



# P2 Industry Case Studies

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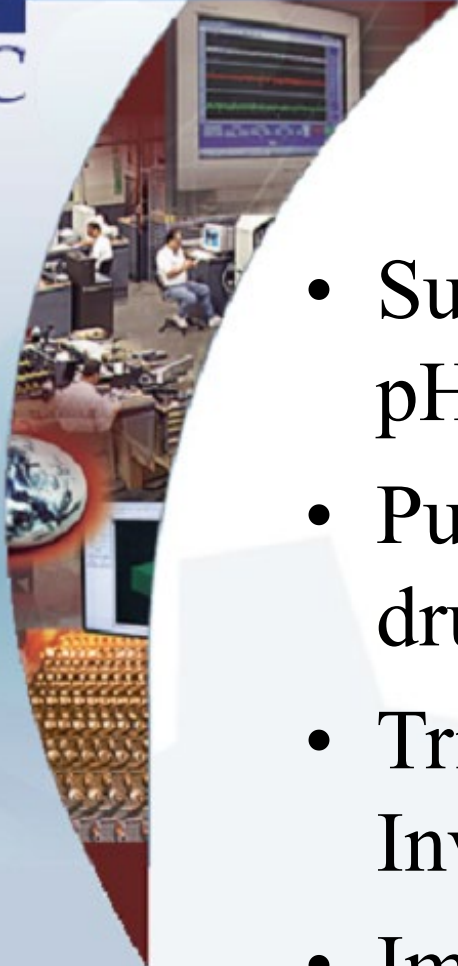
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## P2 Industry Case Studies

- EISC has assisted 25+ companies implementing ISO 14001 EMS
- Most of the following cases were part of an ISO 14001 EMS project
- Most are automotive related suppliers / manufactures



## Cooling Tower - H<sub>2</sub>SO<sub>4</sub>

- Sulfuric acid was used to adjust pH in cooling water system
- Purchased acid in bulk 35 gallon drums for economical rates
- Trigger EPA Toxic Reporting Inventory, TRI, threshold
- Implemented “friendlier” chemical treatment of water



# PBT Materials

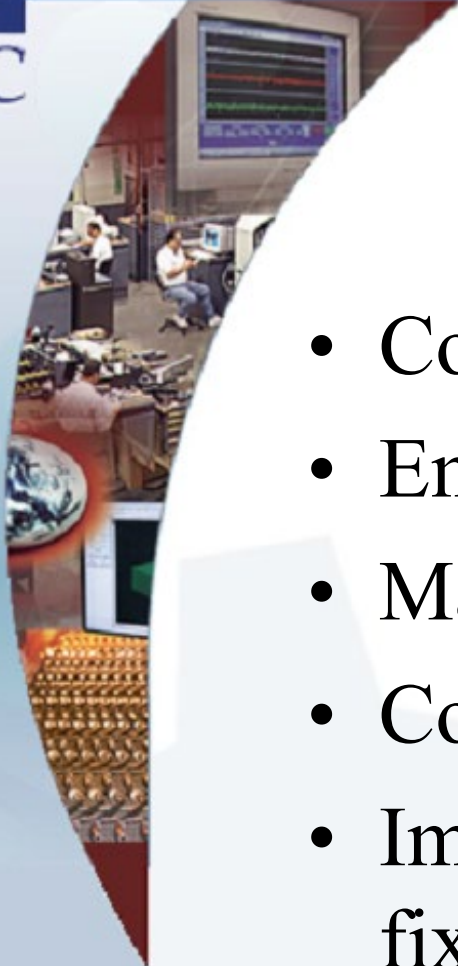
- Reviewed material specifications (missing/incomplete MSDS info)
- Listed material components, application, quantity used, etc.
- Ranked materials per PBT criteria
- Developed a reference tool for ongoing product reformulations

