

FAILURE ANALYSIS METHODOLOGY

**Issue: Solid Tantalum Capacitors are forbidden
for certain uses!!**

**Still, they are used against the rules
in many equipments**

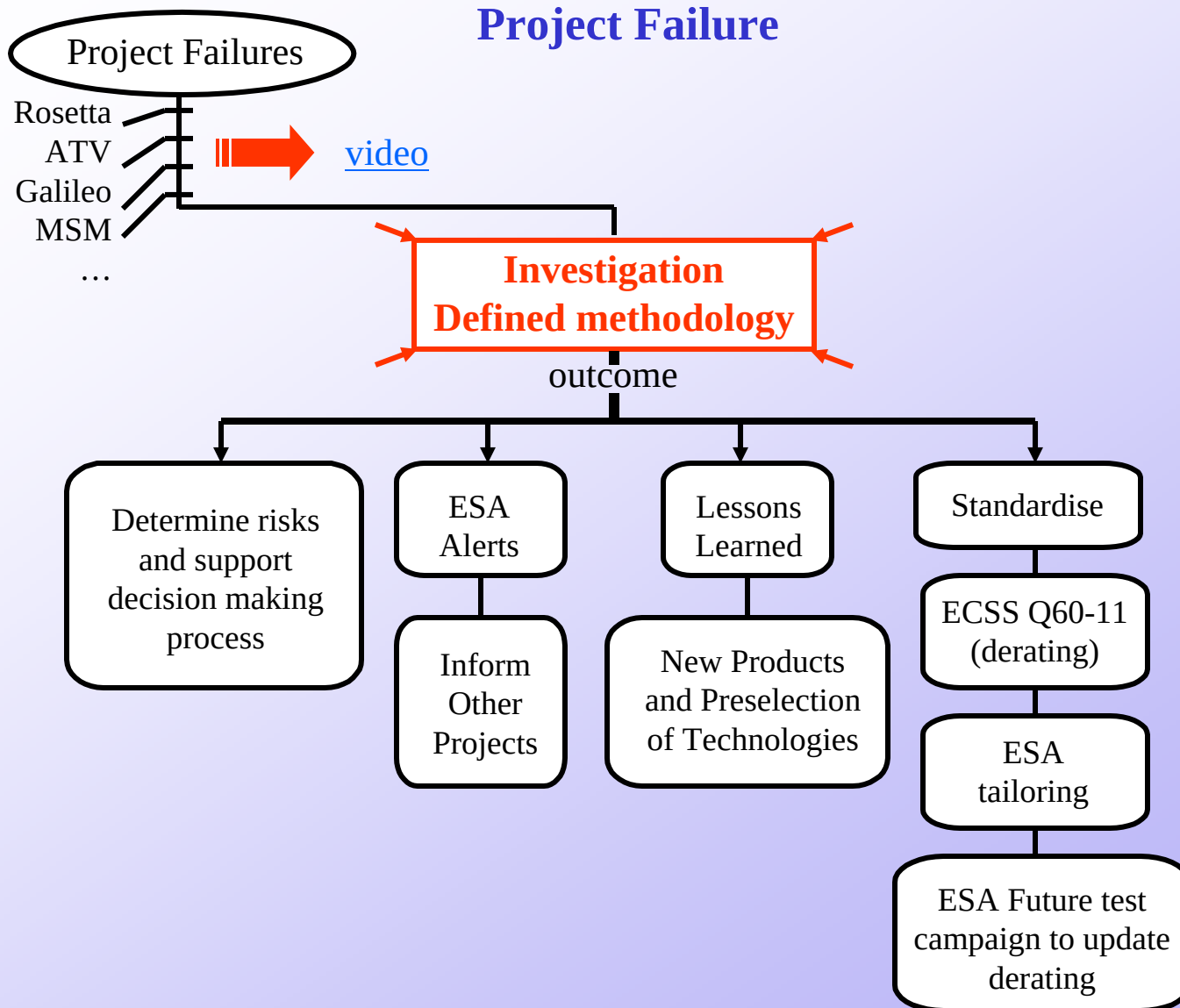
Result: failures on Ground Testing!!

