Controlling Contamination to Avoid Downtime

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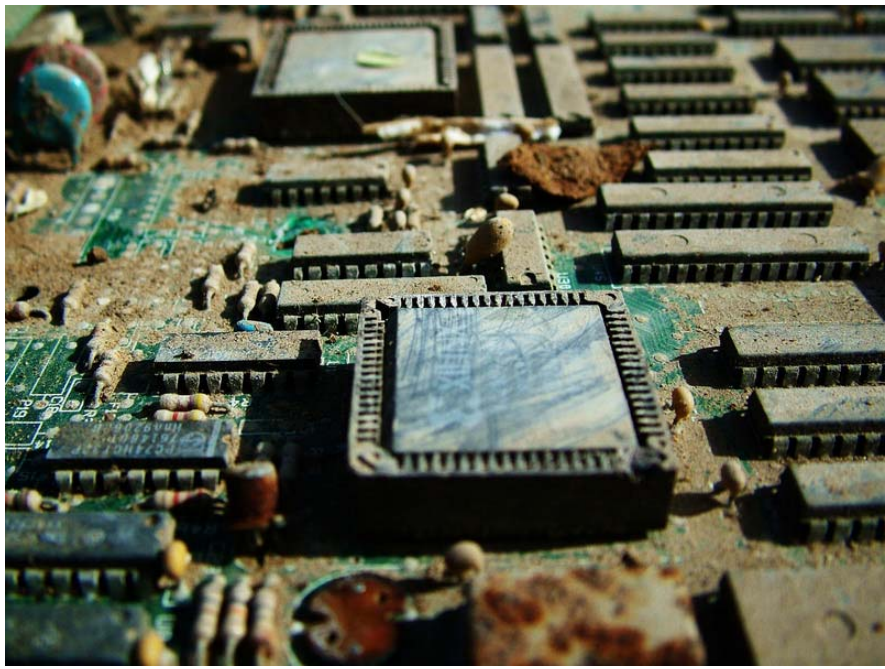
Everything Fails For A Reason

Controlling Contamination to Avoid Downtime
Data Clean Mexico, July 15, 2008

Agenda

- What Are Contamination Sources?
- What Are The Failure Mechanisms?
- What Are The Costs?
- What Should You Do?



Sources of Contamination Outside

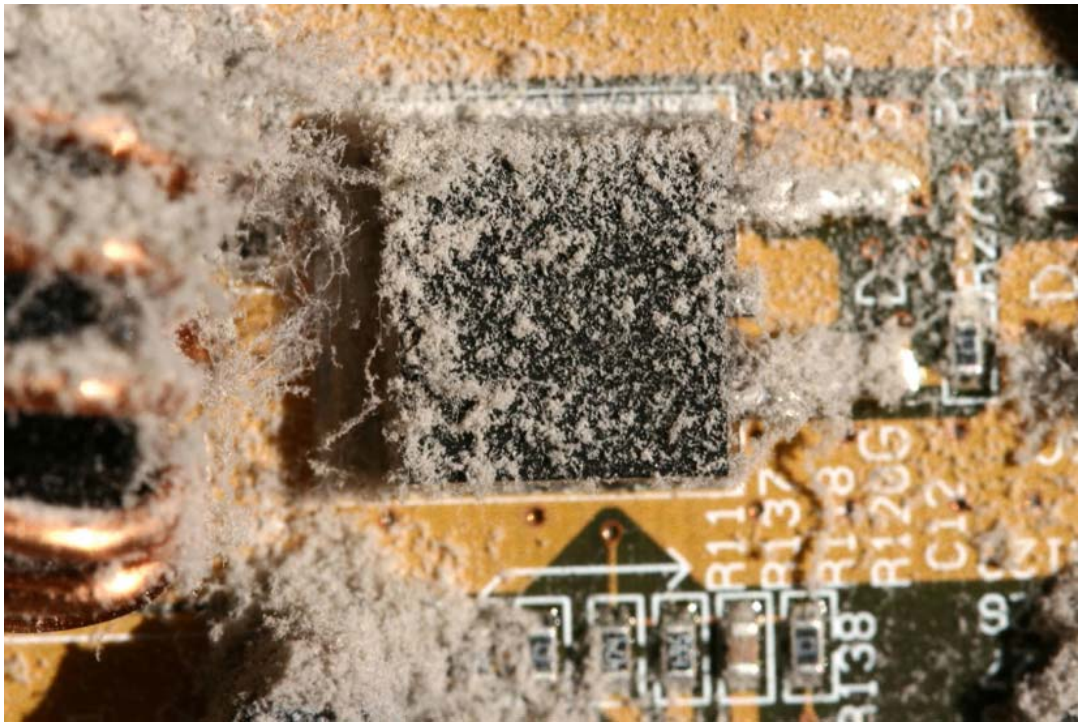
- Dust & Dirt
- Smoke Particulate
- Gaseous Contaminates

