

Multi-Contact

MC

STÄUBLI

Why PV connectors/ cabling are systematically relevant

Small components. Big impact.

PV Magazine Webinar – June 5th 2018 – Best Practices from Industry Leaders



Stäubli Group – three activities, for divisions



125 years experience



5000 employees in 29 countries



200 GW connected

Connectors

Fluid Connectors
Electrical Connectors



Robotics



Textile



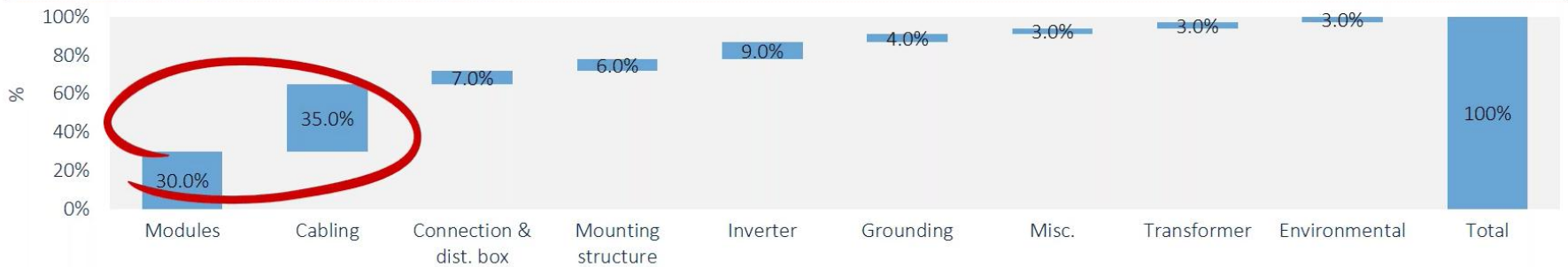
Formerly: **Multi-Contact**



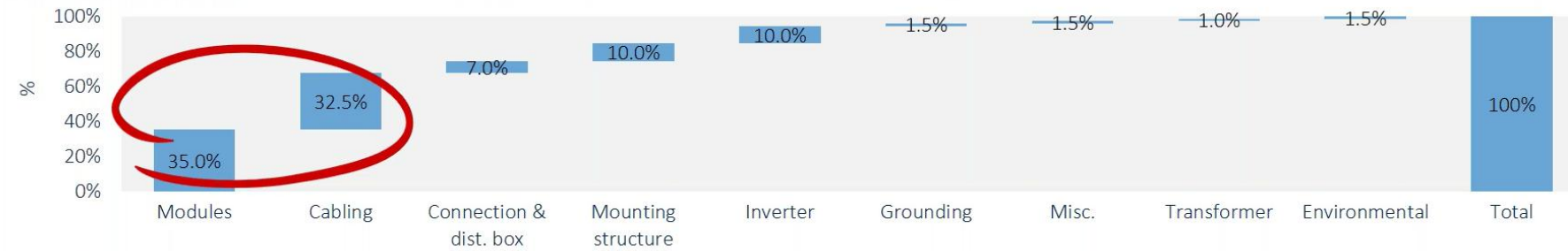
Failures and their financial impact

Failure Patterns Exist Among Solar Assets

Module and cable defects were prominent in 2016...