No.	Chemical Name	Substance in question	C.A.S. Number	PBT	HAPS	EINECS	SARA 313
2	Lubrizol 222	p-dichlorobenzene	106-46-7	Yes	Yes	Yes	Yes
5		m-chlororobenzene	541-73-1	Yes	No	Yes	Yes
4	Denatured Alcohol Automate Blue 8	Ethyl Benzene	100-41-4	No	Yes	Yes	Yes
3		Methyl Isobutyl Ketone	108-10-1	No	Yes	Yes	Yes
		Methyl Alcohol	67-56-1	No	Yes	Yes	Yes
		Xylene/ Dimethyl Benzene	1330-20-7	No	Yes	Yes	Yes
		Automate Red B	Xylene	1330-20-7	No	Yes	Yes
	Lubrizol 3702 Lubrizol 4994 A	o-Dichlorobenzene	95-50-1	Yes	No	Yes	Yes
		Toluene	108-88-3	No	Yes	Yes	Yes
		Zinc Compounds	n/a	Yes	No	Yes	Yes
11	10% Zinc Nap-All lube grade	Zinc Compounds	68476-34-6/27253-29-4	No	No	Yes	Yes
10	Irganox L 64	Diphenylamine	122-39-4	No	No	Yes	Yes
9	Lubrizol 8955	Zinc C1-C14 Alkyldithiophosphatic	68649-42-3	No	No	Yes	Yes
8	Lubrizol 6662	Toluene	108-88-3	No	No	Yes	Yes
7		Hydrogen Chloride Gas	7647-01-0	No	Yes	Yes	No
6		Ethyl Acetate	141-78-6	No	Yes	Yes	No
		Ethyl Benzene	100-41-4	No	Yes	Yes	Yes
	Lubrizol 5981	Maleic Anhydride	108-31-6	No	Yes	Yes	No
	Lubrizol 9992 Ortholeum 300	Zn Compounds	n/a	Yes	No	Yes	Yes
		Zinc C1-C14 Alkyldithiophosphatic	68649-42-3	No	No	Yes	Yes
		Diphenylamine	122-39-4	No	No	Yes	Yes
43		Cadmium	7440-43-9	Yes	No	No	No
42	Zinc Oxide	Lead	7439-92-1	Yes	No	No	No
41		Zinc Oxide	1314-13-2	No	No	No	Yes
40	Vanlube* 622	Antimony 0, 0-dialkylphosphorodithioate	n/a	No	No	No	Yes
39	Triethanolamine, Commercial grade	Diethanolamine	111-42-2	No	No	No	Yes
38	Talc	Magnesium Silicate Hydrate	14807-96-6	No	No	Yes	No
37	NA-SUL-EDS	not known	n/a	No	No	Yes	No
36	Irgalube TPPT	Triphenyl phosphorothionate	597-82-0	No	No	Yes	No
35	Irgalube 349	s, C11-14-branched alkyl, monoheptyl and dihexyl phos	80939-62-4	No	No	Yes	No



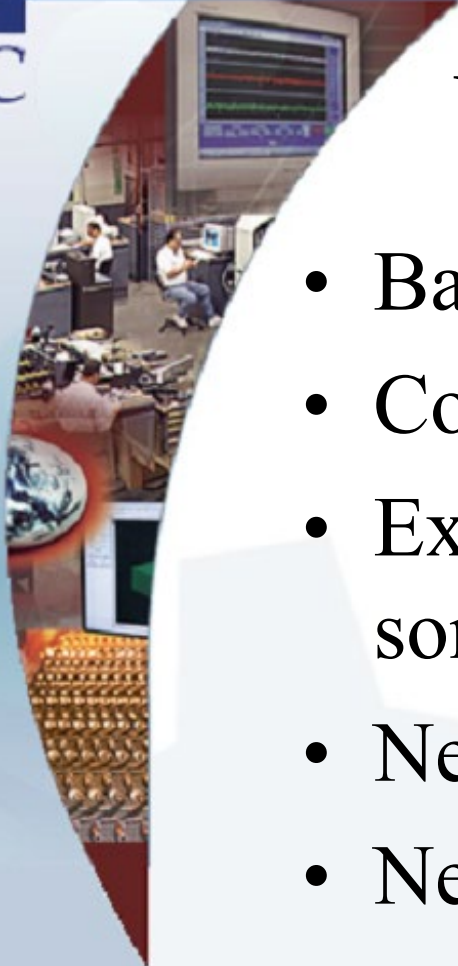
# Spill Containment

- Constructed oil / chemical secondary containment storage centralized inside the building
- Reduced amount of oil stored on site - just in time supply
- All materials are now stored in secondary containment



