

# Organizational requirements for effective ESD protection

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~~Der externe ESD Schutz wird noch immer in vielen Unternehmen aufgrund der fehlenden Sachkunde vieler Entscheider als unnötige Aufgabe angesehen. Durch Missachtung notwendiger ESD Schutzmaßnahmen fehlen somit oft sehr wichtige Abteilungen im ESD Team. Das führt zu periodischen Degradationen im ESD Schutz und damit zu panikartigen Neuanschaffungen vor Kundenaudits. Wird der ESD Schutz aber einmalig sinnvoll aufgestellt und dann gelebt, wird er zu einem wertvollen Qualitätswerkzeug mit überschaubaren Kosten.~~

~~Diese Paper soll aufzeigen wie mit begrenzten Kosten ein sinnvolles ESD Konzept in Firmen eingeführt werden kann .....Pfeile: es sollte dem Leser ein klares Ziel dieses Papers in der Zusammenfassung vermittelt werden)~~

~~**Abstract** – This paper is intended to show how a company benefits from a technically meaningful ESD concept. It is shown that a once sensibly established and maintained ESD control program plan creates limited costs and is a sustainable quality tool. It also shows that a properly selected ESD team saves time and money by avoiding unnecessary expenditures and eliminates degradation of existing ESD control elements.~~

~~**Zusammenfassung** – Dieses Paper soll zeigen, wie eine Firma von einem technisch sinnvollen ESD-Konzept profitiert. Es wird belegt, dass ein einmalig sinnvoll aufgestellter und gelebter ESD-Kontroll-Programm-Plan begrenzte Kosten verursacht und ein nachhaltiges Qualitätswerkzeug ist. Außerdem wird gezeigt, dass ein richtig ausgewähltes ESD-Team dauerhaft Zeit und Geld spart, indem unnötige Ausgaben vermieden und eine Degradation der vorhandenen ESD-Kontroll-Elemente vermieden wird.~~

~~The external ESD protection is still regarded as an annoying evil in many companies. The lack of basic expertise of many decision makers is an excellent excuse for missing the ESD Team. This disregard, leading to periodic degradation in ESD protection and to panic like new acquisitions before customer audits. If the ESD protection is put to good use, it becomes a valuable quality tool at manageable cost.~~

Formatiert: Zusammenfassung

## 1 Expanded requirements

In the new published standard IEC 61340-5-1:2016 [1] an important point was added in the list of requirements for the ESD control program:

- Product qualification.

In subclause 5.2.3 of this standard this point is described. After the methods for the verification, mentioned in Tables 2 and 3 in addition to the qualification, the organization is advised on how to carry out product qualification in addition to its own measurements according to the tables and methods above. In total 4 ways of qualification are possible;

- own measurements,
- measurements made by an external laboratory,
- based on supplier datasheets

- and the evidence of own experience and verification measurements.

Many organizations are able to perform verification measurements in a professional way. Qualification measurements are more difficult to perform not only because of the missing climate chamber. So, the supplier datasheet is the most comfortable way for product qualification.

## 2 Who buys ESD control products?

### 2.1 Actual situation in small and medium sized companies

So far, a typical ESD team in medium and small companies has been mainly an ESD coordinator or ESD representative and a deputy.

However, since these ESD specialists cannot be in direct contact with every employee, many new acquisitions without the approval of the ESD specialists.

## 2.2 Current situation in larger companies in the automotive industry

In larger companies an ESD team with three levels is preferred. The ESD coordinator is responsible for establishing the ESD control plan for the entire company. The second level is the ESD representative or technician in every branch or business unit, who is responsible for performing educations and audits. The third level are employees with ESD knowledge in the respective electronics processing areas. Acting as more knowledgeable contact for the workers. These employees performing additional tasks and are often named ESD assistants.

This concept provides a reliable communication because the workload is well balanced in the different commercial units of the organization. At least the administration is ignored completely.

## 2.3 Avoiding gaps in the concepts

Both concepts having the disadvantage that they are focused on the commercial unit of the organization. By chance, the quality engineering is part of the ESD team. Mostly the main deviations of ESD protection are brought into the company by employees which are not incorporated in the ESD concept. One of the most important parts is purchase or procurement.

To close this gap all ESD control products, which are chosen for the use in the ESD control program must be qualified prior to purchasing. This is described in subclause 5.2.3 in the standard IEC 61340-5-1.