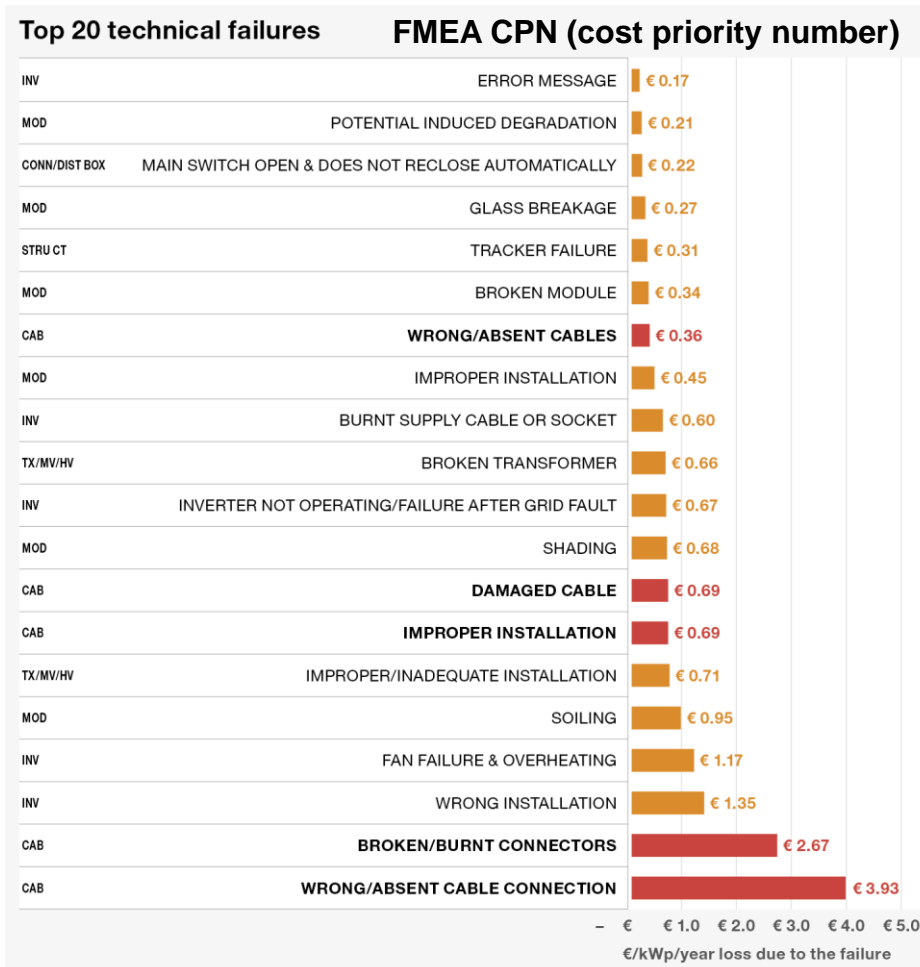
...and continued in 2017



Source: GTM Research, EC

Failures and their financial impact

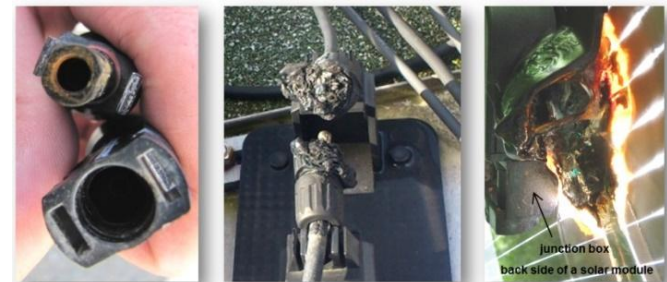
Solar Bankability project by European Commission's Horizon 2020
 Common practice for risk assessment to reduce risks for investments in PV projects



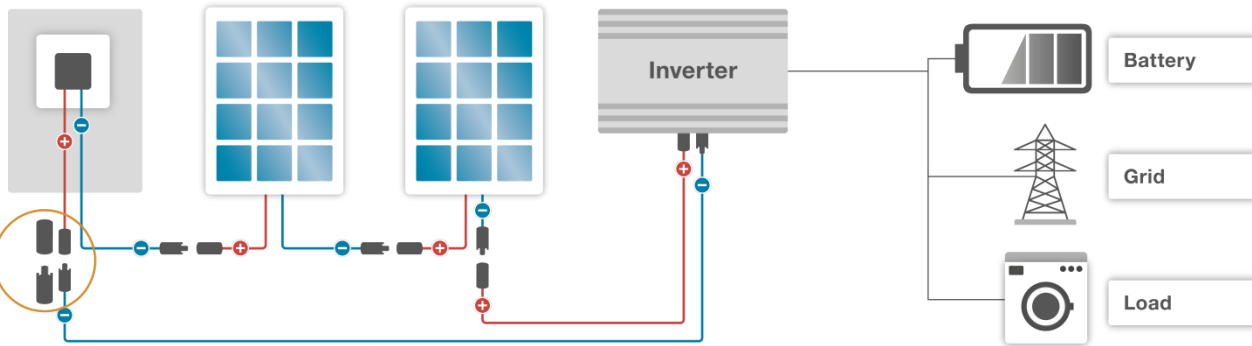
- Cost Priority Number (CPN) = **cost-based** Failure Mode and Effects Analysis
- Indication** of the **economic risk** (in average) of a specific technical risk
- Method was applied to a database of **over one million documented failure claims** (empirical and statistical)
- Technical failures/ risks and their economic impact** due to downtime and/or power loss & repair/substitution costs