Sources of Contamination Inside

- Concrete
- Drywall
- Lumber
- Ceiling Tiles
- Insulation
- Carpeting

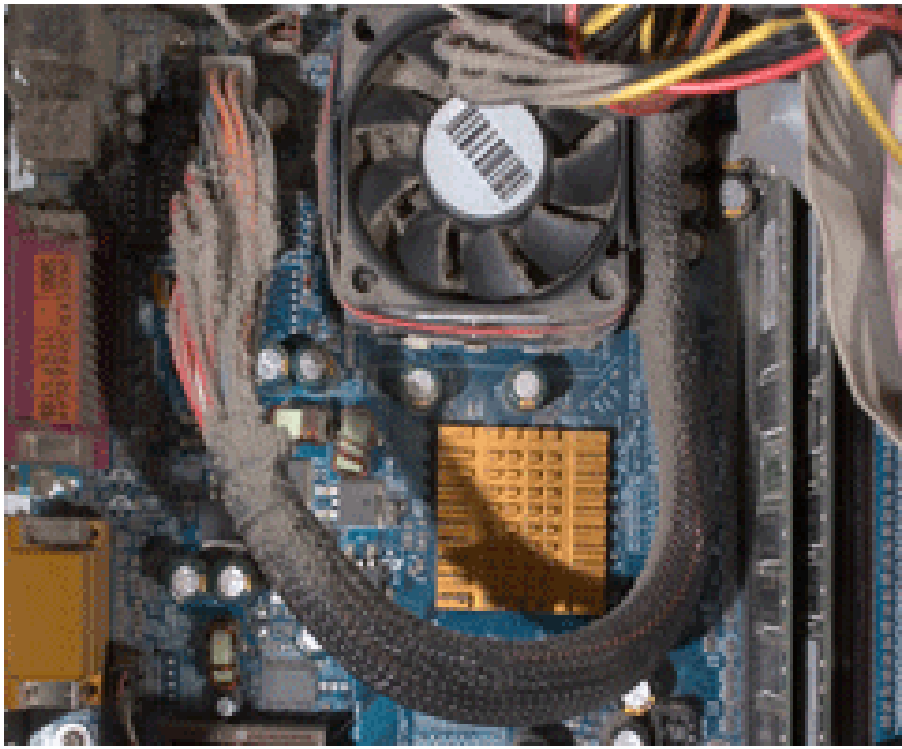
Sources of Contamination Inside

- People
- Clothing & Shoes
- Boxes, Crates, and Paper



Controlling Contamination

What's Different Now?