Why Tantalum Capacitor ? : Small, compact and attractive

Possible Utilisation: Filtering, local energy storage

Possible Misuse: Filtering in power supplies
Improper screening test

Project Failure



Investigation Route: Defined Methodology

TEC-EP (Power Laboratory)

Electrical Characteristic for Utilisation

Capacitor as a Component in a Circuit:
Electrical Circuits Engineering

- Exploration of Utilisation Limits
- Definition of Application Domain
- Assessing Performance in Application

TEC-QC (Component Laboratory)

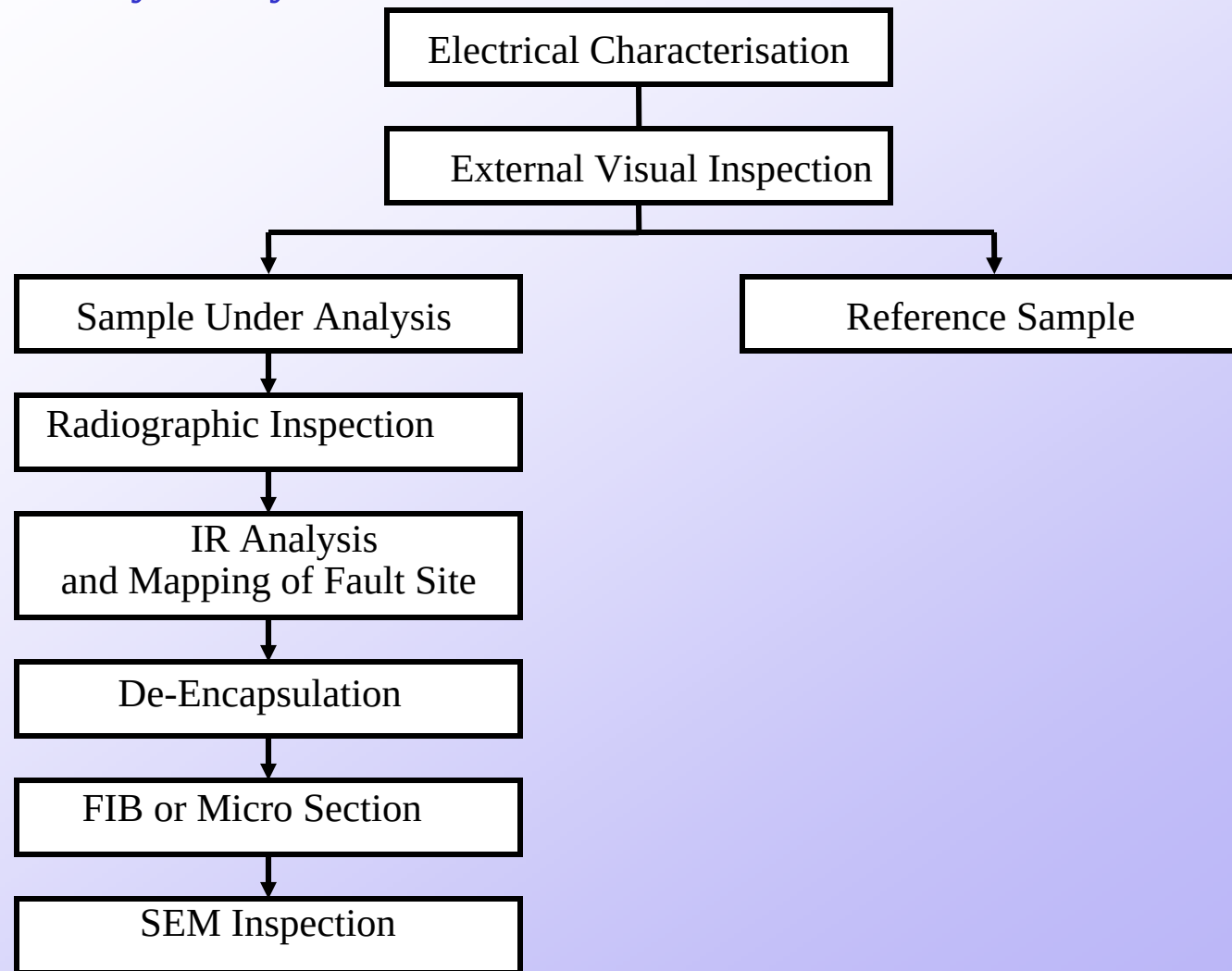
Physical Characteristic

Capacitor as an Electrical Component:
Component Engineering

- Component Level Test
- Physical Testing
- Constructional Analysis