# VOC Reduction

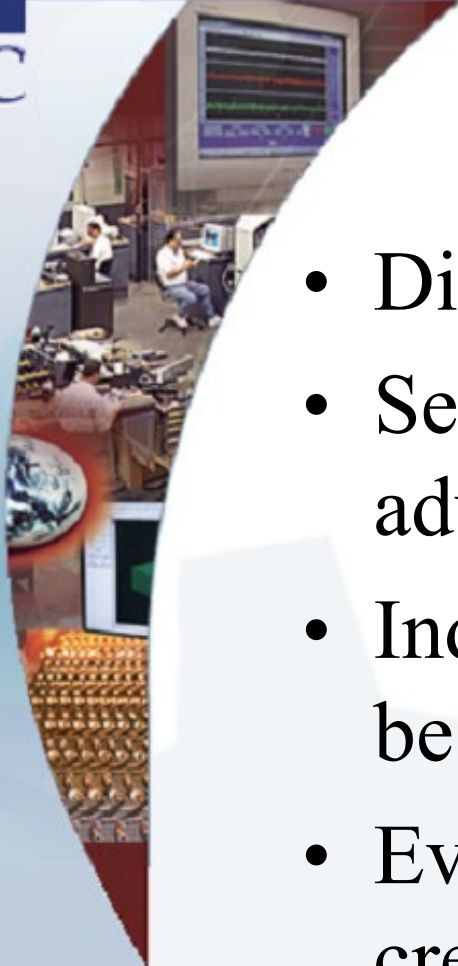
- Coating related VOC reduction
- Emissions at 100 tons per year
- Materials review - not feasible
- Considered electrostatic process
- Improve transfer efficiency -  
fixturing, ventilation air shield,  
robot arm re-alignment - 5-8%



# VOC/Material Reduction

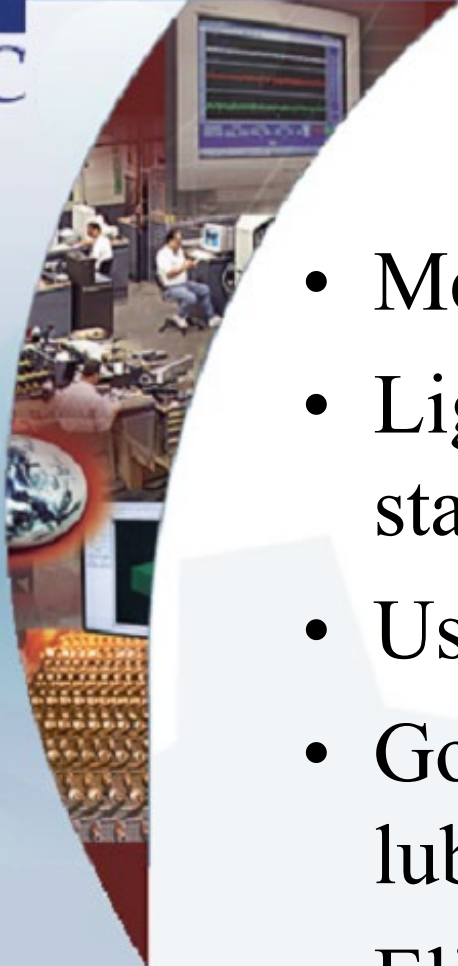
- Batch mixture preparation
- Color & luster require adjustment
- Excessive adds for adjustment sometimes 100%+
- Need: better color matching
- Need: adjust quantity tracking
- Need: less dependency on solvent recovery from wastes/excess





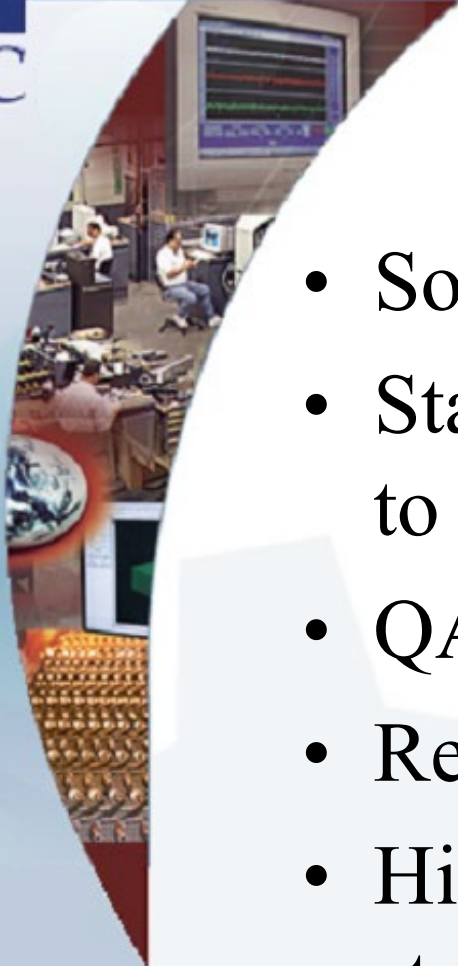
# Wastewater Separation

- Disposal of oily wastewater
- Separation technologies have advanced, coalescing, geometry
- Industrial wastewater discharge - best environmental solution
- Evaporator uses energy resources, creates greenhouse gases, safety & fire risks



