Economic Justification for Implementing an Automated Laundering System for Multi-Use Synthetic Garments

By

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An automated laundering system has been developed to clean and sanitize multi-use synthetic garments composed of PolyConversions, Inc. VR™. An extensive evaluation of an automated washing and drying process with VR™ garments has demonstrated that an automated laundering program can provide the poultry and meat processing industries with a process that can assure consistent and quality performance in cleaning and sanitizing multi-use VR™ garments. The foundation of this program is the ability of the VR™ material to retain its structural integrity and surface composition during its repeated use and during repeated washing and drying processes. Economic factors involved for consideration in the implementation of this program include equipment costs, utility costs, supply costs, labor cost, operational logistics, and space requirements. Enhanced regulatory compliance and reduced liability are additional economic factors that should also be considered.

The ultimate goal in establishing an automated laundering program is to provide a process that would assure all multi-use garments are subjected to a rigorous, standardized and effective cleaning and sanitizing process. Previous studies have demonstrated that PolyConversions, Inc. VR™ garments have the compositional and construction integrity necessary to meet the rigors of multi-use and the chemical and physical forces applied in washing and drying processes. (See: "HACCP Considerations in Cleaning and Sanitizing Multi-Use Synthetic Garments", The National Provisioner Online, August, 2010; "An Innovative Approach for Ensuring Effective Cleaning and Sanitizing of Limited-Use Garments", The National Provisioner Online, October, 2010.) These studies have also demonstrated that automated laundering provides cleaning and sanitation effectiveness required of HACCP by applying the key elements of clinical laundering processes recommended by the Centers for Disease Control and Prevention (CDC). However, establishing an automated laundering process in a meat or poultry processing facility also requires economic justification in its implementation.

Economic Factors

Central to establishing implementation costs is the determination of the equipment requirements from which the associated utility costs, supply product costs, labor costs, and other ancillary costs can be established. The size of a facility as measured by the number of employees will dictate the size of washer and dryer or multiples thereof to

assure adequate garment turnaround time for the next shift or the next day. Increasing the size capacity of the equipment selected may also lower labor costs by reducing the number of loads washed and dried, and may minimize labor dedicated to the laundering process. However, it may be to the advantage of the facility to have equipment redundancy in the event of anticipated or unanticipated equipment downtime and two smaller washers or dryers might be a better alternative to one larger unit.

Four model sizes of washers manufactured by Alliance Laundry Systems, Inc. were used to determine number of garments that could be washed per load. The four models provide a full range of garment capacity options to accommodate small and large facilities as shown in Table I.

TABLE I
Approximate Number of VR™ Garments Per Load

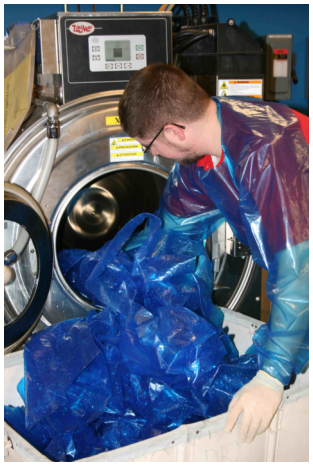
Size Washer* (Volume)	Number Aprons/Load	Number Gowns/Load	Number Sleeves/Load
9 Cubic Feet	60	50	150
13 Cubic Feet	85	70	210
16 Cubic Feet	105	90	270
21 Cubic Feet	140	115	350

*Data provided by Alliance Laundry Systems, Inc. for UniMac™ series of washers

The capacity of each model for aprons, gowns, and sleeves was determined by volume, not weight, typical for washing and drying traditional cotton linens. The number of garments that can fit into the washer and dryer chambers is the limiting capacity factor. Alliance's UniMac™ series washer UWN060T3 (volume of 9 cubic feet) was found to offer the best size for versatility of use in facilities that employ 100, 500, or 2000 employees with one unit recommended for the 100- and 500-employee facility and three units for a 2000-employee facility. See Plate I.

PLATE I
Automated Laundering Process for VR™ Apparel


Loading Washer


Unloading Washer


Loading Dryer

Seen in Table II are estimated costs associated with the implementation of an automated laundry program. These estimates are based on documented costs that would be incurred for equipment, dedicated labor, and utilities. It is assumed in these costs that no new space would have to be constructed and that electric and water utilities would be present at or near that location. Equipment costs per year are calculated using a seven-year depreciation schedule. Labor costs are based on $10 per hour with 2.1, 6.6, and 24.3 employee hours required per day, respectively, for a 100-, 200-, and 2000-employee facility. Utility costs include electric, gas, water, chemical, and sewer expenses.

