



The Cleanroom Wiper Usage Audit

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Cost reduction is no longer just a part of the overall continuous program; it is the critical requirement for survival.

In today's turbulent economy, each day brings new challenges in the manufacturing sector unlike anything most of us have experienced in our lifetimes. Even the best run companies are battling dwindling bottom lines and potential reductions in resources. The outlook is no different for critical or cleanroom manufacturing. Cost reduction plans are mandatory and tools must be identified and employed to drive down manufacturing costs while not negatively impacting the process or final product quality. The Cleanroom Wiper Usage Audit is just such a tool.

Focusing on cleanroom manufacturing environments, outside of raw materials, cleanroom consumables can and often do represent the largest spend for the company. Within the cleanroom consumables category, wipers typically account for a majority of the cost. Depending on the size of the operation and processes performed, annual wiper costs can range from the thousands to hundreds of thousands of dollars.

Performed properly, the Cleanroom Wiper Usage Audit can provide a roadmap for improved methods, increased process performance, improved product quality, and most importantly reduced manufacturing costs. By combining knowledge of the manufacturing environment and processing requirements and a knowledge of wiping materials and their performance characteristics with a proven analysis methodology, the Cleanroom Wiper Usage Audit can be a powerful tool. A powerful tool that often is offered as a free service by wiper manufacturers for their customers.

THE METHOD

Through a systematic analysis method, the audit will provide a clear understanding of the manufacturing environment, processing techniques, key process parameters, wiper usage quantities, wiper usage techniques, and wiper material requirements. From this analysis methodology, knowledge of wiping materials and their performance characteristics, proper wiping techniques, and potential packaging configurations can be applied to provide a total solution for the most effective manufacturing cost reduction. While many approaches may be used to conduct a wiper audit, the one presented here will be based on the DMAIC principles associated with Six Sigma methodology: Define, Measure, Analyze, Improve, Control.

METHOD DETAIL

When performing a Cleanroom Wiper Usage Audit, the following basic steps will be utilized:

Step 1: The Definition Phase

During this phase of the audit, the primary goal will be determined and stated, for example:

The goal of the Cleanroom Wiper Usage Audit is to produce a significant reduction in manufacturing costs associated with cleanroom wiper usage without sacrificing process performance and product quality.

Step 2: The Measurement Phase

During this phase of the audit, the type of manufacturing environment, the type of processing technique, the cleaning methods used, and the type of wipers used will be determined. Typical questions during this phase are:

- Is the processing performed in a cleanroom or a critical environment area? If so, what is the ISO class of the cleanroom or environment?
- Is the cleanroom or environment required to be aseptic?
- What surfaces does the wiper contact in cleaning: equipment only, walls and floors, general work surfaces, in-process product, finished product?
- What are the characteristics of the surface contacted: rough, smooth, heavily soiled?
- What critical parameters are measured on the process, in-process product, and the finished product?
- Are there any special characteristics required in the process?
- What chemicals are used in the process?
- What type of wipers are being utilized: polyester, non-woven, woven, dry, pre-wetted, sterile?

Step 3: The Analysis Phase

During this phase of the audit, more specific requirements of the wiper material will be analyzed along with specific wiping methods and wiper usage quantities. Typical questions during this phase are:

- What are the current wiper specifications and how are they tested?
- Are there any special wiper data requirements?
- What are the most critical parameters required in the wiping material: fibers, particles, ions, absorbency, extractables, abrasion resistance, ESD?
- What chemicals will be used with the wipers: DI water, IPA, acetone, bleach, etc.?
- What size wiper is being used? Is the wiper two ply or one ply?
- What is the basis weight of the wiping material?
- Are the wipers used dry or wet?
- If the wipers are used wet, how are the wipers wetted: dipped, sprayed, squirted, prewetted?
- Are the wipers presterilized or autoclaved?
- What type of wiping technique is used in cleaning?
- How are the wipers currently packaged? Are there any special packaging requirements?
- How are the wipers stored prior to and during use?
- What is the current wiper usage?

Step 4: The Improvement Phase

During this phase of the audit, all of the previously gathered data will be summarized and analyzed for potential cost improvements. This phase of the audit process requires not only a technical understanding of the manufacturing process and product but a technical knowledge of available wiping materials, wiping material characteristics, and potential packaging configurations. If this overall combination of knowledge is not present internally or there is a resource constraint, the leading cleanroom wiper manufacturers are an excellent resource. Their many years of experience in multiple cleanroom environments and processes combined with their extensive knowledge of cleanroom wiping materials can be extremely valuable. Key areas that will be analyzed for improvement include the following:

- Is the wiping material substrate over-specified for the environment and processing requirements: using a laundered polyester knit when a lower priced non-woven could be used?
- Can a lighter weight, high performance material be substituted?
- Can the "value pack" packaging configuration be used in place of the stacked packaging configuration?

