



New York State Pollution Prevention Institute

CASE STUDY

RIT has a long history of partnership with industry to improve production processes, enhance recycling and reuse and reduce the use of hazardous materials. The following case study exemplifies these efforts and showcases expertise that can be brought to bear through the New York State Pollution Prevention Institute.

Recycling of Spent Effluent for Manufacturing of Thermal Insulation

The following project was funded by a grant from the New York State Office of Science, Technology & Academic Research (NYSTAR).

Client

American Aerogel Corporation (AAC), located in Rochester, NY, manufactures proprietary foam insulation used in thermally insulated shipping containers for temperature-sensitive biomedical and pharmaceutical products. This product can also be used for several other applications, such as insulating panels for home and commercial use.

Problem

The proprietary foam insulation manufacturing process developed by AAC requires the use of an aqueous solvent, almost all of which is recovered as spent effluent at the end of the process. This aqueous solvent does not enter into the chemical reaction that produces the foam, but it is an essential part of the manufacturing process. In order for the process to be economically viable, it is essential that the spent effluent (which, if discarded, must be handled as hazardous waste) be purified, recycled, or reused, a solution for which had not been identified.

Objectives

Identify a cost-effective method of purifying, recycling, or reusing the spent effluent.

Work Performed

RIT conducted a site visit to collect data about the existing manufacturing process, and obtained samples of spent effluent and virgin aqueous solvent, as well as its components. RIT then conducted research to determine if components of spent effluent could be cost-effectively recovered through extractive distillation or other separation techniques. Simultaneously, spent effluent was evaluated in RIT's chemical laboratories using gas chromatography/mass spectroscopy (GC/MS) to identify its exact composition, including undesirable contaminants. RIT then determined how to modify the spent effluent with the addition of certain chemicals, and then developed a spreadsheet for use by AAC to optimize the amount of chemicals to be added to spent effluent with respect to minimizing manufacturing cost. AAC then recycled a batch of spent effluent using this process to evaluate the quality of the foam generated from this reused effluent.

Results

Foam manufactured from reused effluent was compared to foam that had been manufactured from virgin influent, and was found to be indistinguishable. The manufacturing cost of the foam has been reduced by 50-67%, which now makes the manufacturing process economically viable. In addition, because spent effluent no longer needs to be disposed of, hazardous waste generation rates and disposal costs have been reduced by over 90%. Since implementing this change, and with assistance from RIT, AAC has procured funding from NYSERDA to expand their production facility and add jobs in Upstate New York.

R·I·T

Clarkson
UNIVERSITY



Rensselaer



University at Buffalo
The State University of New York

and the 10 Regional Technology Development Centers