

ESD : Thunder and lightning on your workflow.



Speaker: Bruno Bertels

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Agenda

- E.D.&A.
- ESD: Electrostatic discharge
 - ✓ **What is ESD?**
 - ✓ **ESD-damage**
 - ✓ **Examples**
 - ✓ **Control and prevention on ESD**
- Q&A

E.D.&A.

Electronics, Development & Assembly

- Founded in 1981
- HQ Located in Belgium, Kalmthout (Antwerp)
- Sales office in Bonn, Germany
- 80+ employees (37 on R&D)
- E.D.&A. develops and produces custom-made electronic controllers for machines and appliances.
 - Industrial market
 - Consumer market



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What is ESD?

Electrostatic Discharge

- Electrically charged objects
- Charged differently → (electrical) potential difference
- Electrical charge imbalance → physically not stable
- Regain balance - electrical current:
 - Electrical contact: electrical short
 - "Close together": dielectric breakdown
- Can occur in every stage of the product:
 - At component supplier
 - During production
 - At the customer
 - In the field (installation, service)



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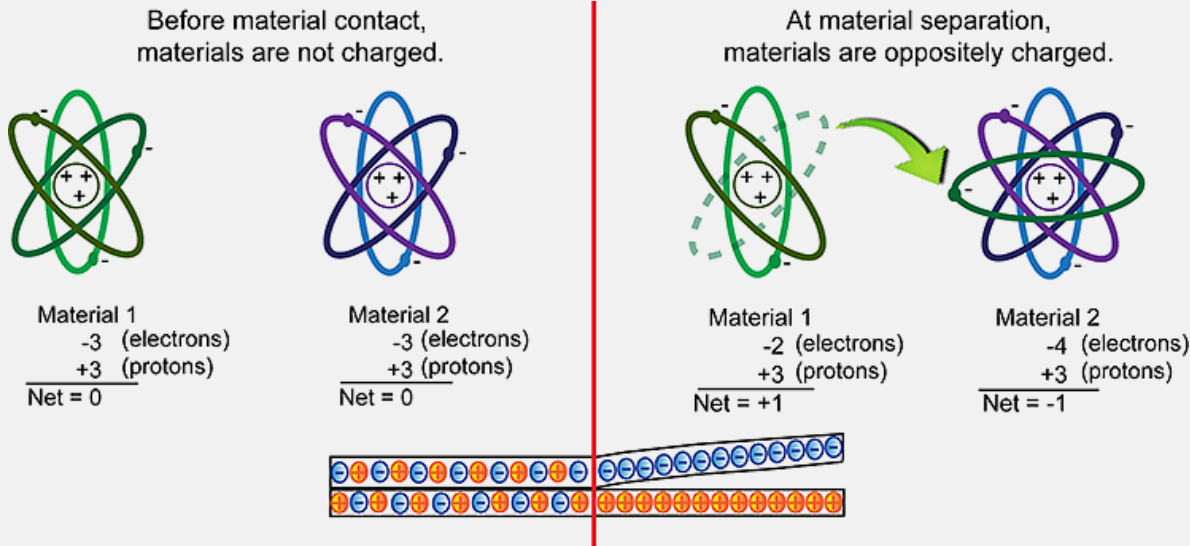


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Electrical charges

Where do they come from?

- Most common cause is tribo-electrical effect = "Contact Electrification"
- Friction of different materials
- Rubbing materials exchanges charges