Conclusion and Action Plan

QC Laboratory Analysis



EP Power Laboratory Analysis: Electrical Circuits Tests

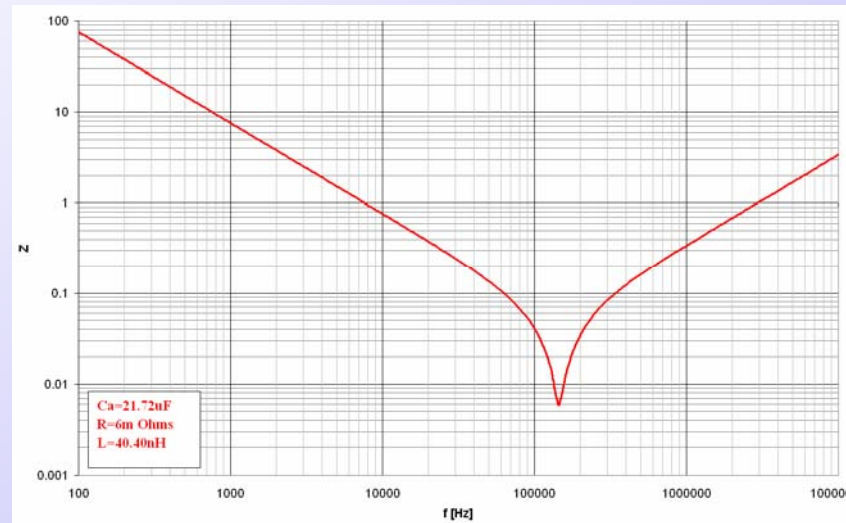
Capacitors tested: Solid tantalum in chip form e.g. 22uF/35V



Methodology of the Study:

1- Initial Signature of the Capacitors & Capacitors Bank

Leakage current and impedance characteristics



EP Power Laboratory Analysis: Electrical Circuits Tests

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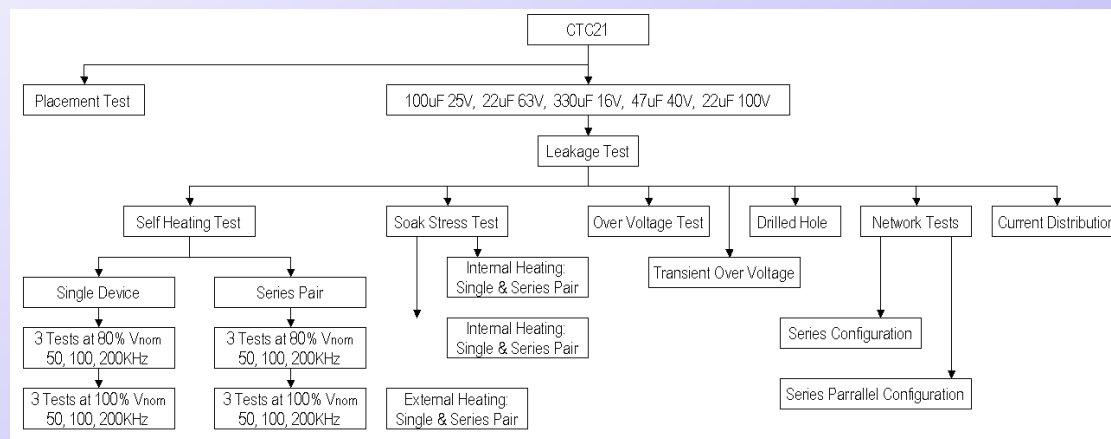
Leakage current and impedance characteristics

2- Utilisation Tests as per foreseen test tree

Converter tests : continuous tests, pulsed tests.

3- Limits Tests as per foreseen test tree

Converter tests until the breakdown occurs.



