

Case Study 1: MUNI Demonstration

- **City and County of San Francisco
Municipal Railway (MUNI)**
- **14 different aqueous units**
- **3-month demonstration period**
- **Three different facilities**

Case Study 1: MUNI Electric Bus Facility

- Light-duty repairs, preventive maintenance
- Light cleaning needs
- 4 solvent units,
- 0.8 hours/day cleaning labor



*Demonstrated a microbial sink-top
and spray cabinet*

Case Study 1: MUNI Electric Bus Facility



Microbial Sink-Top



Spray Cabinet

Case Study 1: MUNI Electric Bus Facility

- **Conversion**

- **2 solvent units => 2 microbial sink-top**

- **2 solvent units => 1 spray cabinet**

- **Results**

- **Annual savings = \$13,250**

- **Capital cost = \$14,030**

- **Payback period = 1.1 years**

Case Study 2: MUNI Diesel Bus Facility

- Heavy-duty rebuilding and repair
- Heavy cleaning needs
- 13 solvent units
- 18 hours per day cleaning labor



Case Study 2: MUNI Diesel Bus Facility

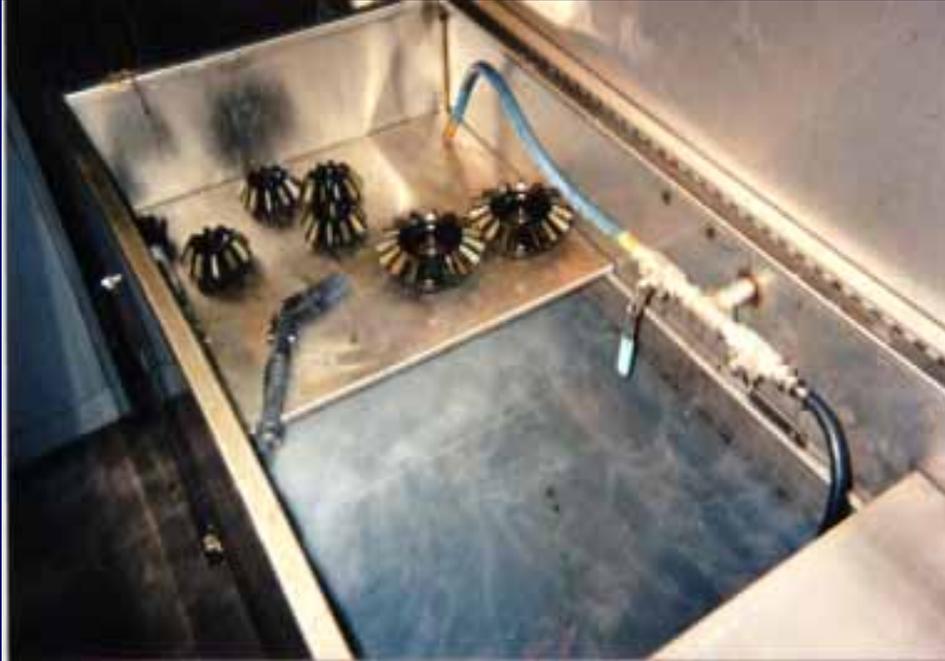


Spray Cabinet



Ultrasonic Unit

Case Study 2: MUNI Diesel Bus Facility



Immersion Unit



Aqueous Sink Top

Case Study 2: MUNI Diesel Bus Facility

- **Conversion**

<u>From (solvents):</u>		<u>To (aqueous):</u>
8	=>	3 spray cabinets
2	=>	1 ultrasonic
2	=>	3 microbial sink-top
<u>1</u>	=>	<u>2 immersion unit</u>
Total: 13	=>	9 units

- **Results**

- Annual Savings = \$134,810
- Capital Cost = \$33,400
- Payback Period = 3 months

Case Study 3: City of Los Angeles

- **Background: Aqueous cleaning optimization**
- **Demonstration Facilities**
 - **General Services 7th Street**
 - **Police Department Piper Tech**
 - **World Airports**
 - **Police Department Central**
 - **Recreational Parks Equipment Repair**

General Services 7th Street Facility Conversion

From (Existing Aqueous Units)		To (Alternative Aqueous Units)
1 large agitating unit	→	1 spray cabinet
3 sink-top units	→	1 spray cabinet
2 carburetor cleaners	→	1 spray cabinet
<u>10 immersion units</u>	→	<u>7 immersion units</u>
Total = 16 aqueous units		10 aqueous units

Current Annual Cost = \$393,705

Modified Annual Cost = \$215,726

Annual Savings = \$177,980

Police Department Piper Tech Facility Conversion

From (Existing Aqueous Units)		To (Alternative Aqueous Units)
4 sink-top units	→	4 sink-top units
4 sink-top units	→	4 immersion units
<u>6 sink-top units</u>	→	<u>3 ultrasonic units</u>
Total = 14 aqueous units		11 aqueous units

Current Annual Cost = \$65,577

Modified Annual Cost = \$65,255

Annual Savings = \$322

World Airports Fleet Maintenance Facility Conversion

From		To
(Existing Aqueous Units)		(Alternative Aqueous Units)
6 sink-top units	→	4 sink-top units
<u>4 immersion units</u>	→	<u>7 spray cabinet</u>
Total = 10 aqueous units		11 aqueous units

Current Annual Cost = \$31,951

Modified Annual Cost = \$18,884

Annual Savings = \$13,068

Police Department Central Facility Conversion

From		To
(Existing Aqueous Units)		(Alternative Aqueous Units)
2 sink-top units	→	2 sink-top units
<u>4 sink-top units</u>	→	<u>4 immersion units</u>
Total = 6 aqueous units		6 aqueous units