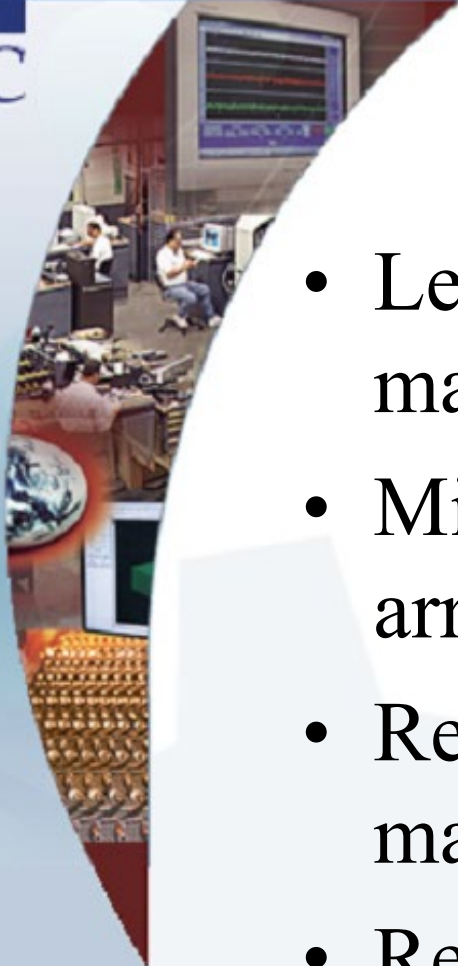
# Lubricant Reduction

- Metal stamping operation
- Light directed nozzle spray of stamping lubricant in the press
- Use of durable dies - nitriding
- Goal is elimination of external lubricants for most operations
- Eliminate socks, pads, granular floor dry, mops, floor scrubbers



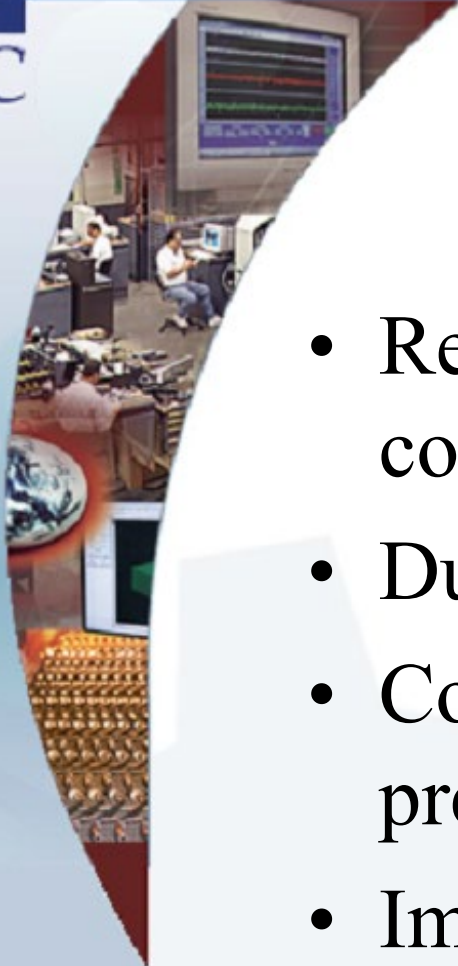
# Higher Value Scrap

- Some processes produce scrap
- Stamping tool & machine design to sort size, steel type
- QA/QC on scrap sorting
- Re-pelletize plastic scrap, trim
- Highly concentrated  $\text{FeCl}_3$  from steel pickling process - premium