TABLE II
Cost of Operating an Automated Washer/Dryer Laundry System Per Year*

Facility Size (Employees)	Equipment (7-Year Depreciation)	Labor ($10/Hr.)	Utilities (Electric, Gas, Water, Chemicals, Sewer)	Total
100 Employees	$2,756**	$ 5,460	$1,800	$10,017
500 Employees	$2,756**	$17,160	$7,002	$26,918
2000 Employees	$8,267***	$63,180	$26,609	$98,056

* Data provided by Alliance Laundry Systems, Inc.
**One washer, one dryer
***Three washers, three dryers

As seen in Table II, labor costs contribute most heavily to the cost of cleaning and sanitizing synthetic garments and have a significant impact for all sized facilities. Labor costs represent 54% for the 100-employee plant and 64% for the 500- and 2000-employee facilities. Reducing labor costs, therefore, would make the automated laundering program more cost effective and the use of a larger washer-dryer system could significantly reduce the cost for labor, especially for the 500- and 2000-employee facilities. Reducing labor costs by a factor of two would significantly reduce the yearly cost of the program, resulting in yearly totals for the 500- and the 2000-employee facility of $18,338 and $66,466, respectively.

Using the figures provided in Table II, the average cost to clean and sanitize a garment per day is calculated as seen in Table III. These figures assume that each employee uses one garment per day.

TABLE III
Cost Per Garment Per Day

Facility Size (Employees)	Equipment (7-Year Depreciation)	Utilities	Labor	Total	Total w/o Equipment (After 7 Years)
100 Employees	$0.106	$0.069	$0.210	$0.385	$0.279
500 Employees	$0.021	$0.054	$0.132	$0.197	$0.186
2000 Employees	$0.016	$0.051	$0.121	$0.188	$0.172

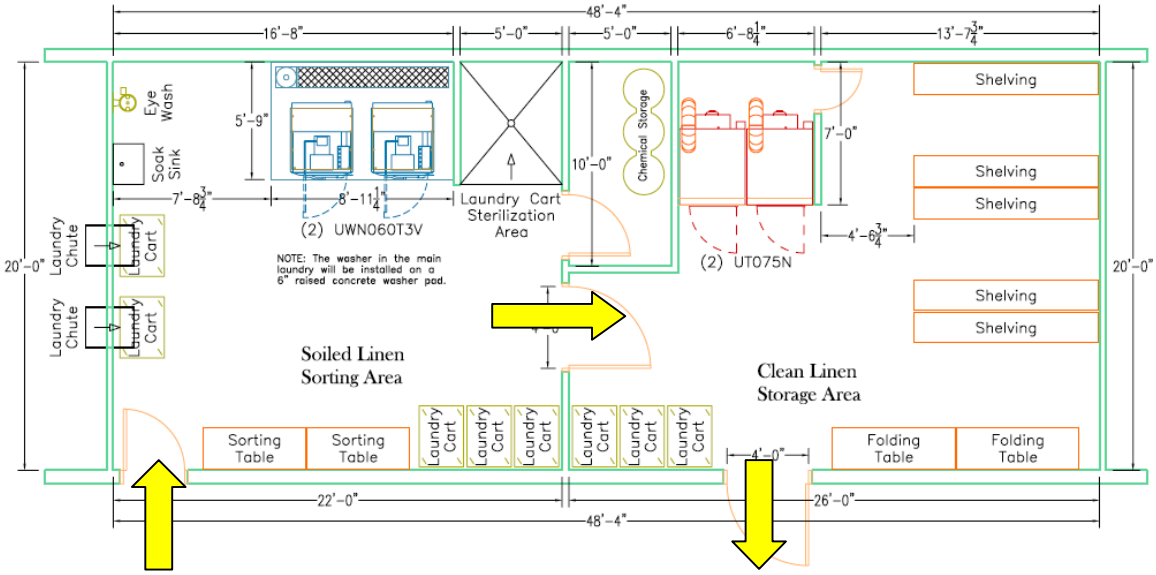
Applying a reduction in labor of 50% by using a larger washer-dryer system would reduce the cost per garment per day for a 500-employee facility to $0.151 and for a 2000-emloyee facility to $0.128. It should also be noted that after seven years equipment costs would no longer contribute to the cost per garment per day with the most significant savings occurring for the 100-emoloyee facility.

Logistical Factors

Logistically a layout for the laundering process needs to employ a number of features to ensure good flow from the processing floor through the washing area, to drying area, and onto storage and distribution. An example of such a layout for a 500-employee facility is shown in Plate II. The layout depicts a redundant system of two washers and two dryers for possible future expansion.