Findings

- ➔ **Risk mitigation measures: minimize LCOE** by optimizing **balance** between **CAPEX** and **OPEX**
- ➔ **Connectors/ cabling with huge financial impact** (€/kWp/year loss due to the failure)

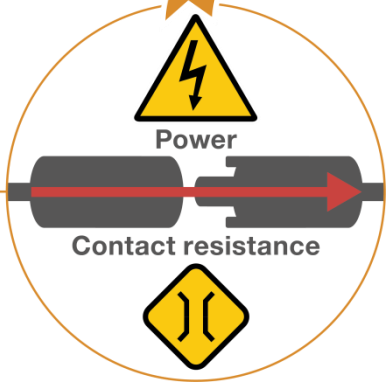
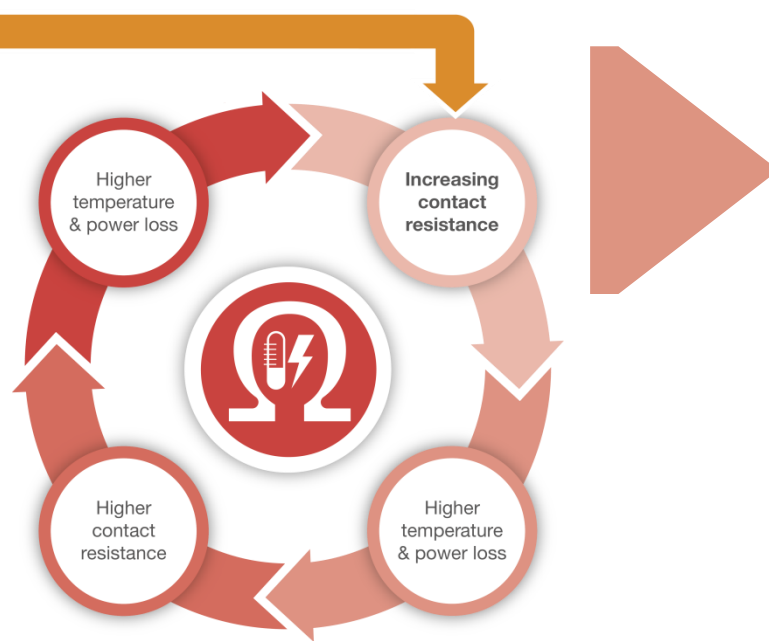


Why connectors can have a big impact?



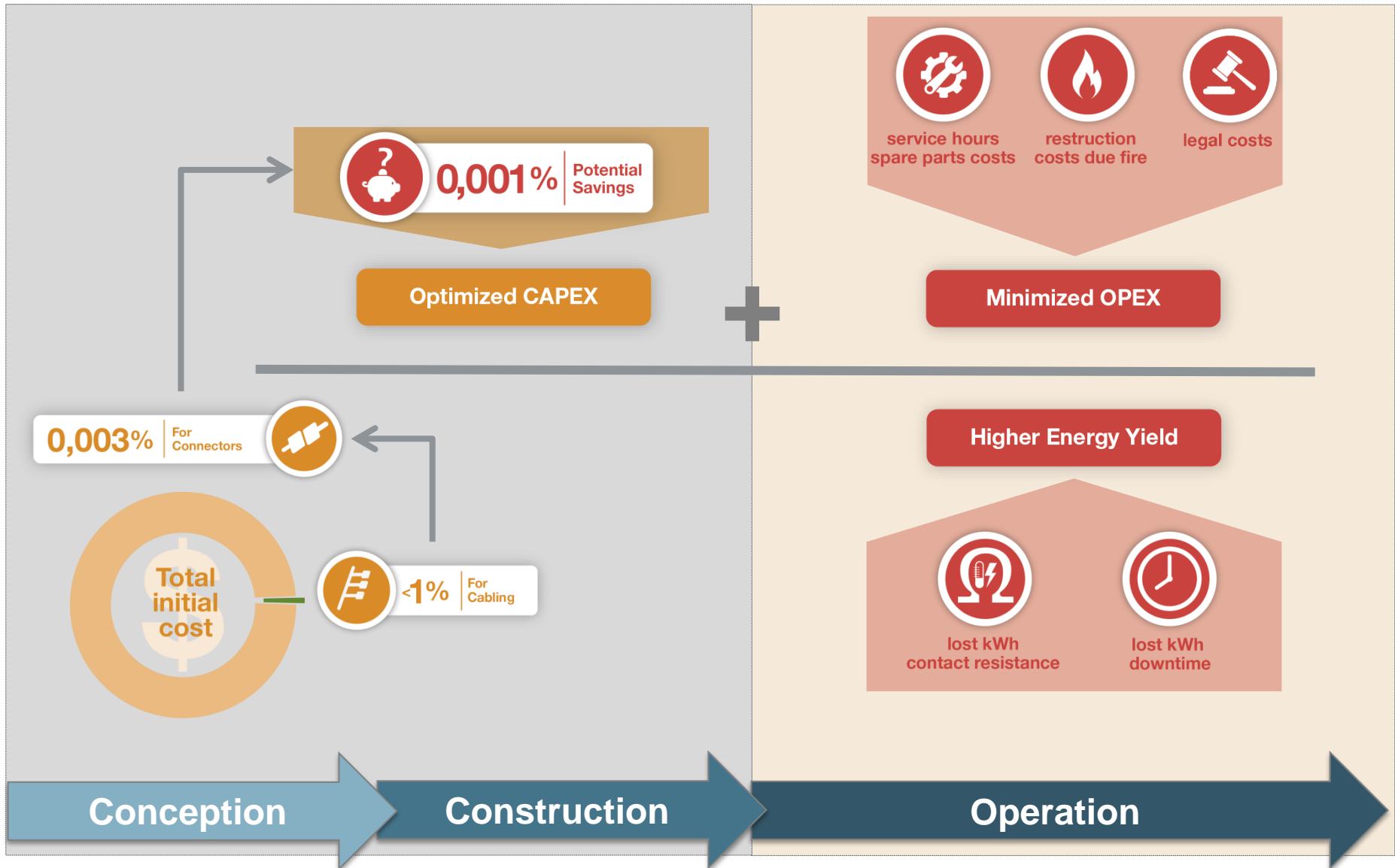
Consequences:

