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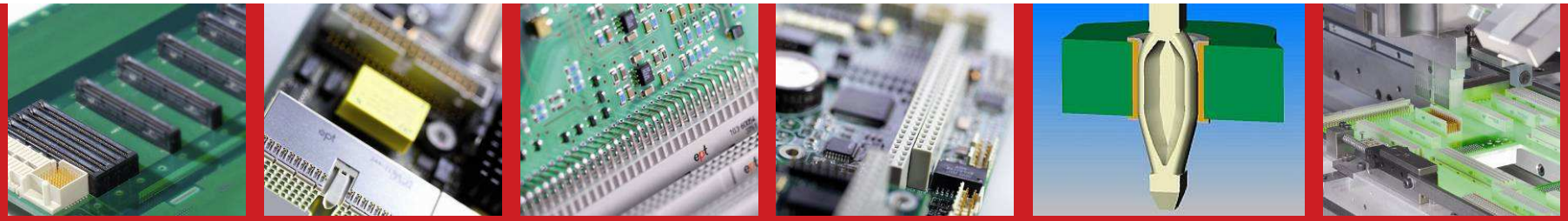


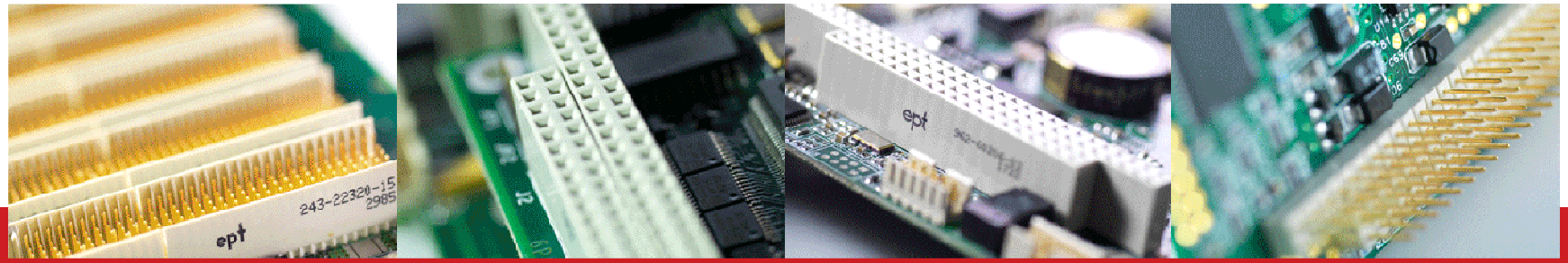
Press-Fit Technology

Reliable electrical and mechanical connection

04.2010
Version EPT01-2-e

Agenda

- Technology
- Advantages
- Pillars of the Press-Fit Technology
- Quality



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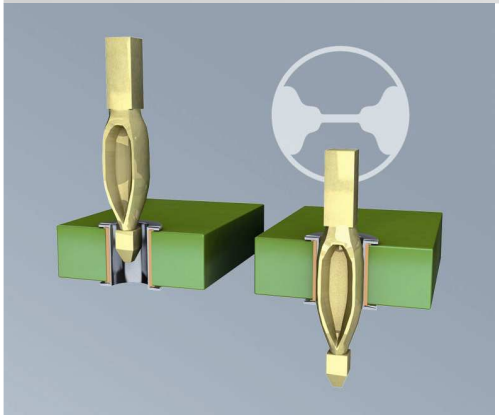
Technology



Press-Fit Technology:

- **solder free electro-mechanical** connection
- force fitting an oversized **contact pin** into the plated through hole of a printed circuit board (PCB)
- **definied and controlled** insertion forces
- a **gas tight** connection is made between the pin and the plated through hole
- press-fit technology belongs to the **most reliable electrical connection** technology.
- **IEC 352-5**

