

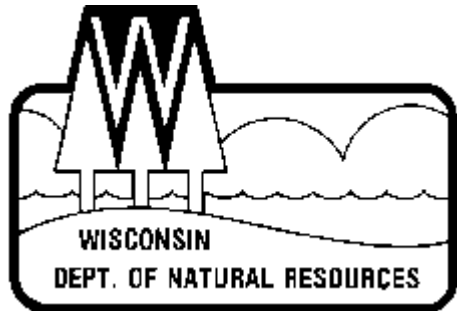


Case Corporation

**Replacing Solvent Cleaners with a CO₂
Pelletizer-Blasting Unit**

Standard Industrial Classification (SIC)	Gray Iron Foundry/3321														
Type of Waste	Solvent cleaners containing methyl alcohol and methylene chloride														
Strategy	Process Modification														
Company Background	<p>Founded in 1842 Case Corporation is headquartered in Racine. It operates three Wisconsin manufacturing facilities with approximately 17,000 employees worldwide. Case is now the second largest producer of agricultural equipment in North America and the world's largest manufacturer and distributor of light and medium-sized construction equipment. Case Corporation products are sold in approximately 150 countries through a network of approximately 4,100 independent dealers and distributors.</p>														
Original Process	<p>Cores are produced to form the sand mold within a casting by mixing foundry sand with resins in a corebox to form a hardened core. Solvents containing methyl alcohol and methylene chloride were used to remove resins from these coreboxes. The solvents were sprayed onto the surfaces of the resin-coated coreboxes and allowed to soak into the surface for a short period (until the resins had liquefied). The process was repeated to remove resins not removed during the initial application.</p>														
Motivation	To improve worker safety by eliminating the use of solvent cleaners.														
Pollution Prevention Process	<p>The solvent cleaning process was replaced with a CO₂ pelletizer-blasting system. The new system converts liquid CO₂ into dry ice snow which is ionized, compressed, and then extruded to produce a continuous flow of well-defined pellets. The pellet size, hardness and quantity can then be adjusted to fit specific cleaning applications. Once the pellets are formed, an airlock inserts them into a low pressure hose for gentle transport to the blasting nozzle where a second, high-velocity air jet accelerates the pellets toward the surface being cleaned. This two-stage air system virtually eliminates pellet degradation in transport. The actual cleaning process of dry ice pellets can be described as an impact flushing action. High speed dry ice pellets first penetrate the resin buildup on the corebox surface. Upon hitting the base surface, the kinetic energy is converted to a lateral release of CO₂ which functions as a gas wedge; lifting and shearing the resin buildup. This inside-out cleaning action is preferable to abrasive grit, which works by cutting or chiseling, and can damage surfaces and alter critical dimensions.</p>														
Material/Energy Balance	<table border="1"> <thead> <tr> <th>PROCESS</th> <th>ORIGINAL</th> <th>POLLUTION PREVENTION</th> </tr> </thead> <tbody> <tr> <td>Feedstock</td> <td>solvents containing methyl alcohol and methylene chloride</td> <td>CO₂ pellets</td> </tr> <tr> <td>Waste/disposal</td> <td>VOC air emissions</td> <td>CO₂ emissions</td> </tr> <tr> <td>Cleaning Hours/Year</td> <td>3,427</td> <td>1,702</td> </tr> </tbody> </table>			PROCESS	ORIGINAL	POLLUTION PREVENTION	Feedstock	solvents containing methyl alcohol and methylene chloride	CO ₂ pellets	Waste/disposal	VOC air emissions	CO ₂ emissions	Cleaning Hours/Year	3,427	1,702
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Economics	Capital Costs														

	<p>Purchase and installation of the CO₂ pelletizer-blasting unit cost \$185,000.</p> <p>Operation/Maintenance Costs No significant additional costs.</p> <p>Payback Period The use of the CO₂ pelletizer-blasting unit has reduced cleaning time by approximately 50%. This reduction in labor costs, coupled with an adjustment in the cost of cleaning materials, has net an annual cost savings of approximately \$69,000. A payback period of 2½ years is expected.</p>
Benefits	Installation of the CO ₂ pelletizer-blasting unit has improved the workplace by eliminating the use of methyl alcohol (a flammable solvent) and methylene chloride (a potential carcinogen), and consequently has also reduced VOC air emissions.
Obstacles	To address potential concerns for employee exposure to carbon dioxide, CO ₂ monitors were installed and ventilation in the area was improved.
Technology Transfer	The technology for the CO ₂ pelletizer-blasting unit was developed and proven in the aerospace industry during the early 1970's. Since then it has been channeled into many different applications. Most recently the technology has been directed into the application of cleaning foundry coreboxes and could be suitable for other foundries.
Other Pollution Prevention Activities	The Racine Foundry has received approval from the DNR to begin reusing foundry sand and is planning to eliminate the use of ignitable parts washer solvent.
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Pollution Prevention Resources	<p>Free, On-site Technical Assistance University of Wisconsin Extension Solid and Hazardous Waste Education Center Milwaukee area: 414/475-2845 Remainder of state: 608/262-0385</p> <p>Pollution Prevention Information Clearinghouse Wisconsin Department of Natural Resources Cooperative Environmental Assistance 608/267-9700 or e-mail: cea@dnr.state.wi.us</p>



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