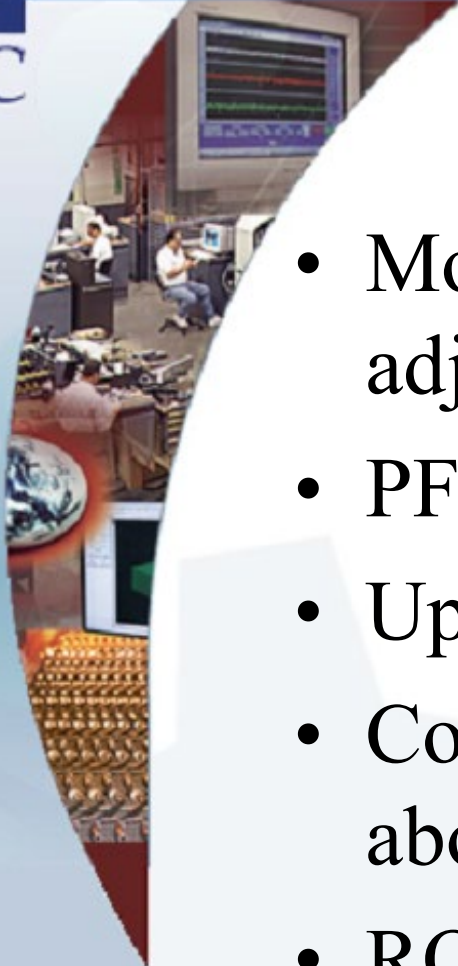
# Reduce Lift Truck Usage

- Lean clean approach to inventory management - loaded pallets
- Mix production units in shippable arrangements on pallets / in boxes
- Reduce lift truck operation, maintenance, replacement
- Reduce number of lift trucks from 8 to 6-7 units



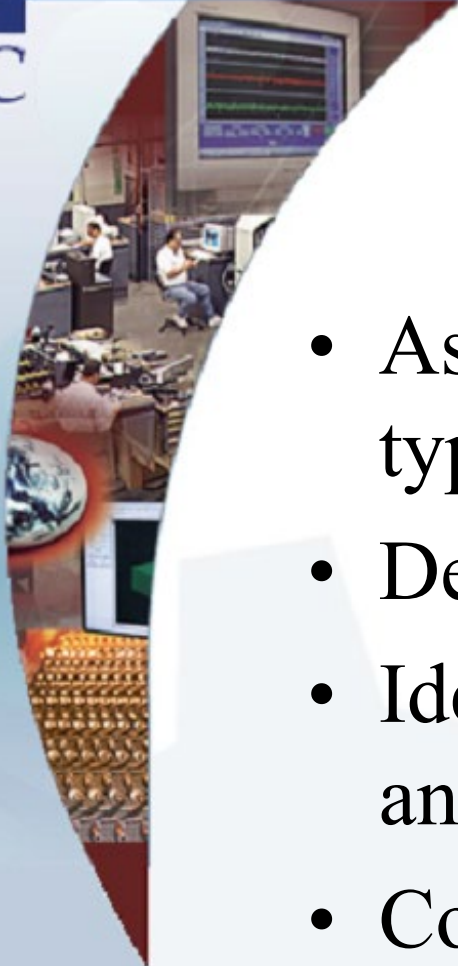
# Air Compressor Energy

- Redirected waste heat from air compressors outside / inside
- Duct from outside for inlet air
- Controllers regulate multi unit air pressure in a narrower band width
- Improve energy efficiency, comfort heating / cooling.