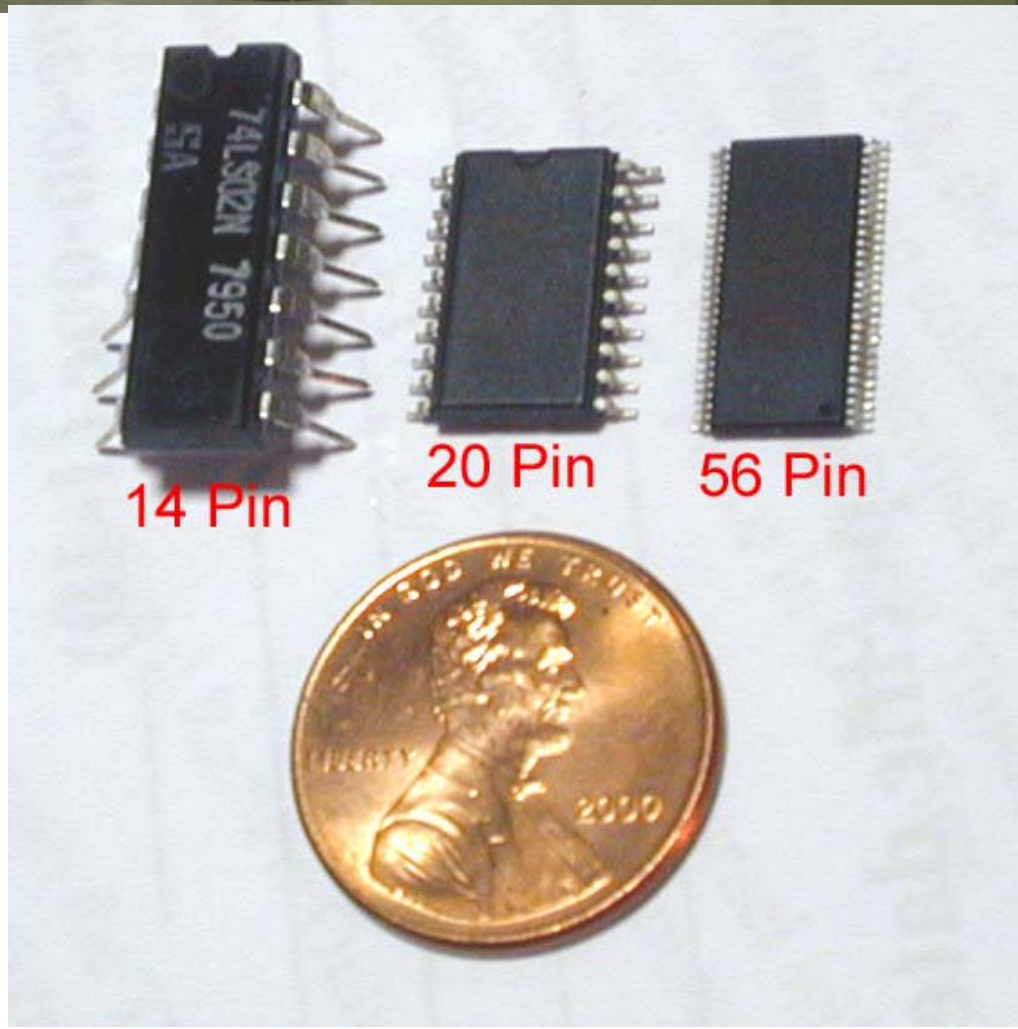


- Building Design Is the Same
- Construction Is the Same
- Materials Are the Same
- People Are the Same
- Equipment Is Much Different
- Equipment Is Much More Susceptible!

