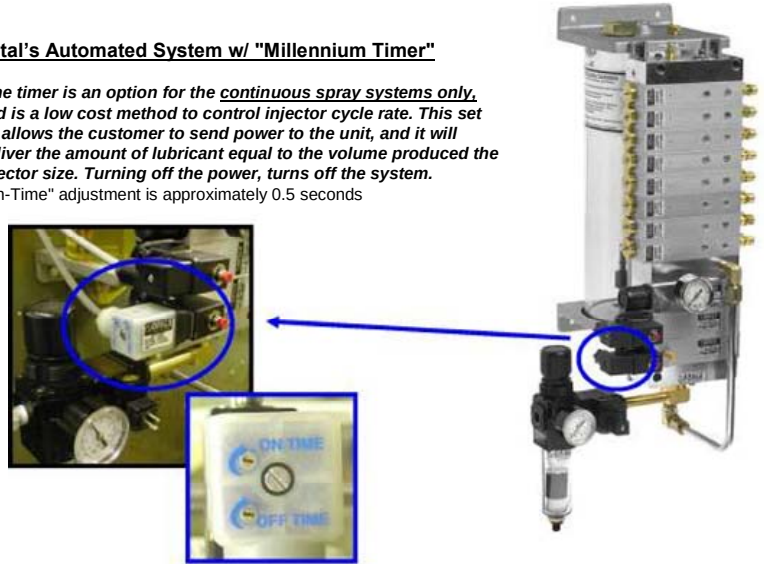
Optional Timer

Total's Automated System w/ "Millennium Timer"

-The timer is an option for the continuous spray systems only, and is a low cost method to control injector cycle rate. This set up allows the customer to send power to the unit, and it will deliver the amount of lubricant equal to the volume produced the injector size. Turning off the power, turns off the system.
"On-Time" adjustment is approximately 0.5 seconds



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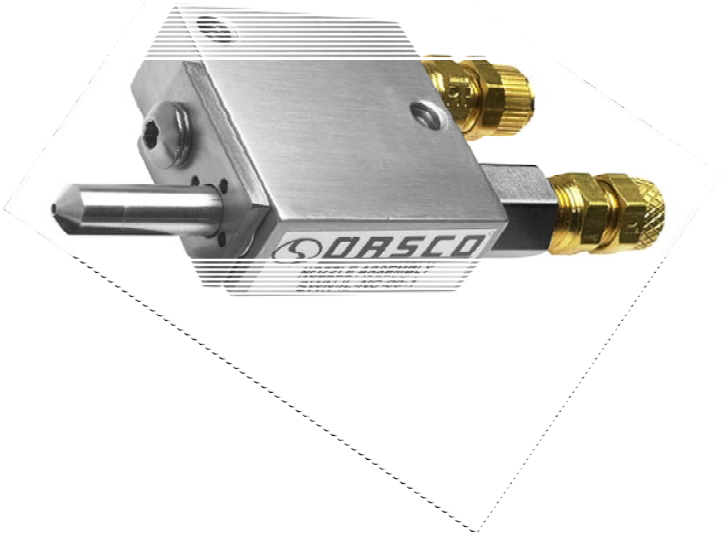
Continuous-Spray Nozzle



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Injector Cross-sectional Images

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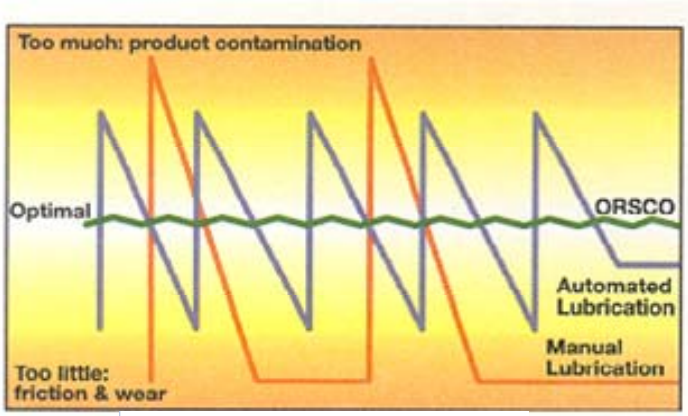
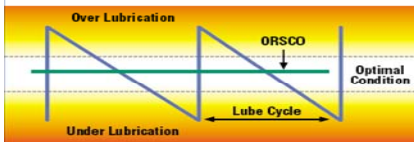
Precise Lubricant Placement with PETROCHEM'S System

increasing amount

no lube



"...Proper lubrication can effectively triple the life of mechanical equipment."



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Lube Consumption Chart

Lube Consumption/Usage Reference Chart:

Injector Cycling SECONDS	ml per Min	ml per Hour	ml per 8 Hrs	ml Per Day *(24 Hr Day)*	ml Per Week *(24 Hr Day)*	ml Per Year *(24 Hr Day)*	Gallons Per Year *(24 Hr Day)*
1	3.600	216.000	1728	5,184	36,288	1,892,160	395.44
2	1.800	108.000	864	2,592	18,144	946,080	197.72
3	1.200	72.000	576	1,728	12,096	630,720	131.81
4	0.900	54.000	432	1,296	9,072	473,040	98.86
5	0.720	43.200	346	1,037	7,258	378,432	79.09
6	0.600	36.000	288	864	6,048	315,360	65.91
7	0.514	30.856	247	740	5,184	270,309	56.49
8	0.450	27.000	216	640	4,536	236,520	49.43
9	0.400	24.000	192	576	4,032	210,240	43.94
10	0.360	21.600	173	518	3,629	189,216	39.54
15	0.240	14.400	115	346	2,419	126,144	26.36
20	0.180	10.800	86	259	1,814	94,608	19.77
25	0.144	8.640	69	207	1,452	75,684	15.82
30	0.120	7.200	58	173	1,210	63,072	13.18
35	0.103	6.172	49	148	1,037	54,062	11.30
40	0.090	5.400	43	130	907	47,304	9.89
45	0.080	4.800	38	115	806	42,048	8.79
50	0.072	4.320	35	104	726	37,843	7.91
55	0.066	3.928	31	94	660	34,403	7.19
60	0.060	3.600	29	86	605	31,536	6.59
65	0.055	3.324	27	80	558	29,110	6.08
70	0.052	3.084	25	74	518	27,031	5.65
75	0.048	2.880	23	69	484	25,229	5.27