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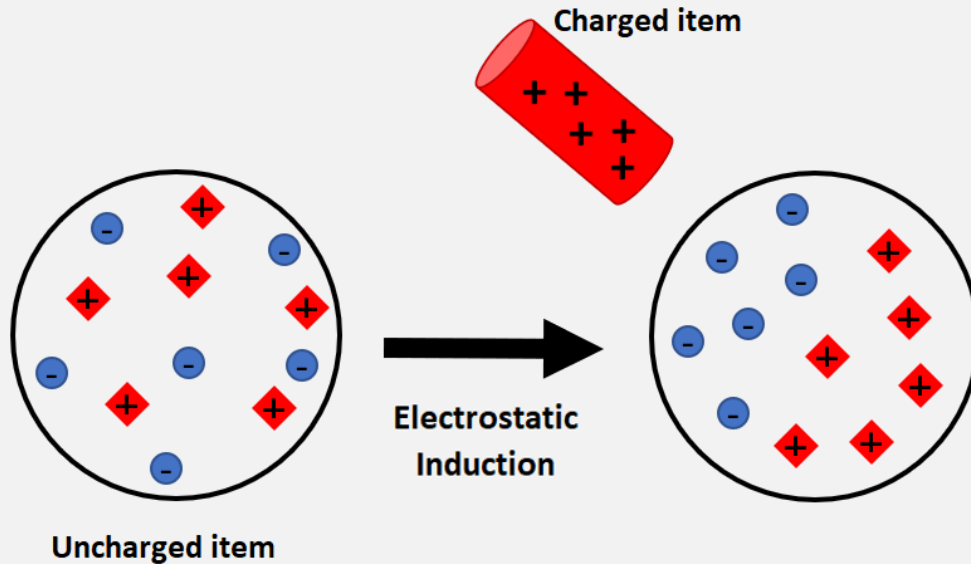


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Electrical charges

Where do they come from?

- Touch or nearly touch with a charged item = "Electrostatic Induction"



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Electrical charges

Where do they come from?

- Charge build up:
 - Taking off a sweater over your head
 - Walking over (fitted) carpet
 - Getting out of a car with fabric seats
- ESD current to regain balance:
 - Touch a heating radiator
 - Touch a metal fridge
 - Touch the car door
 - Touching door handle



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ESD example

Dielectric breakdown



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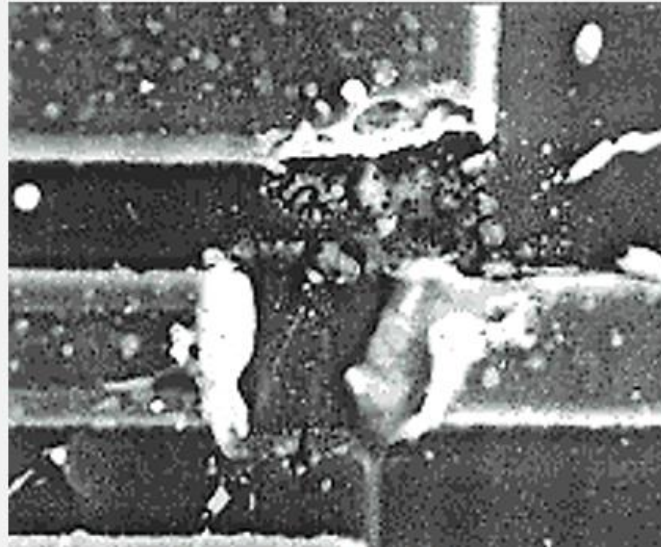


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ESD Damage

What is the problem with this discharge current?

- ESD currents can damage the electronics
- Instant defect
 - Invisible vs invisible
 - Internal component traces



Bonding wire 20 μ m

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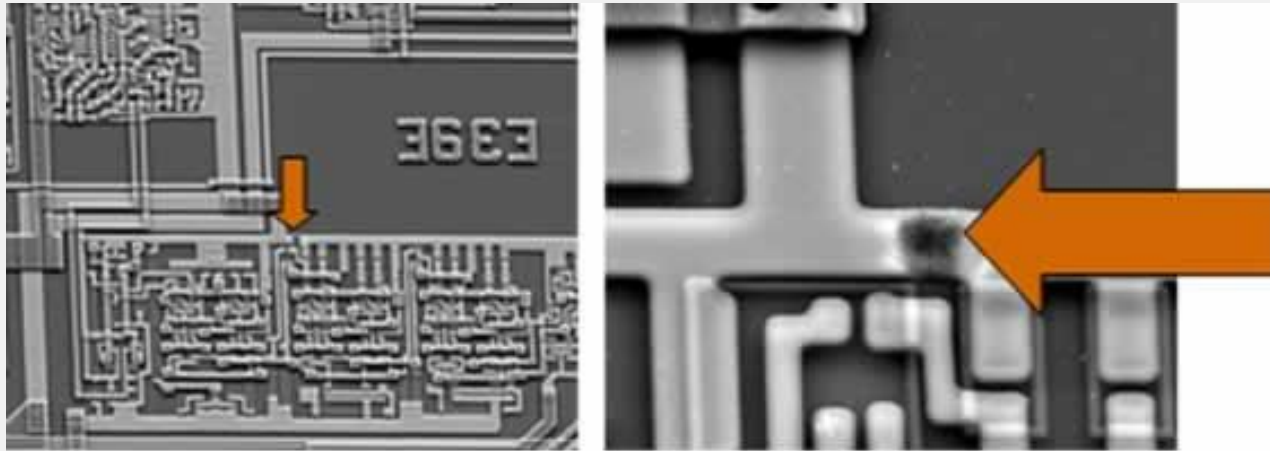
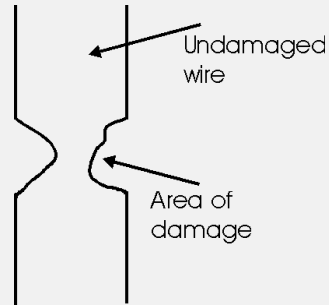