- Can a more economical wiper size be used?
- Can improvement in the wiping technique present a cost savings?
- Will pre-wetted wipers improve the overall cost?
- Should a validated sterile wiper be used instead of autoclaving?

Once the key areas have been analyzed and improvements identified, the overall cost impact should then be determined. Based on the estimated impact on quality, efficiency, yields, and wiper costs, the identified improvements need to be validated and implemented.

Step 5: The Control Phase

After the audit process has been completed and improvements have been defined and validated for implementation, procedures need to be updated and personnel need to be trained on the new materials or techniques to ensure proper control of the new materials and process. The training of personnel in proper wiping techniques is also an area where the knowledge and resources of the wiper manufacturer can be very helpful.

COMMON CLEANROOM WIPER USAGE AUDIT IMPROVEMENTS

Based on typical Cleanroom Wiper Usage Audits, the following cost reduction improvements are among the most common identified and implemented:

“Value Pack” Packaging Configuration: The majority of cleanroom wipers purchased are in the stacked packaging configuration. “Value Pack” or bulk packaging allows the end-user to purchase the same material substrate in the same size with the same performance in a more economical fashion. Typical savings can be 10-15% versus standard stacked packaging.

Lighter Weight, High Performance Material: In recent years, cleanroom wiper manufacturers have developed lighter weight, high performance versions of polyester wipers that offer the same level of performance as previous heavy weight versions. The cost savings generated can range from 20-40% or more depending on the current product being used. Additional benefits can also be derived from a reduction in landfill waste or disposal costs.

Cleanroom Wiper is Over-Specified for the Application: End users sometimes over-specify the wiping material to ensure that there is no migration of particles and fibers from a less critical area to a critical area. This problem can be overcome by proper procedures, visual management tools, and training. If less critical hydro-entangled non-woven wiping materials can be used in place of more costly polyester knit wipers, the savings that could be realized can be 50% or greater.

One of the issues found most often during an audit is that personnel are utilizing poor wiping technique when cleaning processing equipment and surfaces. Using a poor wiping technique not only leads to increased wiper usage and cost but can also significantly impact cleaning efficiency and process and product yields further increasing the actual manufacturing costs. As this issue not only impacts the actual wiper usage but could also negatively impact efficiency and yields, the cost savings can sometimes be dramatic.

Pre-Wetted Cleanroom Wipers: While pre-wetted wipers are more expensive in price, a thorough evaluation of all the costs associated with the use of dry wipers and squirt/spray bottles will result in an overall lower manufacturing cost. The manufacturing costs associated with preparing inhouse solutions and the inefficiencies associated with wetting cleanroom wipers internally may significantly outweigh the price differences:

- Cost of purchasing and handling hazardous solutions.
- Cost of purchasing and maintaining blending equipment.
- Cost of personnel required to blend solutions and prepare squirt/spray bottles.
- Cost of purchasing and maintaining squirt/spray bottles.
- Cost of QC personnel and testing required to validate the solution blending process.
- Cost of disposal for hazardous solution drums and associated containers.

- Cost associated with spillage, evaporation, and over use of prepared solutions.

Other benefits that can be derived from pre-wetted cleanroom wipers include:

- Reduced impact of over-spray on sensitive parts or products.
- Reduced Volatile Organic Compound emissions.
- Increased cleaning efficacy.
- Improved cleaning consistency.

KEY POINTS TO REMEMBER

1. Cleanroom wipers typically account for a significant portion of manufacturing costs outside of raw materials.
2. The Cleanroom Wiper Usage Audit is a powerful tool for finding and implementing significant manufacturing cost savings and process improvements.
3. The Cleanroom Wiper Usage Audit is a systematic approach requiring excellent knowledge of cleanroom environments and processing techniques along with extensive knowledge of cleanroom wiping materials and their performance characteristics.
4. Most cleanroom wiper manufacturers have the knowledge required and can provide Cleanroom Wiper Usage Audits, as well as training, when requested.

BOTTOM LINE

The Cleanroom Wiper Usage Audit is a powerful tool and should be utilized as an integral part of any cleanroom or critical manufacturing cost reduction program where cleanroom wipers are utilized.

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