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LUBE CONSUMPTION:
4 Injector Applicator (Tunnel Oven – 2 chains; 350°F - 625°F)

Injector Cycling Seconds	Liters Per Week per Injector	Liters Per Week for 4 Injectors (liters/week X 4)	Gallons per week (Liters per week divided by factor 3.78 liters conversion)	Gallons per year	Number of 5 gallon Pails	OR Number 55 gallons Drums per year	Annual Lubricant Consumption $ (Gallons Per year X $46.50 per gallon - pail price)
6	6.05	24.2	**6.4 gallons per week**	345	69	6	$16,042.50
7	5.18	20.72	**5.48 gallons per week**	296	60	5	$13,764
8	4.52	18.08	**4.78 gallons per week**	258	52	4.7	$11,997
9	4.03	16.12	**4.26 gallons per week**	230	46	4.2	$10,695
10	3.63	14.52	**3.84 gallons per week**	207	41	3.77	$8,487
15	2.42	9.68	**2.56 gallons per week**	138	28	2.5	$6,417
20	1.81	7.24	**1.92 gallons per week**	104	20	1.9	$4,836

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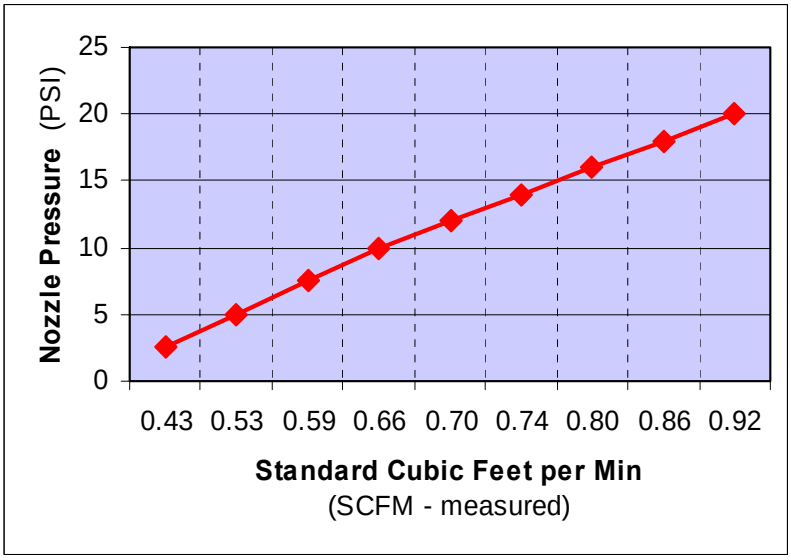
Air Consumption



(based on standard nozzle orifice = 0.046")

CONTINUOUS AUTOMATED LUBRICATION APPLICATOR:

FEATURES & BENEFITS

Features	Benefits
Modular in Design	Ease of maintenance saving time
Adjustable time cycles	Precise measurements-oil savings
Positive Displacement	Metered oil volume- oil savings
Low pressure spray	Eliminates mist - OSHA fines
Environmentally friendly	No dripping of oil - safety
High injector cycle rate	Accommodates large applications
Reliable & Durable	Long lasting with minimal service
Cleanliness	No Graphite Mess & No Contamination
Minimal Production downtime	Lowers production costs & Increases productivity
Minimal Maintenance Downtime	Reduces overall company cost
Lower Maintenance Cost - Chain	Longer lasting chain/cost savings
Automated Lubrication	Saving of maintenance labor dollars
Minimal oil usage	No over usage of synthetic oil & significant savings

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Customer Testimony

(Tunnel Oven, 600°F Temp., 120 Feet Long)

Continuous
Automated Precise Applicator

- Usage: 6 gallons lubricant per week
- (.85 gallons per day per oven)
- Purchases: One Drum every 8 weeks (2 months) per oven
- Lubricant Savings: 66%
- Lubricant Expense per oven per year: $14,400

$ SAVINGS $
$28,800 PER YEAR

Drip Applicator

- Usage: 18 gallons lubricant per week per oven
- 2.6 gallons per day per oven
- Purchased one drum every 3 weeks per oven
- Lubricant Expense per Oven per year: $43,200

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Customer Testimony

(Tunnel Oven, 450°F Temp., 80 Feet Long)

Continuous
Automated Precise Applicator:

- Hours of Operation: 24/7 (Few hours downtime per week)
- Injector Set Time: 10 Seconds
- **Usage Rate: One 55-Gallon Drum every 3 months**
- **4.58 gallons per week**
- No oil on the oven floor.
- Chain well lubricated
- Amperage maintains balanced
- 50% Lubricant Reduction
- **Lubricant Expense: $9600**

SAVINGS:
$12,000 per year

Drip Applicator:

- Hours of Operation: Same
- Drip Drop: Every 8 hours
- Problems with pressure on one side of oven…not enough pressure to release lubricant onto chain
- **Usage Rate: One 55-gallon drum every 6 weeks**
- Oil on the oven floor
- **Usage 9.2 gallons per week**
- Amperage would spike around the 6 – 8 hour lube interval
- Double the amount of lubricant
- **Lubricant Expense: $21,600**