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ESD Damage

What is the problem with this discharge current?

- Latent defect



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Control the environment

- ESD company policy
 - Safe workplace
 - EPA = Electrostatic Protected Area
 - Personal protection
 - Training people



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Control the environment

- EPA = Electrostatic Protected Area
 - Use of ESD sensitive materials
 - Reception of goods
 - Handling



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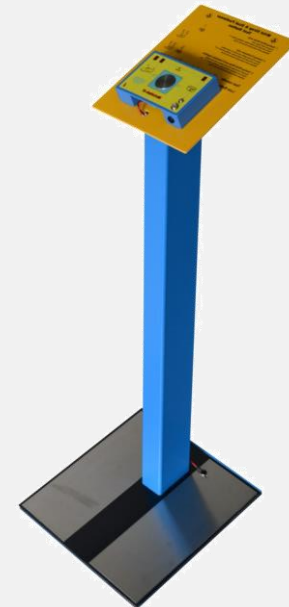


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Control the environment

- Controlled paths to earth: charges that occur are levelled to earth in a controlled manner:
 - Before entering EPA
 - Test personal protection
 - Inform visitors



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Control the environment

- Controlled paths to earth: charges that occur are levelled to earth in a controlled manner:
 - Floor
 - ESD Tiles, ESD carpet, ESD coated floor, ..
 - ESD chair



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Control the environment

- Controlled paths to earth: charges that occur are levelled to earth in a controlled manner:
 - Workbenches
 - Conductive table or ESD table mat
 - ESD Shoes or heel straps



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Control the environment

- Controlled paths to earth: charges that occur are levelled to earth in a controlled manner:
 - ESD jacket - Shirt
 - Wrist straps
 - ...



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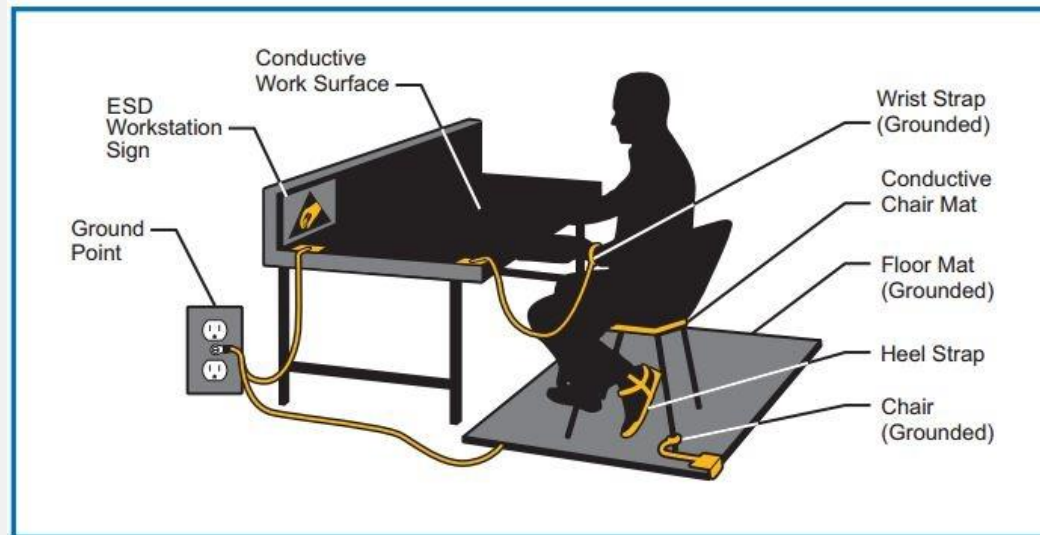