- High risk for (partial) connector failures
- Performance losses, higher PPM-rates and downtimes of modules, strings or plants
- High service/maintenance and spare part costs for repairing
- Hotspots and fire in PV system and reconstruction costs
- High costs for legal disputes due to undefined liabilities



Key for long-term reliability and efficiency → Constant low contact resistance

Impact on LCOE (Levelized Cost of Electricity)

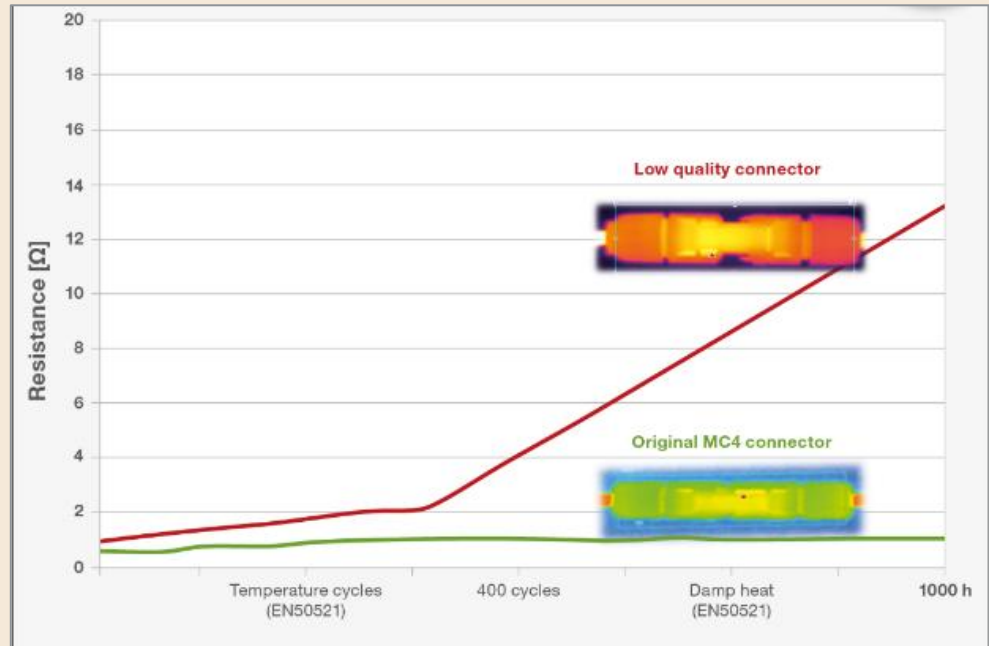


Connectors/ cabling – 3 main risk sources

Components