By looking after the usual ways of purchasing the following variants will be found in the majority of companies:

### 2.3.1 The competence is placed at the employee in purchase

It is usual that the commercial colleague will send a written requirement request to the procurement or purchase, which contains the basic requirements. The purchaser chose the most propitious product based on the given information.

The following risks lurk here:

- The most important properties are not mentioned. For instance, "ESD shielding bags" are needed. Due to the lack of knowledge the

terms and definitions are not really understood by the purchaser. So, he will write only "ESD bags" in the tender.

- The cheapest price decides and so an major property will be ignored. Two suppliers offer „ESD bags“. The cheaper dissipative bags will be ordered instead of shielding bags. To inform the colleague a short note with the information „ESD bags are ordered“ is send to the requester.

### 2.3.2 The purchasing competence is placed on the worker in the production

If many different employees have the responsibility for buying but are not trained enough in ESD the risks of mis purchasing increases. E.g. team leaders are buying based on the smallest budget and without asking the ESD specialists transport carts without ESD properties because

- the size fits best,
- or the cart was the cheapest
- or there was no time for discussing the issues.

### 2.3.3 TCO or costs of correction of the deviation

In both cases no TCO (total cost of ownership) calculation is made and the product related and handling costs based on the bad purchasing will be ignored. Apart from the direct costs, which can be caused by an ESD failure, as detailed described by the paper "EPA status and profitability of ESDS protection measures" by K.H. Helling presented in October 2001 [2], further follow-up costs are faced by the company:

- Performing of measurements for subsequent product qualifying.
- Labour costs for the refitting of the noncompliant ESD products, like isolated carts, with table mats and castors.
- Material costs for castors, mats, cables and more.
- Labour costs for sorting and repacking.

As a short calculation example, the costs for refitting a noncompliant ESD cart will be noted detailed [3]:

Price of a new **ESD-cart** with two boards in the size 975 x 542 mm and 4 ESD castors approx. € **217,00** net

Price of a new **Non-ESD-cart** with two boards in the size of 955 x 505 mm and 4 non ESD castors approx. € **183,00** net

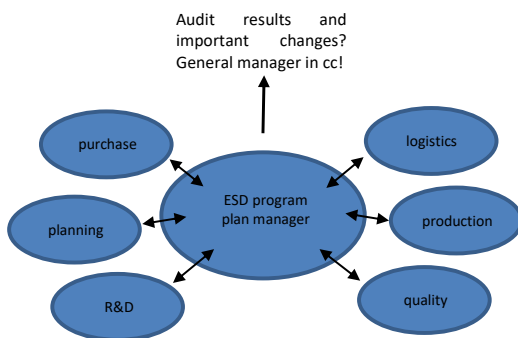
In example the material costs for all needed products for the refitting are at approx. € 145,00, including:

- 2 swivel castors, approx. € 20,00 / pcs,
- 2 castors, approx. € 17,50 / pcs,
- 2 pcs Table mats, approx. € 30,00 / pcs
- Additional material like screws, cables, etc. approx. € 10,00.

One average hour of work will cost in Germany € 33,40 [4]. As a suggestion one hour is needed. Half an hour the worker will need for the basic refitting and as a very short suggestion the purchasing process will take the other half hour. To be honest this will not include the control of the order, in goods receiving and the accounting costs. If these costs will be included the amount of time needed, will be much higher. The costs of the non ESD cart including the correction of the deviation will be € 361,40 or € 144,40 (approx. 66 %). This shows the higher TCOs for the correction of noncompliant ESD control elements.

## 2.4 Process optimization

It is obviously, that every coworker, who is allowed to purchase production related material must have the necessary knowledge to prevent higher costs after the delivery of the ordered goods. Training is essential to make sure that every needed information is transferred to the related coworker. In general, every department or part of the organization shall name and educate at least one ESD-assistant to establish the communication between the ESD-team and the part of the organization (see picture 1).



Picture 1: Example of departments who should be presented in the ESD-team at least with one ESD-assistant.

Every team member needs a trained colleague to be sure the knowledge will be maintained in the organization if the team member will leave the organization.

E.g. in one situation the ESD coordinator took the option for an early retirement from one day to another. He took also the keys for the cupboard with the measurement instruments. The ESD control program plan, which was only stored at his private IT space on the company server, was deleted by the IT guy without any recheck. Every single bit of information was lost without a backup. The next major customer audit was very uncomfortable for the new ESD coordinator.