## Energy - Power Factor

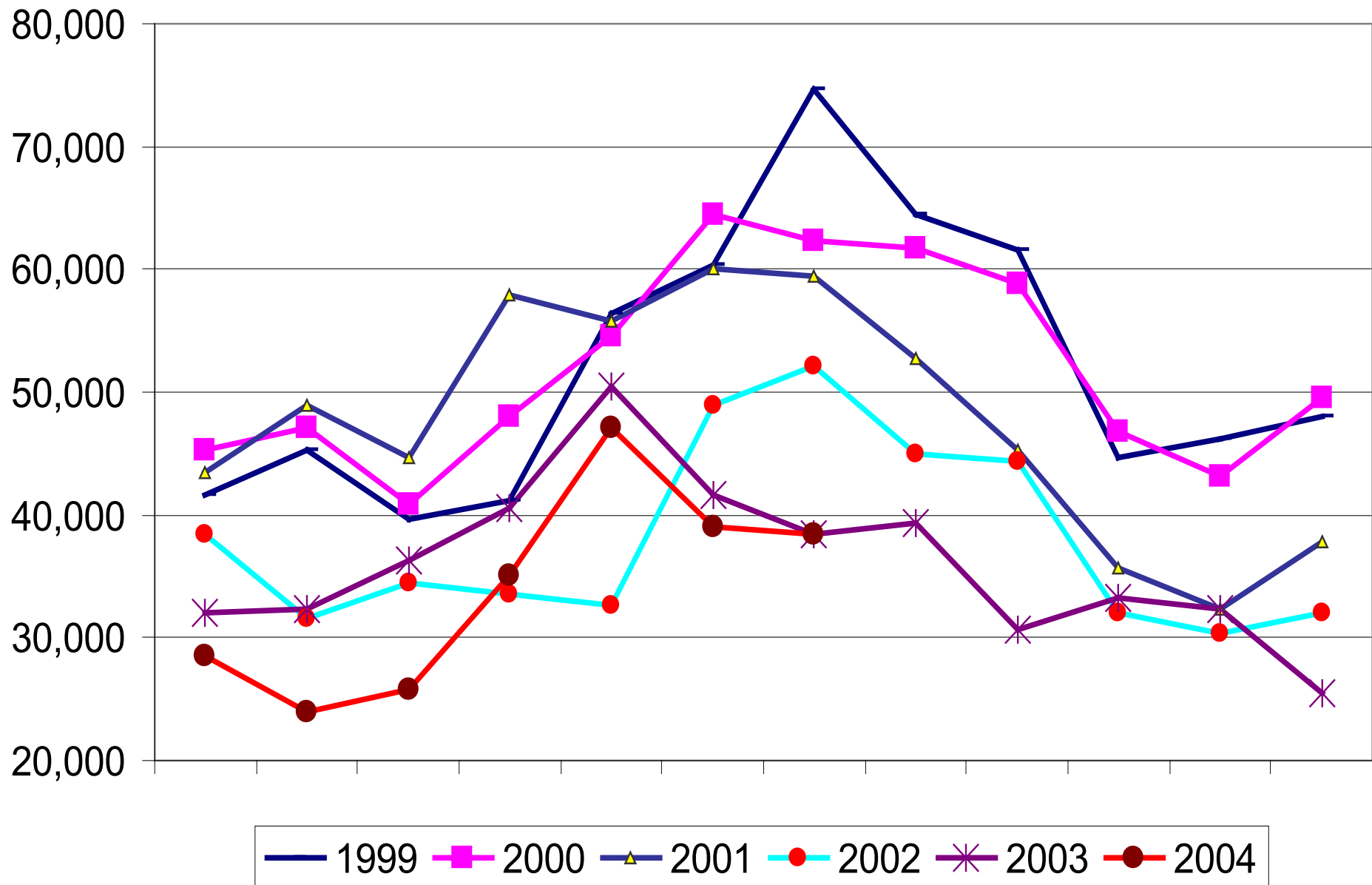
- Molding operation with PF 0.90 adjust to PF of 0.98+
- PF -- % of energy utilization
- Upgraded capacitor bank
- Cost of upgrade: \$80,000 saves about \$5,000 per month
- ROI of < 1.5 years
- Reduced energy related pollution



# Electrical Energy Usage

- Assessment of usage by areas, type of equipment, operation
- Develop usage data & graphs
- Identify and implement controls and actions (delamping, etc.)
- Continue data analysis - ongoing

# Monthly kWhr Usage

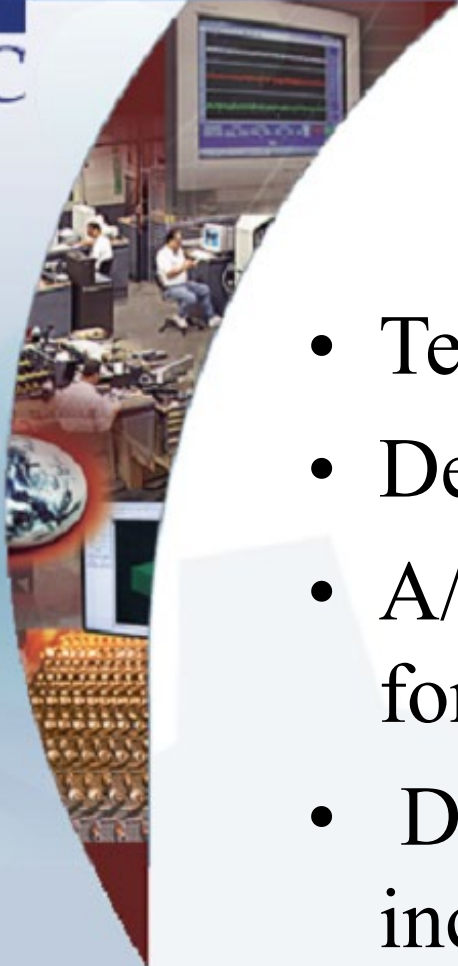






# ASD Motors

- Variable motor loads - use adjustable speed drive motors
- Variable frequency drive, VFD adapted to injection molding press
- Operates at 15-100% of full load
- Energy efficiency related saving of 30-50% are realistic



