

Presentation to:



US Army Corps of
Engineers

Regarding:

Designing for
Optimal Energy Use
in Production Facilities



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KAHN
ASSOCIATES, INC.**

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Report Documentation Page

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Potential Areas for Saving

- Building structure
- HVAC system
- Lighting system
- Process related systems
- Control improvements
- Energy recovery



Building Structure

- **Control infiltration**
 - **Air entering through a building opening has over 500 times heating energy use of a single pane window of the same size.**
- **Insulate building appropriately**
- **Consolidate building space**
 - **Minimize areas that do not serve a function.**



Proper Lighting

- Provide correct lighting levels
- Use switching
- Use efficient lamps



HVAC System Options

- **Central heating system conversion**
 - **Use building-based systems**
 - **Use natural gas heating**
 - **Eliminate distribution losses**
 - **Employ equipment sized for specific use**
 - **Allows for easy shut down when not needed**
 - **Ensures appropriate size for load**



HVAC System Options

- **Minimize distribution losses**
 - **Ductless heating minimizes fan power energy**
 - **Variable speed motors are employed to reduce pumping and fan energy use**
- **Achieve balance between O & M and energy cost**
 - **Over controlling a system makes it difficult to operate**
 - **Cost to clean a waste stream may be more expensive than the recoverable energy**



HVAC System Options

- **Displacement ventilation**
 - **Allows fresh air to enter space low and internal heat to warm the air causing it to rise**
 - **Provides a cooler space temperature with less cooling energy**
 - **Keeps lower area cleaner**
- **Evaporative cooling**
 - **Provides a lower discharge air temperature without the use of refrigeration equipment**
 - **Two-stage evaporative coolers provide even lower air temperatures**



Process Issues

- **Electrical distribution**
 - Design load to fit system
 - Design to allow proper switching
- **Compressed air**
 - Avoid oversized compressors
 - Maintain to reduce leaks
 - Reduce pressure
- **Cooling water**
 - Use variable speed pumps
 - Capitalize on heat recovery potential



Process Issues

- **Paint booths and ovens**
 - Reduce air volumes
 - Properly temper the air
 - Heat recovery
- **Plating operations**
 - Reduce air exhaust
 - Reduce tank temperatures



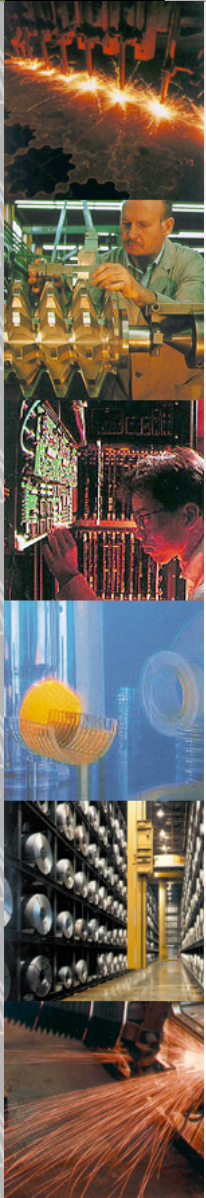
Process Issues

- **Clean rooms**
 - **Minimize air changes**
 - **Control contaminant sources**
 - **Provide proper ventilation and thermal control**
- **Maintenance facilities**
 - **Radiant heating**
 - **Properly sized systems**



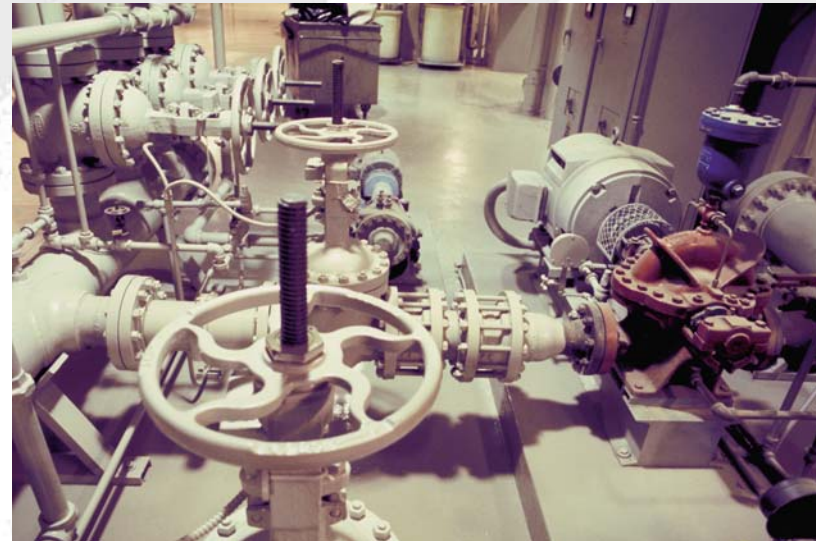
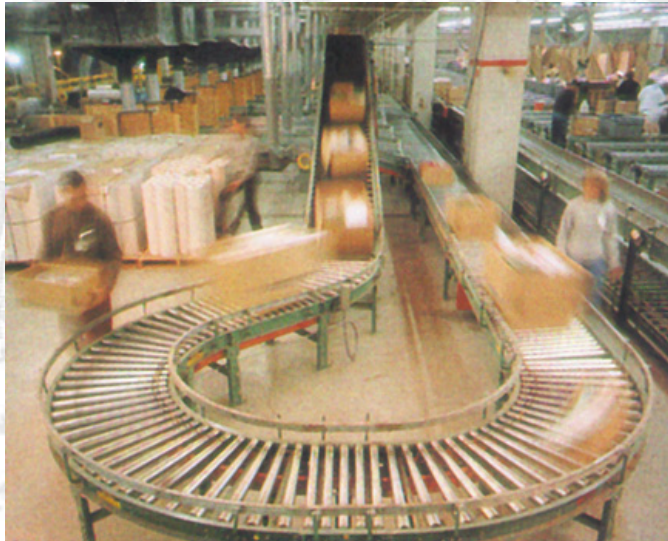
Energy Recovery

- For success, you need:
 - Good timing—systems need to operate long enough to provide return on investment
 - Short distances—to keep costs down and allow wider choice of recovery systems
 - Proper compatibility—cleanliness, thermal levels, flow rates



Controls

- Turn things off when not needed
- Turn things down when not needed
- Employ wireless communication to lower installed costs



Lean Design

- **Develop clear and complete design criteria**
- **Plan design approach and presentation**
- **Utilize 3D CAD design**
- **Value engineer at the right times**
- **Keep client/owner informed**
- **Ask the right questions**