### 2.4.1 Communication

One important part of the communication is the transfer of knowledge from the ESD-Coordinator into the departments. This includes limits, values and requirements but in the counter direction feedback about new machineries and layout changes and their way of qualification.

### 2.4.2 Product qualification database

To establish a database for all qualified ESD control elements of the organization has the objective to eliminate failures during the purchase process. Every worker could easily check if a qualified product is already used in the organization and rebuy it with a minimum risk.

In this database not only the internal article number should be stored, but also two different sources for every necessary ESD control elements. It doesn't make sense to qualify one product brought by two suppliers who receive it by the same major supplier. If the major supplier is no longer able to deliver the product, the complete supply chain will break down.

As a second step the way of qualification must be documented. If the datasheet of the supplier was used for qualification, at least a test method and the measured value must be noted in the datasheet. The general term „meets the requirements of IEC 61340-5-1“ is not enough.

In some cases, the ESD coordinator of the organization will be forced to apply lower limits in the ESD control program plan than given in the tables of IEC 61340-5-1. This mostly happens at the combination of shoes and flooring.

If the installed floor is not as good as it can be and reaches alone a very high resistance to ground, it can be necessary that the highest accepted value for shoes is lower than 100 MΩ. If the shoe is in the data sheet only qualified with „meet the

requirements” it’s not possible for the purchaser to decide if the shoe will meet his internal lower limits. If the supplier is familiar with the ESD standards, he will qualify his products according to the standard IEC 61340-4-3 and will note the typical measured value, e.g. 5 MΩ. With this information the ESD coordinator can decide if the shoe will match his internal requirements or not.

If the supplier doesn’t use the correct wordings and is not able to pass the needed information on his data sheets, it is mandatory to support the qualification of the supplier by own qualification measurements.

If the member of the purchasing department is well educated and able to qualify products based on the data sheets of the supplier, the needed information should be documented in the qualification data base and could be passed to the ESD coordinator and the logistics before the first purchase and delivery. On the other side the worker knows, if the documentation is not detailed enough for the own qualification, he must request a sample of the product and send it to the ESD team for qualification measurements before the first use.

The product qualification database could, if it is well maintained, be the base for maintenance and cleaning plans. The information for every product can also be used for planning the incoming goods inspection. Based on the database, the values for the qualified products are known and could be compared to the values of the delivered goods. The changes of products by the supplier, even if he doesn’t send product change notifications, are now visible.

General information about the person in charge and the release date makes the stored data complete.

If the product qualification data base is known, accessible and readable for every employee, who is responsible for buying and purchasing, the number of uncontrolled ESD control elements will be reduced to an acceptable amount of time.

#### **2.4.3 Plan for verification**

Every new ESD control element must be added to the plan for verification after the qualification process. This happens best direct after the successful qualification by adding the required information into the maintenance plan or audit system of the division.

If the supplier is very good known as a high-quality supplier, the verification measurements could be performed with longer intervals. If the quality of the delivered goods is not predictable, shorter

periods must be planned, to make sure that the product fulfills the specifications.

By sharing all necessary information with the persons in charge, the responsible person in any line knows about new ESD control elements in his area and could be more attentive during the verification measurements to prove the qualification data by the acquired data from his own experience.

#### **2.4.4 Practical example ESD shoes**

In the actual version of the standard IEC 61340-5-1:2016 is noticed that for qualification of the system person/shoe/flooring in combination not only the system resistance is the required value. Regarding the existing standards the walking test is also required to find the matching shoe for the existing flooring system. The two requirements of  $R_g < 1 \times 10^9 \Omega$  AND maximum Value of body voltage  $< 100 \text{ V}$  should guide the ESD coordinator to reduce the maximum number of different shoes, which are used in the organization, with the objective to reduce the own workload. The number of flooring systems must be recorded as well, but in the majority the floor lays while a new coordinator is named by the organization periodically. So, every new type of shoe should be qualified and periodically verified by system resistance and walking tests accordingly to table 2 note “d”. The system must be proved and work under the worst-case conditions for the organization.

If any worker could choose his shoe from a huge catalog of different shoes from any possible producer, it leads to unexpectable number of walking tests on every flooring system this worker could ever walk on and the combination is part of the main personal grounding system.