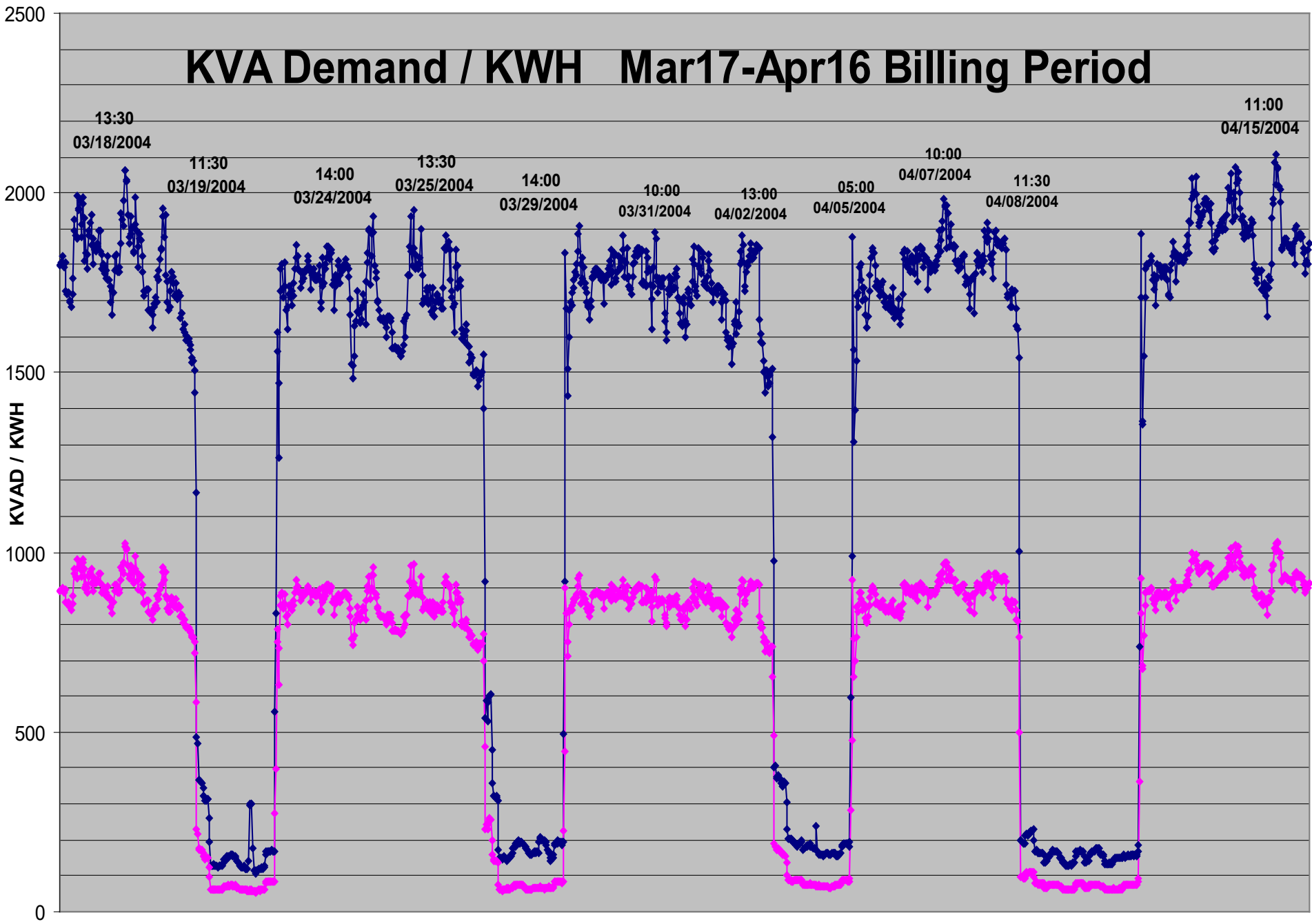
# A/C Economizer

- Test lab requires A/C all year
- Dedicated rooftop unit for lab
- A/C economizer uses outside air for cooling at  $<55^{\circ}\text{F}$
- Ducting and controls modified to incorporate economizer features