1. Quality vs. Low-end Product



Conception

Construction

Operation

Connectors/ cabling – 3 main risk sources

Components

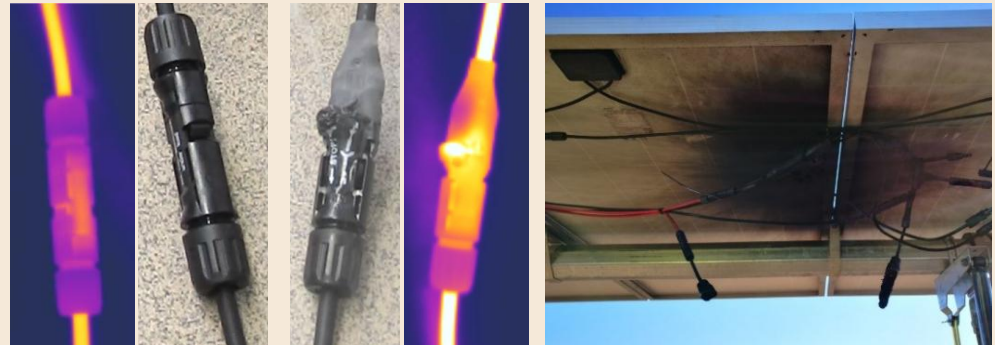
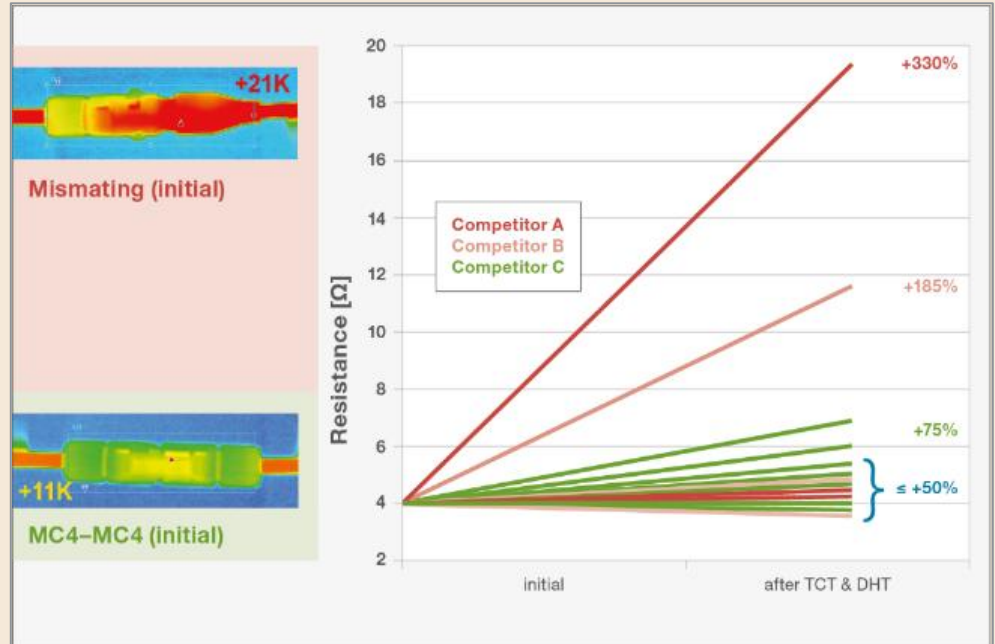


1. Quality vs. Low-end Product

Installation



2. Cross-Connection



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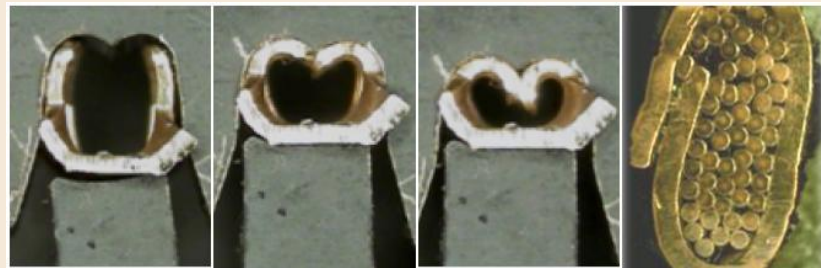
Installation



2. Cross-Connection



3. Defective Installation/Crimping



Conception

Construction

Operation

FAST MOVING TECHNOLOGY

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