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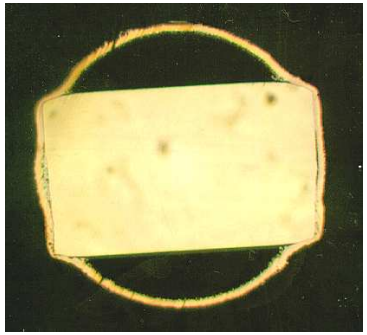
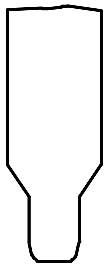
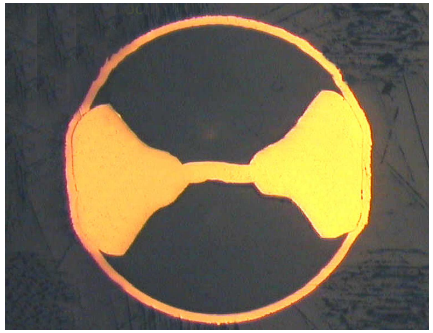
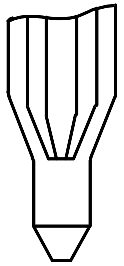
Flexible / Solid Press-Fit Zone





massiv





flexibel

Advantages of the flexible press-fit zone:

- deformation of the flexible press-fit section prevents excessive deformation of the copper barrel of the PCB
- greater plated through hole tolerances can specified with flexible press-fit pins
- insertion forces are lower with flexible pins
- multiple press in cycle, for repair, are possible with flexible press-fit sections

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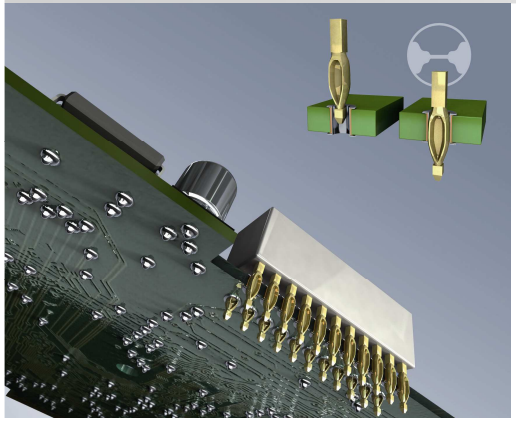
Advantages



- **No thermal stress** on the PCB
- **No fumes, gases, or cleaning fluids** which may reduce the contact reliability of the connector
- **No cold solder joints**
- No shorts as a result of solder bridging
- Superior **mechanical / electrical connection**
- Fast, **cost effective** and **process stable**, assembly of the connector onto the PCB
- Complete **repairability**
- **Long tail connector pins** can be applied to the PCB without the difficulty in lead soldering
- **High reliability**