Controlling Contamination

Physical Characteristics

- Voltage Down 24%
- Clock Speed UP 10,000 X
- Lead Pitch Down 75%



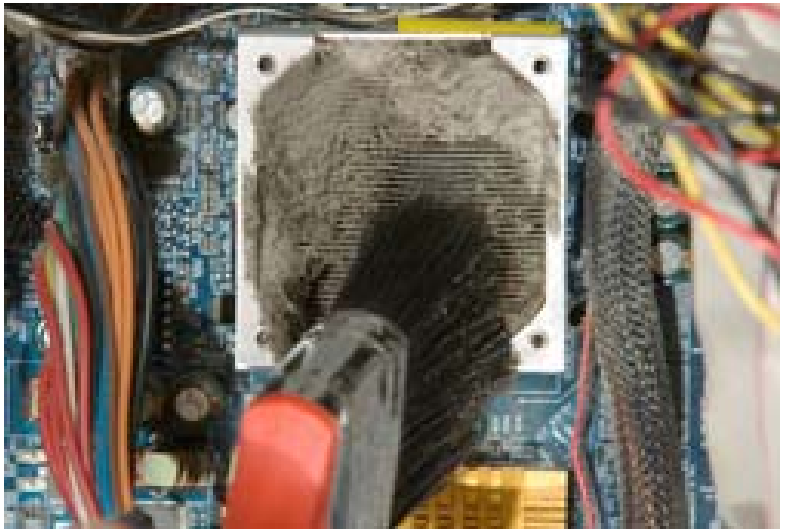
Equipment Vulnerabilities - How Does Contamination Cause Failures?

- Overheating & Thermal Failure
- Current Leakage - Electrical Shorts and Opens
- Physical Wear

Thermal Damage

"Premature clogging of filtered devices will cause a restriction in air flow that could induce internal overheating and head crashes.

Heavy layers of accumulated dust on hardware components can also form an insulative layer that can lead to heat-related failures."
~ Sun Microsystems

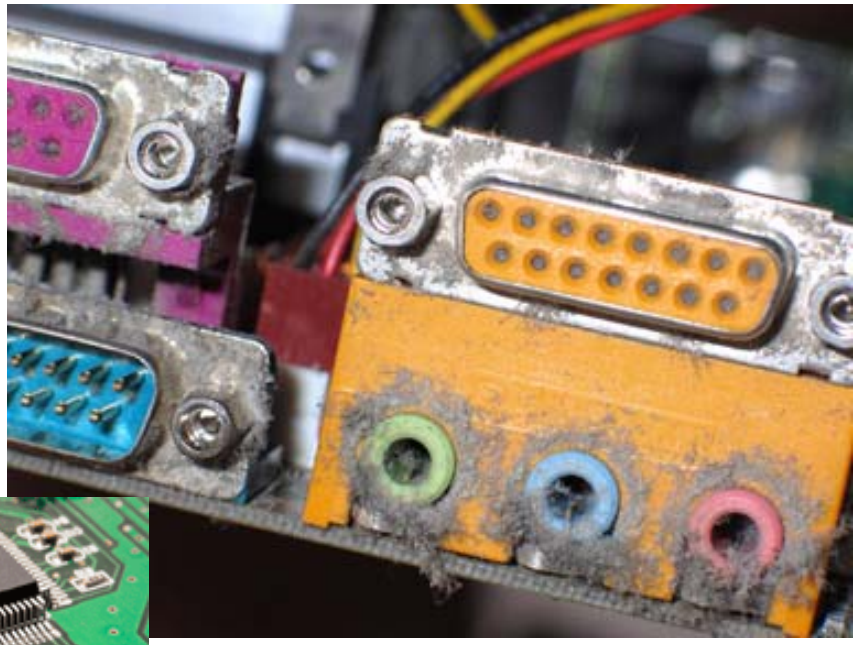


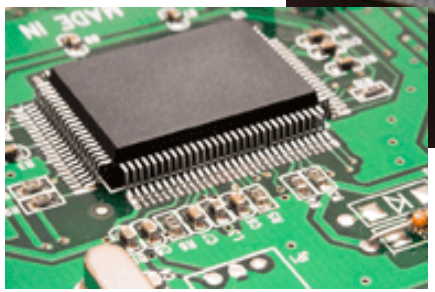
Controlling Contamination

Electrical Shorts & Opens

Conductive Contaminates

- Ionic Salts
- Carbon & Sulfur Residue
- Ferrous Metals
- Zinc Whiskers
- Metal Shavings





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Electrical Shorts & Opens

Contaminates + Humidity = Shorts

Contamination particles can cause performance issues when they form an insulating layer around components. Mixed with humidity they can create semi-conductive bridges between component leads.