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Control the environment

- Create 1 controlled discharge path for the operator
 - man – jacket – shoes – floor mat – ground
 - ESD safe workbench to work with ESD sensitive items



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Prevention

- Prevent charges
 - Use "safe" materials
 - ESD safe tooling



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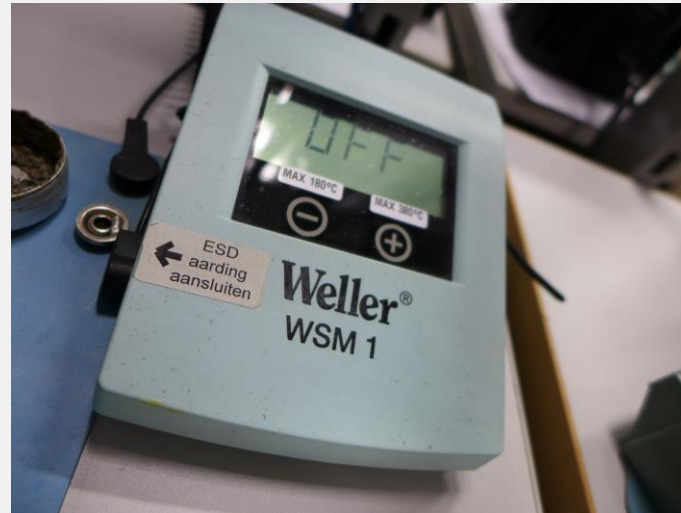


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Prevention

- Prevent charges
 - Use “safe” materials
 - Ground equipment (soldering)



- In general: use only “anti-static” materials within EPA.
(= anti tribo-electric effect)

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Prevention

- Prevent charges
 - Not ESD safe items within EPA are not allowed.
 - Plastic bags, document wallets, ...
 - Document holders
 - Tape dispenser
 - Plastic bottles
 - Component bins
 - ...
 - Prevent friction
 - No carpets
 - No fleece sweaters
 - Do not attach tape on a PCBA: pulling it off can create static build-up



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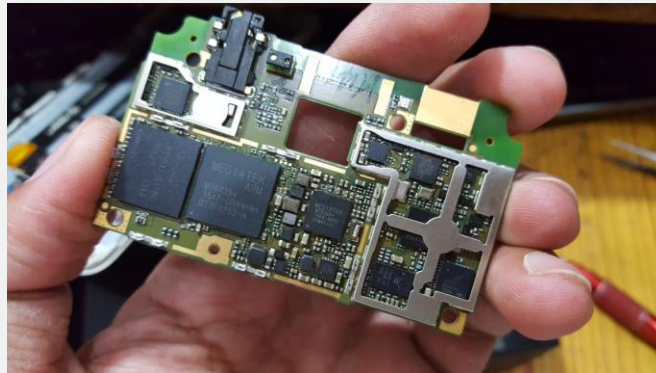


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Prevention

- Prevent undesired discharge
 - Get rid of possible charges without undesired damage
 - “Loose” the charges by touching a radiator e.g. in the field
 - Do not touch PCBAs randomly: try to handle it at the corners only



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More info and tips

- Pink materials: (unwritten standard) = antistatic
- Antistatic: often surface coating on packaging → wears out
- Static shielding bag: conductive, attention for batteries and electrical voltage
- Keep ESD packaging closed



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More info and tips

- ESD sensitive component



- ESD protective product (packaging)



- Customer advice

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A hand is pointing towards the center of the image, which is a screen displaying the 'ed&a' logo and the text 'Q&A'. The background is a light blue gradient with a faint circuit board pattern. The hand is in the foreground, slightly out of focus, with the index finger pointing at the screen. The screen shows the 'ed&a' logo in dark blue, with the ampersand in a lighter blue. Below the logo, the text 'Q&A' is displayed in the same dark blue. At the bottom of the screen, there is a blue bar with white text providing contact information.

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Q&A



Thank you for your attention

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