



In production processes, compliance with the required cleanroom class is essential. Nevertheless, enterprises increasingly have to examine their cleanrooms to exhaust all potentials for savings. Sufficient possibilities exist for reducing costs through well-considered Measures.

Keeping contamination under control at low cost

Savings potentials in microelectronics



Mr. Rijnder Mier,
electrical engineer for measuring
technology

Reduce air conditioning costs while maintaining the cleanroom class

Today, everyone is watching energy costs-either for compelling financial reasons or simply to comply with the relevant regulations. Anyone who examines their air conditioning costs will usually discover a potential for savings: with a cleanroom area of 1,200 m², savings of up to €50,000.00 per year in electricity costs are realistic.

"When" and "where" are the keys to cost reduction here: because the air quality is often kept at a constantly high level of purity, although this is not always necessary. In hallways or storage and service areas, you can reduce the air quality by controlled reduction of the filter performance. If you do not have three-shift operations, and the cleanroom is not used during the evening, at night or on weekends, you can lower the cleanroom class during these times (for example from ISO 3 to ISO 5).

This reduction of the air quality, which is hardly noticeable in your operations, contains high – often undreamt-of – savings potential.

With even more precise adjustments you can even reduce the air quality, and therefore the air conditioning costs, during cleanroom operations. The residence time of the products in various cleanroom areas can also provide occasion for measures that make it possible to reduce the electric air filter performance without affecting the degree of purity. These measures can include streamliners to improve cleanroom conditions and reduce air speed in specific areas. It is also possible to establish intelligent recirculation of the used and filtered cleanroom air to achieve substantial savings.



Adam Preuß
Vertriebsleiter Deutschland basan
GmbH

Investments	Savings
<ul style="list-style-type: none"> • Installation of streamliners 	Electricity costs
<ul style="list-style-type: none"> • Consulting costs and costs 	The service life of the pre-filters (F9-filters) and of the HEPA filters is increased for ventilation settings
<ul style="list-style-type: none"> • Ventilation control for time-dependent setting of ventilation 	Air conditioning costs (dehumidifying and humidifying, fresh air supply) are reduced
<ul style="list-style-type: none"> • Costs for modification of air recirculation from exhaust systems 	

Table 1: analysis of the savings potentials

Prevent contamination through employee behaviour

The number one source of contamination in the cleanroom is the human being. The conduct of newly trained employees is usually correct; however, cleanroom discipline soon slackens with the onset of everyday routine. Incorrect behaviour, such as walking too fast, which causes turbulence and disturbs laminar air flows, can even jeopardize the cleanroom classification in the worst case. Conscientious dressing and undressing, as well as hygiene and handling of personal objects are all issues that quickly become inflationary in the everyday routine. Since understanding affects the behaviour of employees much more strongly than enforcement through regulations, regular training prevents expensive mistakes and has a general motivating effect on all cleanroom personnel. This is more important than all other aspects of your contamination concept and will result in lower costs in the long run. Therefore, do not neglect cleanroom training, even if the training budget is often the first to suffer from short-term savings measures.

Foresighted contamination control reduces production and ESD problems

Even if it is possible to reduce costs to some extent by purchasing less expensive cleaning materials, inverse logic is usually to be recommended here. Suitable cleaning materials of



Fig. 1: Wearing intermediate cleanroom clothing can reduce the number of emitted particles $\geq 0.5 \mu\text{m}$ and $\geq 5 \mu\text{m}$ by more than 50%.

good quality, specially designed for the equipment to be cleaned, reduce production problems and save you more money under the bottom line. The same applies to ESD protection.

Instead, examine the overall cleaning costs to determine whether they can be reduced. Cleaning costs fall into two categories: the cost of the cleaning materials and products, and the cost of the internal or

external cleaning personnel. By reducing the actual cleaning and personnel costs, which usually dominate, you can achieve much higher savings.

The costs of active contamination control can be reduced with foresighted passive contamination control. This can often be achieved by simply modifying the changing rooms and air showers: the less dirt and contamination that is carried into the changing rooms from outside, the less you have to clean at high expense. Since our street shoes – and our cleanroom shoes – always carry contamination from outside areas, much of the contamination can be stopped by the use of sole cleaning machines and a suitable cleanroom floor covering in the air showers, in addition to peel-off mats in the outside area. The correct positioning of furniture in the sit over area intensifies this preventive effect and protects your product.

Contamination from a bird's-eye view

A contamination concept cannot be developed quickly by sketching it out on a piece of paper. Such concepts are often the result of years of trial and error. Savings potentials become apparent when various factors are examined not individually, but as part of an overall system. With well thought-out interaction of the various aspects, it is possible to cut costs while maintaining the same results. For example, to clean the floor three times a day in an ISO class 3 cleanroom and to put on



fresh cleanroom overalls every day is a luxury that your production does not need. The cleanroom concept in this example does not match the production requirements; in fact, the cleanroom concept exceeds the requirements unnecessarily.

A remedy can be achieved by coordinating the individual components of the concept. A well-coordinated contamination concept can answer the following questions:

- After how many hours of work are cleanroom overalls contaminated?
- How often do the facilities in the cleanroom have to be cleaned?
- How long does it take until the floor is contaminated?
- How and where is contamination carried?

To save money, you should first observe and gather facts; then you can put together a comprehensive cleaning concept. Selective, small-scale measures can have a very positive effect: for example, cleaning the entrance area after each shift or regular cleaning of the soles of cleanroom shoes.

The following rule applies here as well: fewer people in the cleanroom means much less contamination; therefore, costs can be saved by reduced cleaning on weekends.

Cost-efficient supply logistics

Cleanroom supply can also become a cost pitfall. Materials may take up too much expensive storage space, or the cost of procurement and logistics is too high. For many cleanroom decision makers, this responsibility is only a secondary, burdensome activity that has to be performed daily.

Clothing

Clothing logistics is the only area where several factors will affect the procurement and logistics expenses in the coming years: rental, purchase, in-house cleaning or third-party cleaning service? Who repairs the clothing and who is responsible for clothing logistics? Thorough analysis and calculations are necessary to determine whether it is less expensive to have logistics activities performed internally or to outsource them as non-key competencies.

Consumables

Costs can also be reduced by using consumables. Standardization of the materials and equipment used helps to streamline both procurement logistics and warehousing. You can also free up storage capacities with just-in-time deliveries. With concepts such as consignment warehouses or annual quantity contracts, you can increase your supply security without incurring excessive liabilities and avoid supply bottlenecks that could jeopardize your production.

The general cleanroom rule applies here as well: preventive measures are better than expensive solutions to big problems caused by small mistakes!

Substantial savings are possible

With a cleanroom area of 1,200 m², basan customers managed to save an average of about €50,000.00 per year. Standardization of the products used and outsourcing of the procurement logistics based on the basan Full Service Concept (FSC) played an important part. The introduction of the FSC saved an average of 75 square meters for a cleanroom of the size in question, not to mention savings resulting from freed resources for actual core tasks. Further costs were saved by actions implemented in coordination with basan, including reduction of the air speed, optimization of cleanroom clothing and cleaning processes and intensified passive contamination control.

Contact

basan GmbH, Kriftel
Tel.: #49-6192-9986-0
Fax: #49-6192-9986-50
info@basan.com
www.basan.com.