### **3 Choose the appropriate co worker**

#### **3.1 Preparation**

If the ESD coordinator can count on good qualified responsible persons in every division of his organization his workload will decrease markedly.

Every new worker must be trained and equipped with the necessary ESD control elements in his working area by the beginning of the work to make sure that the required information is accessible by the first entering of an EPA. Regarding to the size

of the organization this is a job for the ESD assistant.

In principal the coordinator should choose workers as ESD assistants who are valued and experienced. They should be socially competent. A couple of decisions made by the coordinator could be not so easy to communicate to the workers. A distanced view to the situations during coffee breaks could help to find the appropriate person. Who are the leading wolfs in the group? Who is the one who is asked afterwards? Who is forming the opinion of the team? Often these are persons in charge for safety or first responders.

### 3.2 Equipment

The main responsibility, not only the legal product liability, for the product quality of the organization lays at the general management. If the management will not provide the necessary financial and personal resources to the ESD-coordinator to fulfil the needed tasks, it's not possible to establish, document, maintain and verify a proper ESD control program accordingly to the standard IEC 61340-5-1.

One of these tasks is the back up at personal decisions. What kind of possibilities the ESD coordinator has by bringing uncomfortable measurements to life? What should I do, if the worker will not close his smock completely or will not check the wrist strap daily? It must be clarified how the hierarchy works.

### 3.3 Plan for training

If the ESD team is complete, the members must be well trained to perform own trainings.

Every employee must be trained accordingly to his requirements. It is helpful for understanding the internal requirements of other departments to put the members of different departments with similar training requirements to one group together. The basic training for every worker must contain the awareness of ESD and the correct use of the own ESD control elements. What kind of activity could be brought together?

- Does the worker sit during his work and uses wrist straps? E.g. workers at the assembling workstation or at the incoming goods control place.
- Operators at production lines and logistic are both working in a standing position.
- Cleaning personal and controller are both not in duty to handle ESDS by themselves but shall

know how to recognize an EPA and comply with the requirements if entering.

If it could be managed, a short break should be integrated in the training so that members of different groups get the opportunity to hear about the problems and solutions in other departments. The awareness that the own work has important impact on the work of other workers could be helpful to implement not loved activities to the work schedule. E.g. if the order picker has to repack the screws or rubber pads from an insulated bag into a dissipative bag before bringing this to the EPA.

In general, the ESD refresher trainings must be created with changing elements. There is nothing more boring than seeing the same small film for the hundreds time. The physics lessons at school shows positive and negative Examples. The basic structure could be possible:

- ESD-Awareness' – Are there any own issues during the impact of ESD? It could be others than electrical induced physical damages. Intimate questions especially to the R&D guys could be very interesting. Nothing has more impact than the own personal experience.
- ESD-Basics – Basic knowledge about charging and discharging principals. It shall be recognizable for every worker, where the ESD risks are present.
- ESD control elements and measurements for lowering the ESD risks. – What are the possibilities for every worker himself to avoid ESD damages?

To clarify the relations, it is needed to use remarkable experiments, if possible, with material the workers are familiar with. E.g. a charging cable for a smart phone could be charged very easily by rubbing. Small videos could help to memorize the learned content and link it to some cute or dramatical pictures. If every group has different videos seen, there is a possibility that the workers talk after the presentation to each other about the ESD training. This helps also to deeper memorizing the content. One of the best examples is the dog with three legs, which was charged by rubbing with a blanked. The group has talked a couple of days afterwards about this cutie. And avoid hanging their private jackets at the chairs in the EPA afterwards. Lesson learned.!

## 4 Prejudices

Often heard is the argument, that ESD protection is a kind of Voodoo. Problems and damages are

complicate to find and even worse to prove afterwards. Therefore ESD protection is expensive and heavily to bring in mind at the management level.

#### 4.1 Thesis

In opposite to this the authors of these paper defend the statement, that ESD control is, compared to many other problems in an electronic manufacturing a field easy to control. The models and basic physical effects are well known and in a series of standards well documented. If the ESD control chain from the semiconductor manufacturer to the original equipment manufacturer is closed and under control the customer could be very sure to receive a reliable product.