PLATE II

Layout of a 500-Employee Facility Automated Laundry Process*



* Provided by Alliance Laundry Systems, Inc., Ripon, Wisconsin

Critical to this layout is the separation of "dirty" from "clean" areas as required under HACCP regulations to ensure that garments remain clean after laundering. Featured in the depiction above is a separate area to sort and wash soiled garments and to decontaminate laundry carts. Once the garments have been washed, they enter a separate clean area for drying and storage prior to re-distribution. Space is also provided to accommodate clean laundry carts and clean garment storage. The arrows depict directed flow of the garments into the dirty area from the floor to the clean area and back out to the floor.

Less Quantifiable On-Site Laundering Benefits

When viewing the initial and on-going expenses of operating an on-site automated laundry system, cost factors such as equipment, supply products and labor costs may appear to be too high to be initially justifiable. However, other factors less quantifiable can offset these seemingly higher costs by benefiting the facility through labor shifting, enhanced regulatory compliance, and reduced liability.

Labor costs contribute a substantial fraction of the cost in implementing the program. However, offsetting labor benefits should also be considered when calculating the total cost to the facility. Replacing manual cleaning and sanitizing with an automated laundering program could result in a more productive use of employee time. Assuming that ten minutes per employee per day would no longer be required of the employee to clean/sanitize apparel could result in 10 hours, 50 hours, and 200 hours saved per day, respectively, for productive work in a 100-, 500-, and 2000-employee facility. Quantifying that shifted labor at the company's average hourly rate could result in significant financial benefits to the facility.

Enhancing regulatory compliance is another example of cost avoidance by the implementation of a standardized automated laundering program. Manual processes are fraught with numerous challenges. These challenges include human behavioral factors and employee adherence to assigned responsibility leading to processes that are not necessarily uniform or rigorous to provide the consistency required for effective cleaning and sanitizing. As a potential source of microbial contaminants, HACCP requires that re-used synthetic garments be subjected to validation documentation assuring that garments are adequately cleaned and sanitized between uses. Validation documentation must be provided (1) through peer reviewed articles that have demonstrated the process does meet performance criteria, (2) through internal facility documents indicating the process is valid, and/or (3) through the collection of periodic performance data (e.g., microbial sampling) to validate the process. Validation for any manual, multi-employee process is necessarily ongoing and continuous to assure that protocols established are properly implemented on a daily basis. By implementing an automated laundering program using standardized protocols having documented reliability, the validation process becomes one of equipment monitoring through automatic recorded verification of washing cycle times, water temperatures, and chemical concentrations with only periodic microbial sampling of garments to serve as microbial verification of process.

Although more subtle, the regulatory and civil liabilities caused by failure to adhere to regulations and resulting in product contamination are also real costs. Often these liabilities generate further financial loss through loss of consumer confidence in the facility's ability to deliver a safe product. Implementation of an automated laundering program that provides assurance that each garment is being properly cleaned and sanitized to clinical standards substantially minimizes those risks as compared to a manual cleaning and sanitizing program. These lowered risks may also be directly translated into lower insurance premiums for the facility.

Summary
An on-site automated synthetic garment-laundering program for PolyConversions, Inc. VR™ garments has been developed that demonstrates consistent, standardized cleaning and sanitizing. This process has been documented to effectively re-use and launder VR™ garments for a minimum of twenty times with identical cleaning and sanitizing efficacy as that for a new garment. From documented figures provided, implementing an automated laundry program in a 500- and 2000-employee plant could cost as little as $3.02 and $2.56, respectively, per garment per month to clean and launder and re-use. When factoring in other benefits such as labor shifting, enhanced regulatory compliance and reduced liability, an automated on-site laundering system provides a cost-effective solution for assurance that re-used garments will meet HACCP validation requirements for effective cleaning and sanitizing.

About the Author
Nelson S. Slavik holds a Ph.D. in microbiology from the University of Illinois at Urbana-Champaign (1975) and has previously served on the University of Illinois faculty within the Department of Health and Safety Studies. He is president of Environmental Health Management Systems, Inc. (Niles, Michigan) and consults with healthcare and the food processing industry regarding environmental and health and safety regulations, microbial decontamination, hazardous waste management, and hazardous materials management. He currently serves as a regulatory and technical consultant to PolyConversions, Inc. and consults with the food industry on microbiological safety issues and the efficacy of germicidal treatment of reusable and disposal products.

About PolyConversions, Inc.
PolyConversions, Inc. (www.PolyCoUSA.com) was founded in 1993 to research and develop exclusive splash and aerosol protective materials and apparel designs for industrial applications. Manufacturing strictly in the U.S.A., PolyConversions, Inc. produces under the trademark VR™ Protective Wear designed as a cost effective durable replacement for vinyl and other traditional protective apparel impervious materials.

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