EP Power Laboratory Analysis: Electrical Circuits Tests

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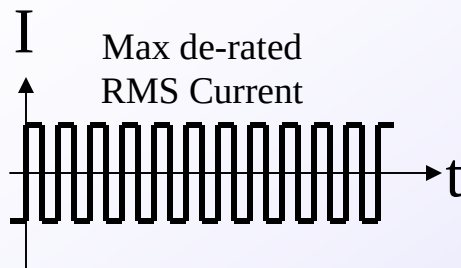
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4- Analysis of Tests Results

Overall conclusions, derivation of application domain,
input to ECSS-Q-60-11 or derating

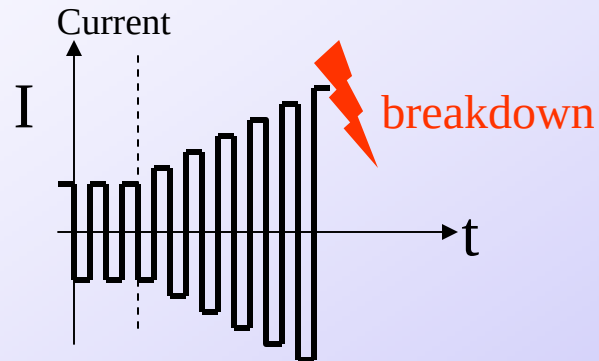
Example of Power Laboratory Tests: Current Tests

Continuous Tests

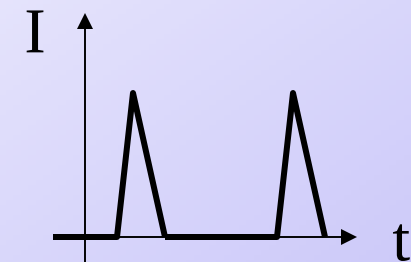


Limits Tests

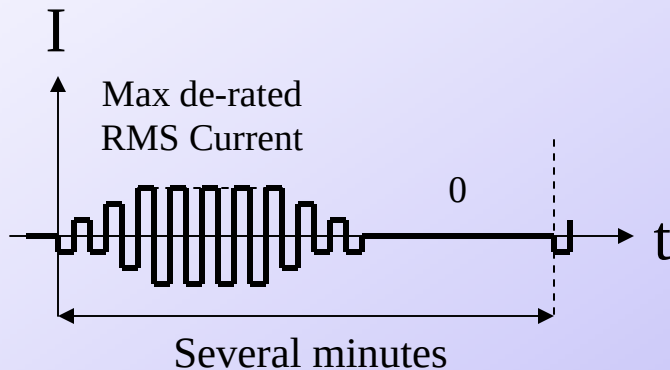
Max de-rated RMS



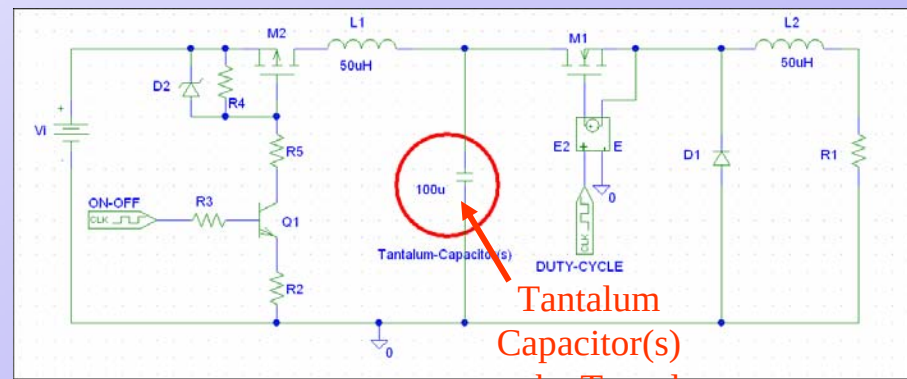
Spike Tests



Pulsed Tests



Dedicated Converter Build to Test the Capacitors



**Tantalum
Capacitor(s)
to be Tested**

The diagram illustrates a 3D space defined by three axes: **Configurations / Uses** (vertical), **Types and Sizes** (horizontal), and **Manufacturers** (depth). The vertical axis has two marked levels: **Parallel** and **Series-Parallel**. A red dotted plane is shown within this space, containing several labeled points: **AVX**, **Firadec**, **CTC21**, **TBJ**, **TPS**, and **TAJ**. Dashed lines connect these points to the axes, indicating their coordinates in this 3D space.