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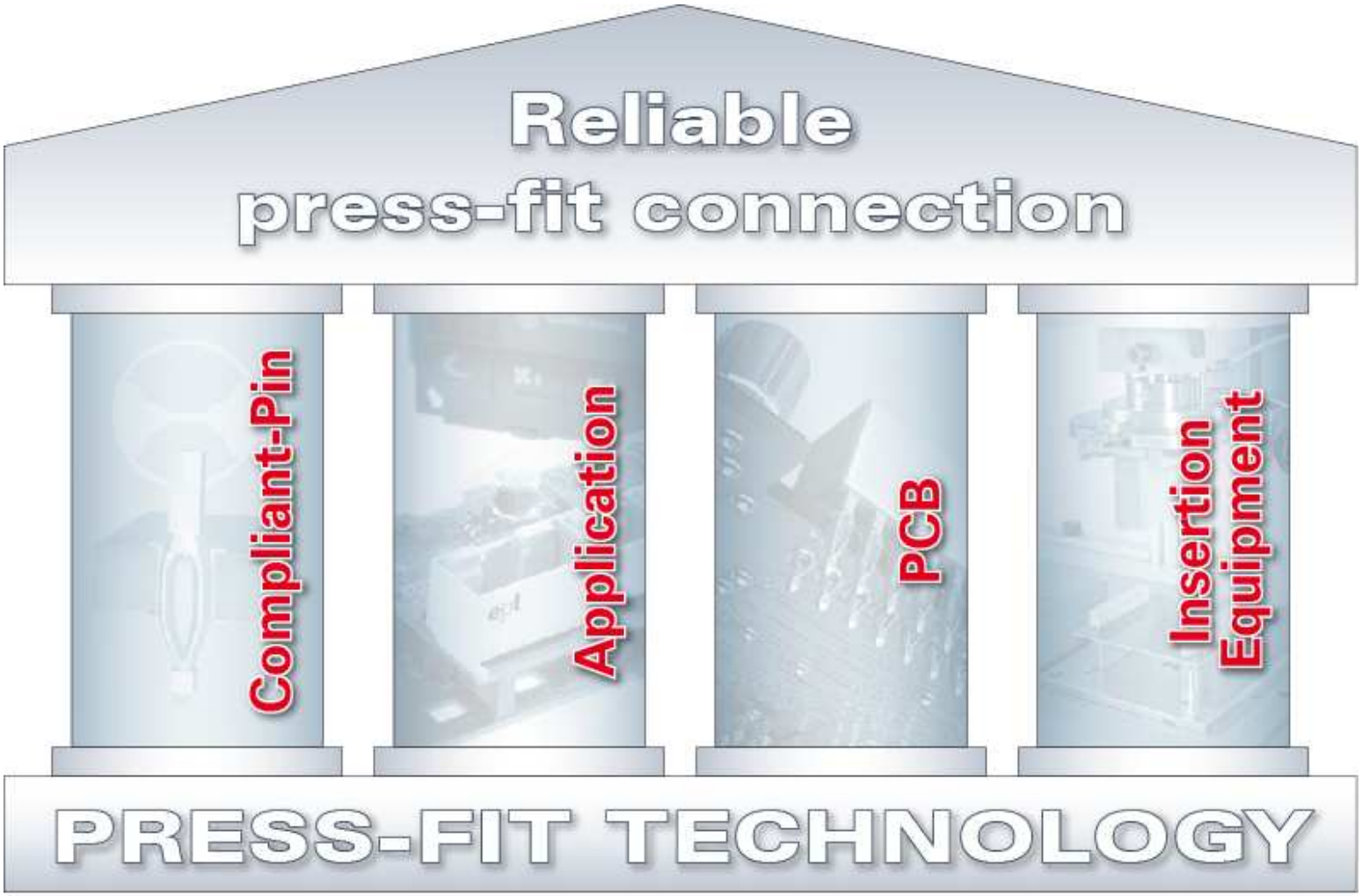
Pillars of the Press-Fit Technology



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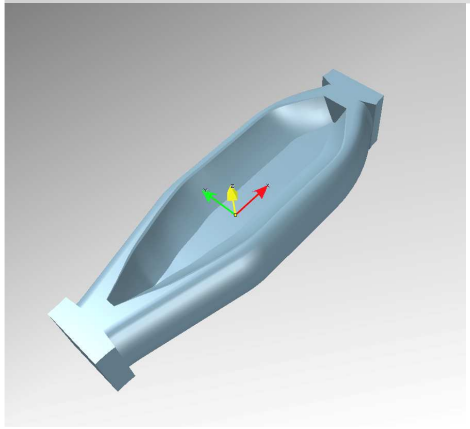
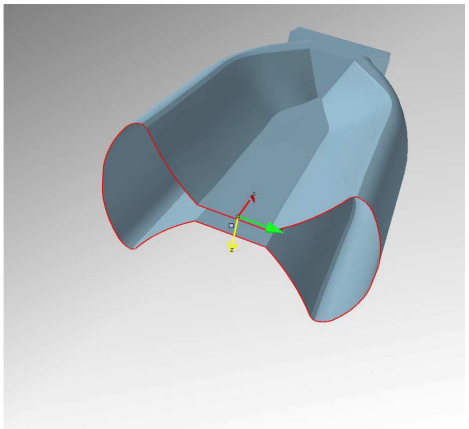
Compliant-Pin - Parameters





- Design
- Dimension
- Material
- Surface / Plating

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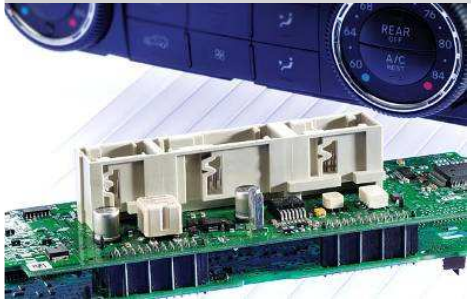
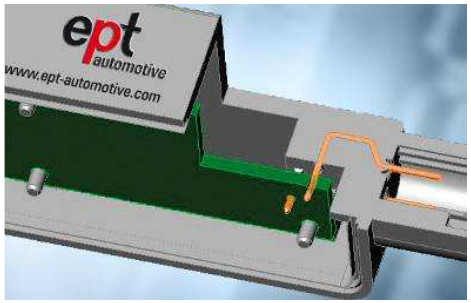
Application Characteritics





