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# Keller Crescent Company's Solvent Recovery Solution

*A Success Story*

by Gary Jones

## Introduction and Background

Keller Crescent, Co., a full service advertising agency and commercial printer located in Evansville, Indiana, has instituted a unique program designed to maximize its recovery of waste solvents for reuse. A strong focus on environmental stewardship has lead Keller Crescent's management to direct a series of progressive waste reduction efforts. The current case study provides a review of Keller Crescent's most recent progress in its quest for continuous environmental improvement. Keller Crescent's efforts show how continued and focused commitment to waste reduction is needed to sustain and build upon early successes, thereby providing maximum cost savings, waste reductions, and emission reductions.

Since it's founding in 1885, the company has seen a tightening of environmental regulations. Keller Crescent's growth has resulted in an operation with a total employment of more than 500 individuals. Keller Crescent is a commercial printer whose clients range from pharmaceutical to automotive. Keller Crescent's printing capabilities include web flexographic and sheet-fed offset printing to computer-controlled offset presses.

In the early 1990's Keller Crescent made a corporate commitment to stay ahead of the regulatory progression by making a commitment to pollution prevention. Keller Crescent's focus on source reduction of emissions enabled the company to meet regulatory requirements, avoiding the negative risks associated with non-compliance such as potential penalties. Keller Crescent chose to focus on pollution prevention because the company believes that it best enables the company to fulfill its responsibility to provide both its employees and its community with a safe environment.

Printing companies including Keller Crescent have a continuing challenge of managing waste solvents and used shop towels. Their press cleaning process annually generates over 350 barrels of used shop towels and 55 barrels of used blanket wash. The average barrel of shop towels contains 600 shop towels saturated in ink, water and solvent while the blanket wash barrels contain over 50 gallons of a 50% mixture of water and solvent.

Prior to 1996, Keller Crescent had used an explosion-proof centrifuge and distillation unit to recover solvent from their print towels. The centrifuge process spun the print towels at high speed to force out the waste solvent. The recovered liquid waste was then processed through a distillation system with a solvent recovery rate of approximately 50% of the solvent available for processing.

Although using the centrifuge produced positive results in terms of solvent recovery and waste reduction, Keller Crescent wanted to improve their performance. Because Keller Crescent was recovering the removed solvents on-site with a distillation unit, they were required to use staff and perform their own maintenance, which increased their costs. The distillate bottoms were a hazardous waste and the disposal costs were about $300 per barrel. Keller Crescent was also concerned about the liabilities associated with shipping and disposal of hazardous waste.

In early 1994, MAI Environmental, Inc. of Mt. Vernon, Indiana, which had performed engineering work for Keller Crescent, approached Keller Crescent and suggested that a microwave-based solvent recovery system might be able to help with the print towel problems. A subsidiary of MAI, MicroChem, LLC, had built a microwave-processing unit to process laboratory and paint waste. Keller Crescent agreed to work with MicroChem to explore the possibility of removing and recycling the solvent from print towels.

After working with MicroChem for over a year, Keller Crescent began testing the microwave process full-scale in September 1995. Although there were the normal start-up problems as with any new process, by 1996 the microwave process was improved enough to be used exclusively and the centrifuge/distillation systems were dismantled. Keller Crescent contracted with MicroChem to process all shop towels and barrels of blanket wash and has used the process for more than five years.

## Microwave Recovery System

Similar to other types of solvent recovery systems, the goal of the microwave system is to recover clean usable solvents from waste solvents contaminated with ink and other contaminants. However, the microwave recovery system is more versatile than traditional recovery systems. As can be seen in the attached diagram, the microwave system works in a one-step process subjecting the print towels and blanket wash to intense microwaves that break the emulsion between the water and solvent. Breaking the emulsion allows the clean solvent to be recovered and reused without any additional processing. The recovered water and solvent mixture is collected together and then separated into separate containers. After being treated by the microwave unit, the soiled print towels are then ready to be laundered by a commercial laundry. The wastewater, which ends up as “distilled water”, generally meets the local regulatory requirements and can be discharged to the local sewer authority. It is important to recognize as with any discharge to a sewer authority, it is imperative to contact them to ensure the acceptability of the discharge. Discharges of industrial wastes to septic systems are generally prohibited.

## Results and Benefits

The end result of the microwave process is that Keller Crescent has eliminated all hazardous waste costs associated with their print towels and recovered blanket wash. With a recovery rate approaching 98% of the amount present before processing, each 55-gallon barrel of print towels returns an average of five gallons of solvent. The 55-gallon barrels of blanket wash return an average of 25 gallons of solvent. Eliminating the hazardous waste stream from shop towels and blanket wash has prevented Keller Crescent from becoming a large quantity generator and has significantly reduced Keller Crescent’s solvent purchases.

An examination of purchases for 2000 indicate that Keller Crescent purchased almost 9,500 gallons of various solvents while the microwave process returned over 2,750 gallons of solvent back to Keller Crescent for reuse. In effect, the microwave process has reduced Keller Crescent's solvent purchases by almost 25%. The recycled solvent represents about 50 drums of solvent that Keller Crescent did not have to purchase and 100 barrels of waste solvents that were not sent out for hazardous waste processing. Since the company generates approximately 4.5 drums of waste solvent per month, it is basically getting back (as re-usable solvent) the waste that it creates.

Although at first the microwave process seemed to be more costly, careful research showed that its cost was in fact less than the centrifuge/distillation system formerly used by Keller Crescent. In addition to the capital purchase costs of the centrifuge and distillation system, the old system incurred cost in the shipping of hazardous waste, paperwork management for manifesting the hazardous waste shipments, increased purchases of virgin solvent, escalating cost of service and repairs on the old centrifuge/distillation systems, assurance of compliance with all regulations and the labor and benefit costs for the full-time employee required to operate the systems.

Analysis by MicroChem indicates that the breakeven point for purchasing a microwave unit would be about 30 barrels of print rags per week (approximately 18,000 rags). At that level, a printer would have an estimated ROI of about 5 years. For printers with smaller quantities of print rags, contracting with a local operator to process print rags should save money with as little as 1 barrel of print rags per week.

Keller Crescent is very pleased with the results they are experiencing with the microwave process. The process allows the company to use its own solvents and chemicals to produce high quality products, while minimizing hazardous wastes, reducing solvent purchases, and preventing air pollution emissions. The end result has been a win-win situation for Keller Crescent. The new microwave system allows Keller Crescent to continue its progress toward increased environmental stewardship.

## Additional Information and Vendors

There are two companies that currently offer microwave-based solvent recovery systems. Besides MicroChem, Progressive Recovery, Inc. also offers a system.

For more information, please contact:

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# Microwave Recovery System