#### 4.2 Costs

Based on experience and analyses of data from the customers from the Stat-X Group it can be proved that a well implemented and living ESD control program plan is a reliable quality tool. It is a tool to plan the spending for ESD control elements and reduces the costs in total and, in case of a wide organized ESD team, to reduce the needed time for every member to a acceptable minimum.

##### 4.2.1 Analyses of customer related sales volume

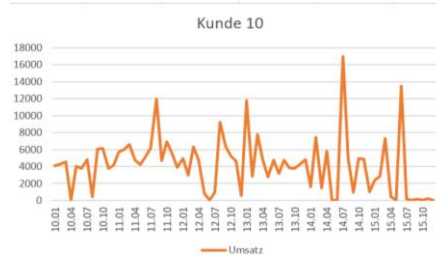
To make the numbers for an appropriate ESD control visible customer related sales values were compared. Only customers were brought into this evaluation who brought 100% of their ESD control elements exclusive at the Stat-X group. Additional only customers were taken who were well known inclusive their special needs and their requirements for quality and product reliability. This is necessary to compare values over a long period of time and exclude influences which are not related to normal processes and are not under control of the viewed organizations.

If ESD control is a daily based quality tool the sales volume will be continuous with a small number of peaks regarding to bigger investments after major changes in the processes or following growth effects with hiring new workers or installing new product lines. Tables, Flooring and other long-term products will be not sold daily to small and medium sized companies. If the sales volume shows regular peaks this could be planned investments or corrections of major deviations after customer assessments. The requested delivery time and the attendance to reach a good deal and low prices points to the one or the other case. To make this

visible two customer profiles out of ten will be compared.

##### 4.2.2 Sales Value report customer 10

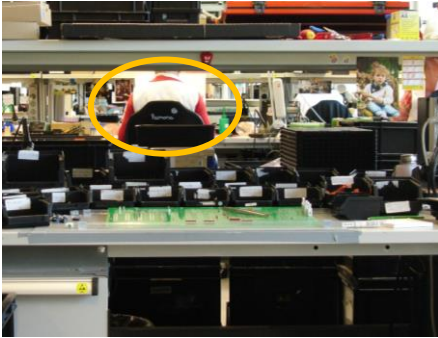
Customer 10 is a perfect example for a bad ESD control program. That ESD protection is a basic criterion for producing reliable electronic components was not understood by the management. Even if the top customer has asked for it in every assessment. This leads to regular major deviations and many customer claims.



Picture 2: Customer sales value (in Euro) over a period

The chart is showing peaks in the year 2011, 2012, 2014 and 2015. These peaks are following the consequences of the regular customer assessments of the biggest single customer who is responsible for about 60% of the total sales of the organization. In the year 2011 the logistic concept was change to conductive boxes. In the year 2012 the floor must be striped and newly sealed after a change of the cleaning company without a proper education of the service provider. In the year 2014 chairs and trolleys were changed, because the cleaning of the castors was not mentioned in the maintenance plan and in the year 2015 the floor was degraded again. Although the customer has asked for the maintenance plan since 2012. In the end of 2015, the key customer was lately unsatisfied and cancelled all products and orders. The management of customer 10 decided than to close the plant.

The major fault war the weakness in decisions made by the local management. The ESD coordinator who was also in charge of the quality, gained no support from the management at problematic decisions. To satisfy the workers during a hot summer, the manager decided by themselves to allow cotton smocks without sleeves instead of the ESD garments, to make working a little bit more comfortable. After the summer was over the cotton smocks stayed in the production. Every attempt to remove the smocks from the shop floor was interfered by the manager, who did not understood the risk of static charging by induction due to the highly chargeable private clothing of the workers.



Picture 3: Workstation at customer 10 – The worker wears cotton smock without sleeves (yellow marking), Private belongings at the workstation and insulating tape instead of table matting at the surface of the ESD table.

Also, the fights against non-process related insulators at the workstations were lost. As a sample the logistic department declined the repacking of LC displays from a not cooperative supplier, which were packed in highly insulative and chargeable foam trays. Regarding the low volume of purchased products, the supplier decided not to change the packaging material to an ESD compliant version. The supplier claimed, that the displays are not ESDS and could not be damaged by ESD-events.