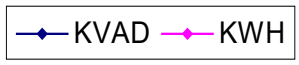
# KW Demand Shaving

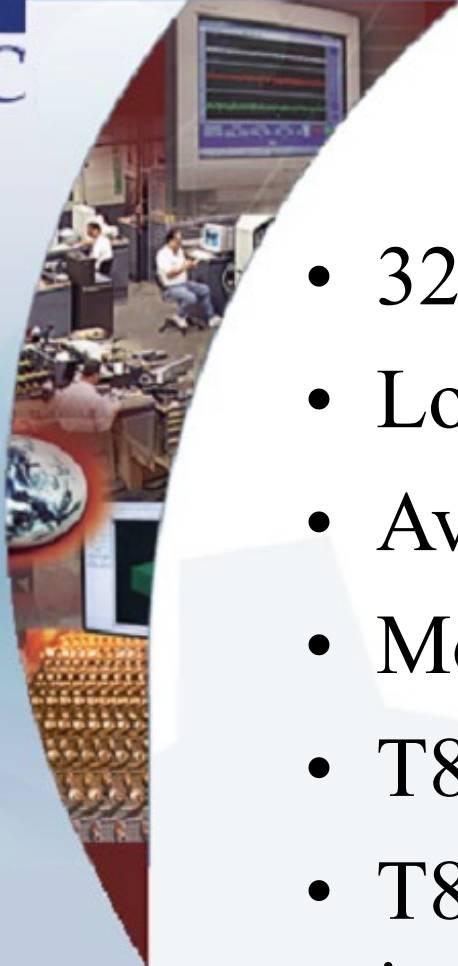
- Significant \$ impact, good ROI
- Analyze 15 minute KW demand data from utility website
- Identify peak demand periods
- Develop soft strategy to reduce peaks by machine re-scheduling
- VFD on widely variable motors

# KVA Demand / KWH Mar17-Apr16 Billing Period



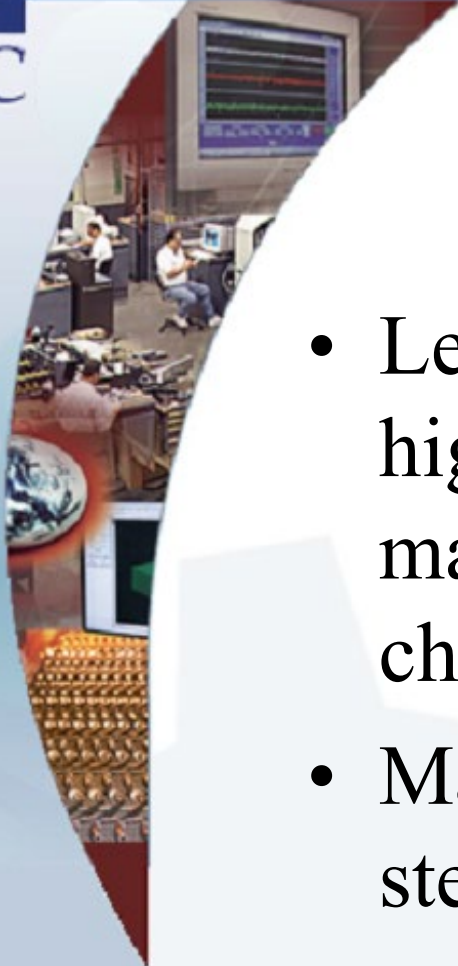
Date





# Lighting Energy

- 32WT8 vs 400W HID MH
- Low mercury fluorescent
- Average life - 20,000+ hours
- Motion sensor switchable
- T8 reduces energy 50% vs HID
- T8 - uniform & higher lighting intensity, color rendition and overall performance



# Steam Boiler - Water

- Less blowdown by allowing higher water solids, TDS, reduces make-up water, deionization, chemical adjustments, heat loss
- Make-up water meter to track steam condensate trap operation, overall system performance, losses, maintenance



# Waste-to-Energy

- Feasibility testing - snack food
- COD wastewater surcharge
- Process clarifier solids, aerobic biofilter sludge & off-spec product --> anaerobic digester
- Produces biogas for process heating or generator - CHP



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