Current Annual Cost = \$26,604

Modified Annual Cost = \$26,248

Annual Savings = \$356

Recreation and Parks Equipment Repair Facility Conversion

From		To
(Existing Aqueous Units)		(Alternative Aqueous Units)
2 immersion units	→	2 immersion units
<u>1 carburetor cleaner</u>	→	<u>1 ultrasonic unit</u>
Total = 3 aqueous units		3 aqueous units

Current Annual Cost = \$19,747

Modified Annual Cost = \$19,365

Annual Savings = \$383

Glenmoor Auto Repair

- **Full-service shop**
 - **Two technicians**
 - **Eight bays**
- **Previous solvent use**
 - **One solvent sink-top**
 - **Serviced every 16 weeks**
 - **1 hour cleaning labor per week**
- **Demonstrated microbial sink-top and spray cabinet**

Glenmoor Auto Repair

- **Microbial sink-top**
 - **Used for 60% of parts**
 - **Two filters per year**
 - **No spent solution**
 - **Positive worker response**



Glenmoor Auto Repair

- **Spray cabinet**
 - Used for larger, more soiled parts
 - 25 gallons solution
 - Solution changeout once per year
 - “Parts so clean they shine”



Glenmoor Solvent Cleaning Costs

<u>One Solvent Unit</u>	<u>Annual Cost</u>
Leasing/waste management	\$ 690
Cleaning labor	\$2,600
Electricity	<u>\$ 120</u>
Total annual cost	\$3,410

Glenmoor Aqueous Cleaning

Aqueous Microbial Sink-Top

Purchase price (one-time)

Annual O&M

Annual Cost

\$1,300

\$ 534

Aqueous Spray Cabinet

Purchase price (one-time)

Annual O&M

\$1,700

\$1,238

Total Capital Cost = \$3,000

Annual Savings = \$1,638

Payback Period = 1.8 years

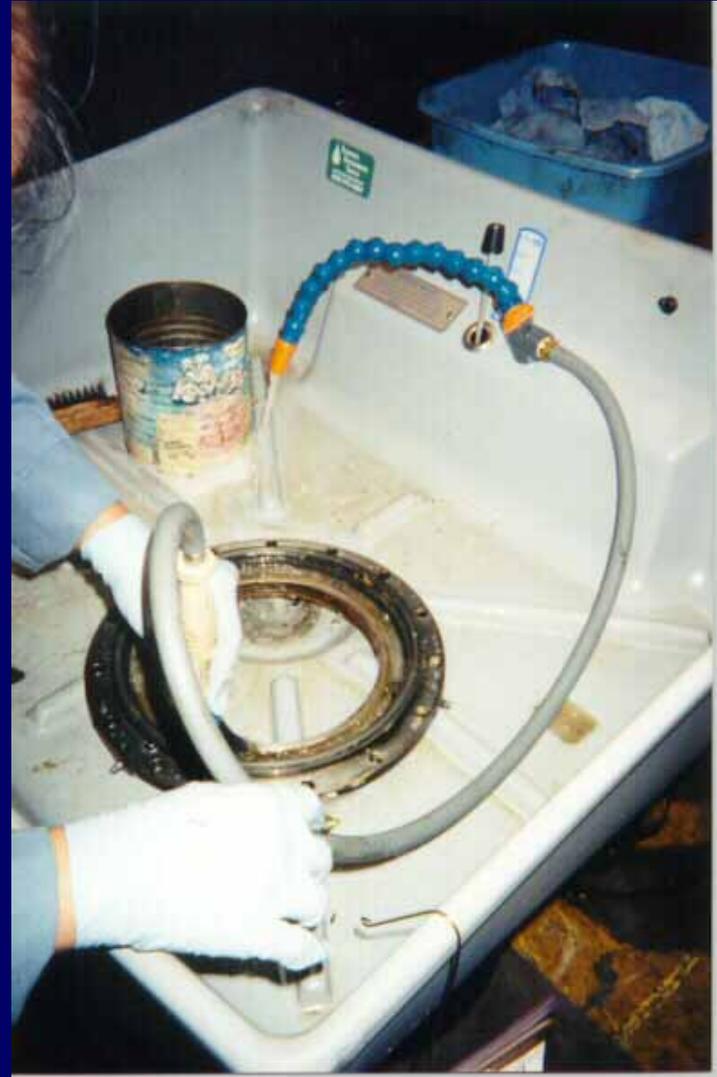
Larry's Autoworks

- **Full-service shop**
 - **Six technicians**
 - **Fourteen bays**
- **Solvent parts cleaning baseline**
 - **Two solvent sink-tops**
 - **Serviced every 6 weeks**
 - **12 hours cleaning labor per week**

Conversion Strategy = microbial sink-top + spray cabinet

Larry's Autoworks

- **Microbial Sink-Top**
 - **Used for 10 % of parts**
 - **Small parts and painted parts**
 - **Solution Life > 16 months**
 - **Capital cost = \$1,300**



Larry's Autoworks

- **Spray Cabinet**
 - **Used for 90% of parts**
 - **Reduced cleaning labor by 60%**
 - **Solution change every 6 months**
 - **Purchased used for \$1,600**



Larry's Autoworks

Cost Analysis

- **Capital Cost = \$2,900**
- **Annual Savings = \$14,874**
(driven by labor reductions)
- **Simple Payback = 2.5 months**