- **Applications** of press-fit technology (automotive, telecom, etc.)
- **Appliances** (Backplane-daughtercard, pinheader for cable connection, board-stack-solution, etc.)
- **Design**
- **Material**
- **Process-Integration**

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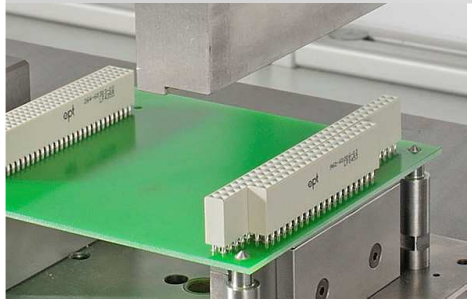
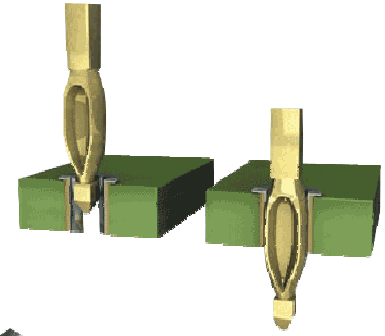
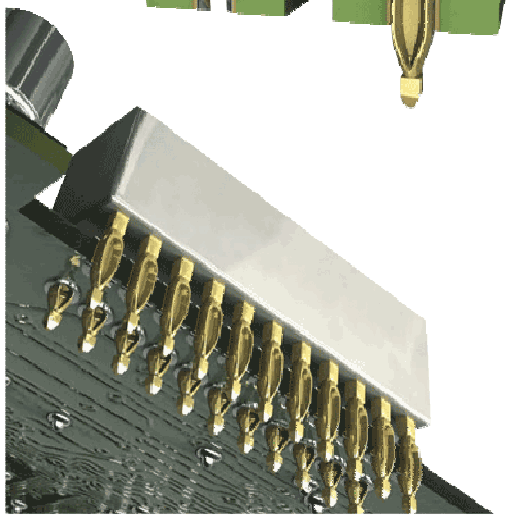
PCB Characteristics







- **Base material**
- **Hole-assembly**
  (drilling diameter, Cu-Layer, surface)
- **Position-Tolerance**
- **Lamination and Layer-Qty.**
- **PCB Thickness**
- **Surfaces to support the press-in process**

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Characteristics Insertion-Equipment

- Positioning of **assembly force** to components/contacts
- **Prevention of damages** of the PCB, contacts and components
- **Repeatability**
- **Cycletime**
- **Process controlled**
- **Integration** into manufacturing process

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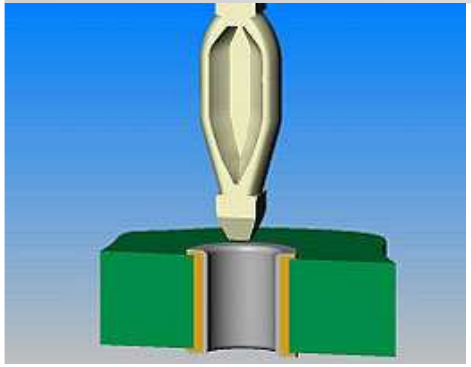
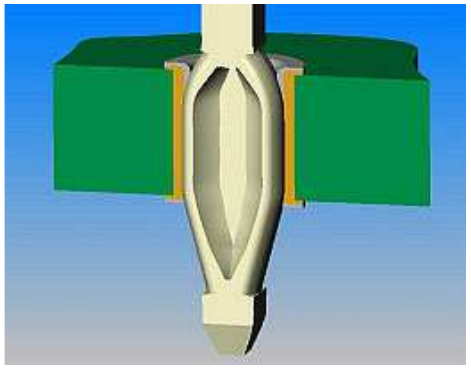
Quality Parameters





Contact resistance (<1mΩ / millivolt-method)