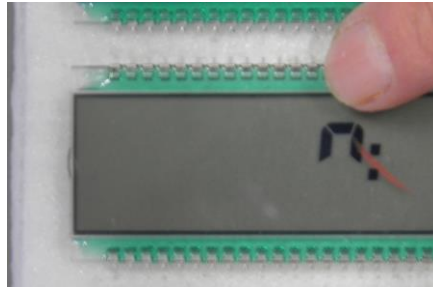
After knowing about the high ESD risk from the foam trays at the point where the ESDS was handled, the number of trays at the workstation should be reduced or the usage of an ionization system will be mandatory.



Picture 4: Workstation at customer 10 – Pile of foam trays in the EPA.

The worker felt the electrostatic discharge when removing the displays from the foam and the displays sometimes lights up. After installing the displays on the PCB many of them failed at the end of line tests. Misleading not the Display was

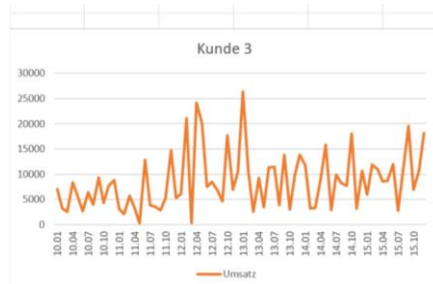
damaged but several other components from Asics to resistors.



Picture. 5: LC-Display – electrostatic discharge at touching the component.

#### 4.2.3 Sales value report customer 3

The opposite example is customer 3 as an example of a good ESD protection level. The following chart shows, that the sales value is continuously growing. Three investment peaks in 2012 an in the end of 2012 / beginning of 2013.



Picture 5:

The positive development of the sales values is visible at the total sales values of the organization but also in the quality policy and the position as a grade A supplier in many customer assessments. The most customer assessments are showing only minor deviations which were cleared during the normal process verification measurements. Repeating assessments were not necessary.

#### 4.2.4 Possible correlation

At the review of the customer values it was obviously that companies with a good ESD protection level has continuously overall costs for ESD control elements between € 400 and € 600 per year and worker. This includes all products for personal grounding like gloves, garments and shoes but as well packaging material and low-price investment goods like trolleys and measurement instruments. This number divides not between

production and administrative workers, so it is only an estimation for any budget planning. After a couple of talks to experienced ESD coordinators the number of € 500 per year and worker was seen as realistic.

*Table 1: Costs for ESD control elements per year and employee*

Customer	Number of employees	Estimated sales value in Euro per employee and year
1	125	489,00
2	140	625,25
3	250	508,00
4	20	413,35
5	45	621,33
6	25	509,28
7	80	260,40
8	120	297,20
9	4	1359,00
10	150	344,00

### 4.3 Time

At least every quality tool is only effective if the responsible person is able to maintain all the necessary tasks with the needed amount of time. By own experience as an external ESD coordinator, the authors knowing, that a well-educated ESD team could provide all basic reports and information to the planned schedule. With this support the total needed time for every member of the ESD team will decrease notable.

#### 4.3.1 Requirements

To anchor the ESD protection in the quality system of the organization, the basic requirements must be implemented as an organic part of the daily work instructions.

As an example, it must be secured that in the moment of material purchasing of a supporting production material, which can be brought into the EPA, the packaging material shall be dissipative. It is necessary that the purchaser notes on the buying documents the requirements for packaging accordingly to the standard IEC 61340-5-3 [5].

In the cleaning documents for every workspace in total 3 ESD instructions should be included. The maximum time needed should be 5 minutes. The worker should prove, if all cables are connected properly or if the ESD hygiene is kept at the workstation. The specialist knows ESD hygiene as the situation where no not-needed insulators are present at the workstation.

The ESD assistant in the production planning needs to receive all sample drawings and detailed product lists for every kind of ESD workstation. He must know which type of ESD control elements must be planned to secure the ESD protection from the first moment of work. The list of ESD control elements are based on product qualification database. All products included could be used without any doubts.

#### 4.3.2 Key tasks

The ESD program plan manager has to write the ESD control program plan in coordination with the members of his ESD team. Part of this process is an assessment per year to prove all ESD control elements and to gain all needed information from the workers by intensive talks. Our own experience is, that some information could only be acquired by asking very direct questions. If every information is collected and evaluated, the program plan manager knows what kind of ESD control elements are used in the organization and how they are verified. This information is the foundation for the product qualification database and the plan for verification. In an organization with approximately 120 employees and an EPA of 1000 square meter the yearly assessment needs around 3 days for measurements alone. How long the ESD team needs for preparation of all needed working instructions and cleaning plans depends of the capabilities of the ESD specialists.