Physical Wear

- Tape drives are designed to operate in a clean environment.
- **Problems can be caused by dirt, dust, fibers, and airborne particles.**
- Particles can damage the tape or the head.

Source: IBM

Controlling Contamination

What are the costs?

- Hard Costs
- Soft Costs

What's Your Cost per Second?

- $100M Revenue = $3.17 per second
- $1B Revenue = $31.69 per second
- $10B Revenue = $316.90 per second = $1,140,840.00 per hour

Financial Consequences of Downtime Failures

- Data or Orders not Processed Because Systems were Down
- Cost to Repair Damaged Equipment
- Time Spent Getting Systems Back Online and Recovering Data
- Reduced Productivity Caused by Idle Employees
- Customer Support Managing the Crisis
- Potential Litigation

Voided Warranties Due to Environmental Conditions

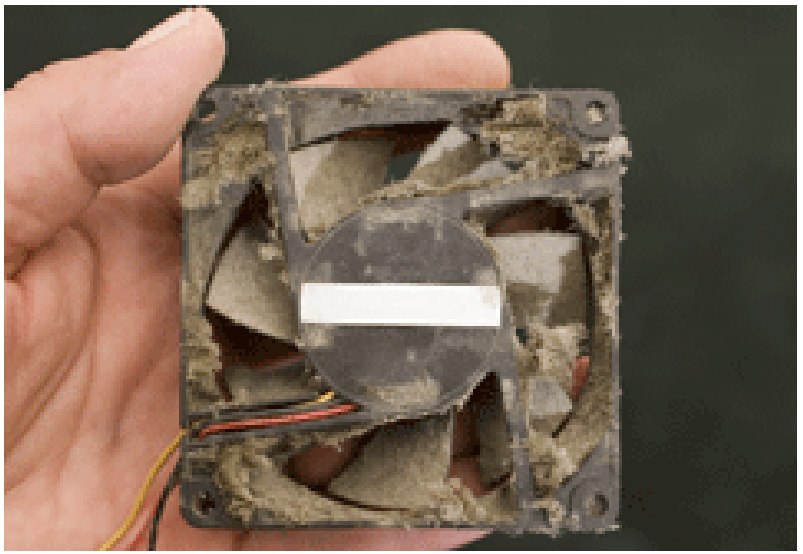
Hard Costs - Personal Health and Safety

- Indoor Air Pollution
- Pollen
- Spores
- Bacteria
- Insects
- Rodents

Soft Costs

- Aesthetics
- Employee Pride & Morale
- Customer Loyalty & Brand Damage

How to Limit Contamination Failures



Facility Physical Location:

First Line of Defense or Weakest Link?

Controlling Contamination

Consider the Datacom Environment:

- Level 0 – No Barrier to ambient conditions
- Level 1 – Cabinet level protection
- Level 2 – Typical Riser or Wiring Closet
- Level 3 – Server Room
- Level 4 – Enterprise Class Data Center

Follow Best Practices

- Keep the Contaminates Out
- Get the Contaminates Out
- Implement & Execute a Sustainable Plan

Keep Contaminates Out

- Restrict Access
- Use Tacky Mats and Track Off Mats
- Seal Openings & Cracks
- Unpack equipment outside Data Center

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Get Contaminates Out:

- Regular Cleaning
- Irregular Cleaning
- Construction Cleaning
- Require Trades to Clean up

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Implement a Plan:

- Change Control Protocols
- Ongoing Maintenance
- Ongoing Measurement and Monitoring
- Adjust as Needed

Controlling Contamination

- Questions
- Thank You

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