Retention force

Insertion force

Prevention of tin chips

Minor pull down effect

Minor hole deformation

Obliquely positioned (pins)

Repairable

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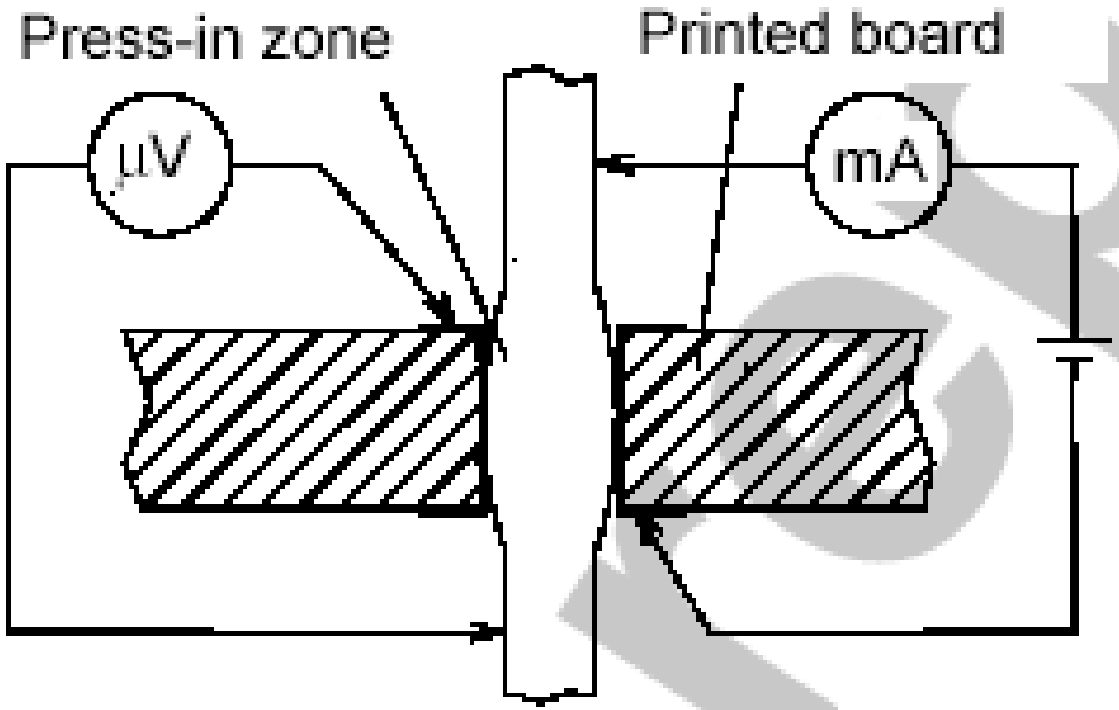
Contact Restistance

Measurable Contact Restistance



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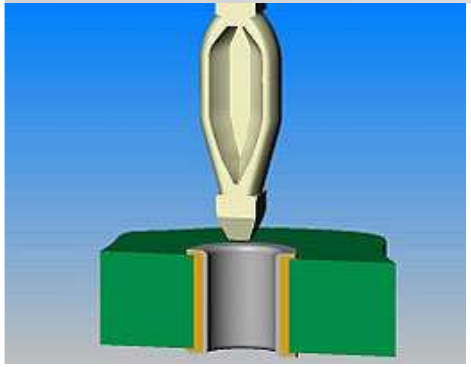
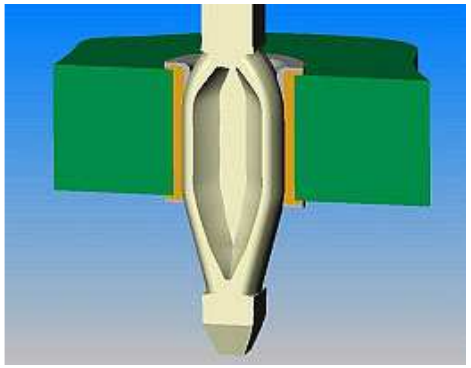
Qualitätsmerkmale