#### 4.3.3 Repeatable tasks in the production

The ESD assistants of the production related departments collects at a weekly task the cleaning reports and the lists of the daily checks from the personal grounding testers. If possible, the regular checks could be easier documented by using IT technologies. If needed short measurements could be performed. If major deviations are detected refresher educations with the related workers must be scheduled. Depending on the size of the department or production line this will last about one hour per week.

The expense for ESD assistants in administratively departments are even lower. The tasks are related to holding documents like working instructions and databases up-to-date and keeping the requirements in mind at every purchase.

Every worker must be trained and equipped with the necessary information and ESD control elements. In every organization safety trainings and other educations must be legally based performed so the additional ESD training could be added with 10 minutes expense.



Missing ESD control elements must be purchased and installed and if needed first time measured depending at the level of degradation and the dynamic of the organization. With growing database only not regular used ESD control elements must be searched and over the time, less effort is needed for researching and qualification of ESD control products.

Based on own experience an ESD assistant should need 1.5 hours for ESD actions per normal working week. If assessments are scheduled the workload rise. It should be kept in mind, that some of these tasks are not only related to ESD.

#### **4.3.4 Repeatable tasks at management levels**

The ESD responsible shall plan and perform refresher trainings for the related departments. Additional continuous communication between all levels of the ESD team is necessary. This meeting are the link between ESD coordinator and ESD assistants. The important information given by the workers must be passed to the management level and the changes of the ESD control program plan by the ESD coordinator must be implemented in the work instructions and cleaning plans. Last but not least these changes must be communicated to the workers who needs them.

Depending to the durability and the kind of the ESD control element periodical spot checks could help to receive a good ESD protection level and reduce the level of work during the yearly assessments. New qualified products could be measured quarterly to get a feeling for the behavior of the element in relation to the relative humidity and get an information about the properties for the verification plan.

The workload for the ESD responsible is even higher than for the ESD assistant. If the number of employees is limited, the person, who is the ESD assistant is normally also the ESD responsible. Or the ESD program plan manager is also the ESD responsible. In this case the workload will be added. The ESD responsible should schedule approximately 3 hours per week for the necessary tasks. Training days and assessment days will be added.

#### **4.3.5 Repeatable tasks for the ESD program plan manager**

The ESD control program plan manager must seek the communication with all other members of the ESD team to keep the ESD protection in mind. This will defend the ESD protection against degradation. Only a living ESD control program

plan will protect the organization against ESD failures. It is even complicated to conduct a regular meeting with more than 3 employees quarterly. Many things could be arranged by E-Mails. But having face-to-face meeting is important for confirming team members to perform a meaningful and valued task.

The main responsibility for the ESD program plan manager is to coordinate the ESD team. If all tasks are delegated the program plan manager must keep the plan up to date and the needed changes related to the requirements of the organization. He has to scan and implement the changes in standards and customer or legal requirements.

It is necessary to intervene when there is a problem and to present the issue in a positive way to the management in order to obtain the necessary approvals in necessary budget discussions. A regular task is to report the status of the ESD program to the management.

If the program plan manager is also an ESD responsible or ESD assistant in his own department, this keep him in touch with the basic problems of the workers and will be noted positively by the people who has to work on his requirements. Decisions are not made by persons without experience, they will made by rethinking the consequences. If the company is larger than a certain level it is more complicated to keep this combination. Based on the example above an organization with approximately 120 employees the work of the ESD program plan manager will take also around 3 hours per week. In some weeks only the checks of the documentation and updates for the databases are necessary. Other weeks will be packed with internal assessments or refresher trainings.

## **5 Conclusion**

If the ESD control program plan in an average organization is well maintained the needed duties are easily to cover. The amount of time and money could be planned and the ESD protection will lost its myth.

If the ESD protection level is good, it's even more complicate to argue about bigger investments because there are no major problems with ESD. Regarding to this it is essential to keep the daily work in positive connotation at the management of the organization to make sure they know about the work which is done successfully. As Mister Helling wrote in the paper „EPA status and profitability of ESD protection measurements “[2] its more

expensive to work without any ESD protection than to implement the current state of the art.

## Literature

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