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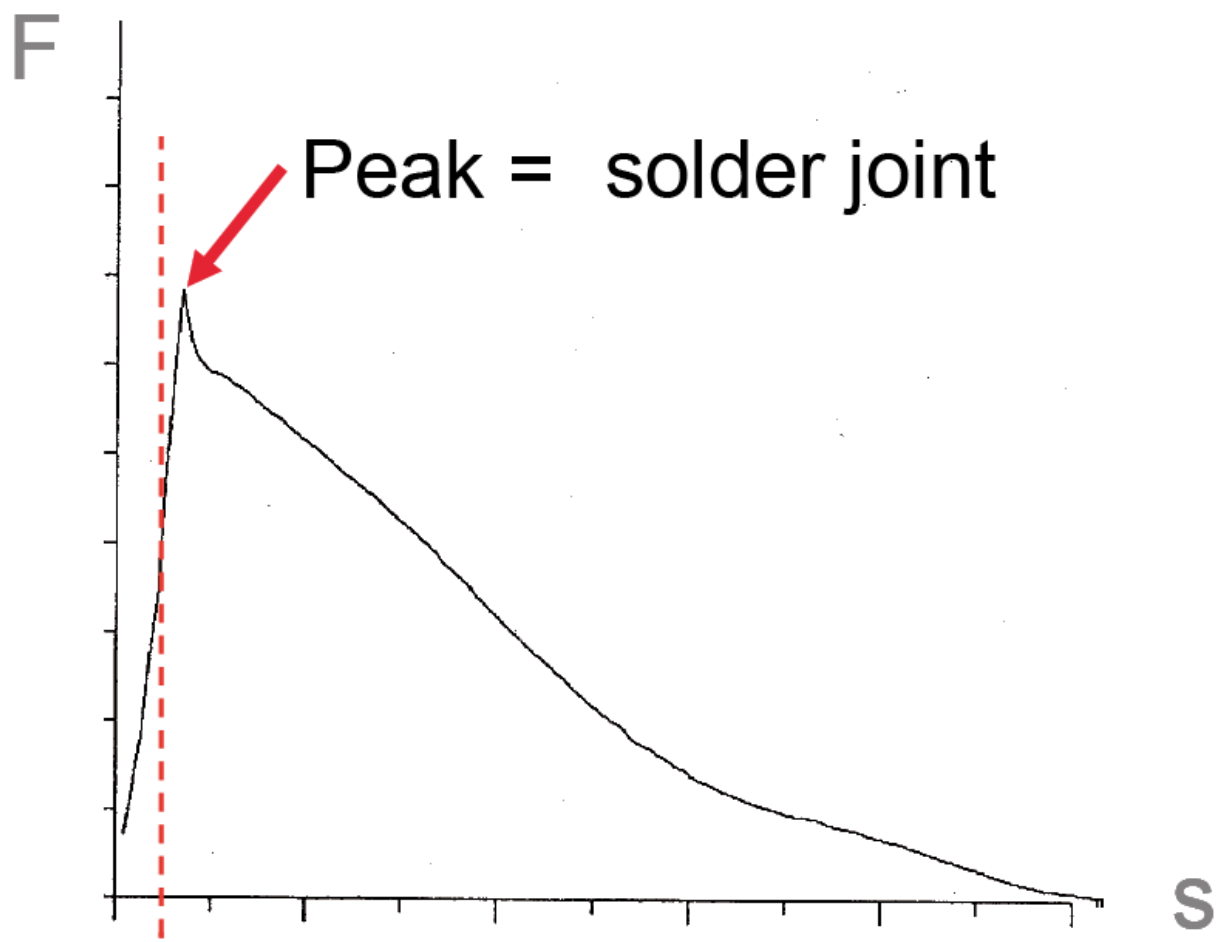
Retention Force (Peak)



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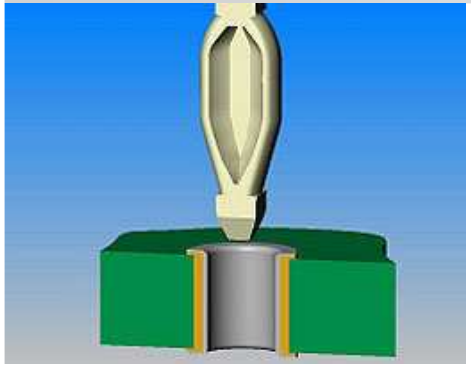

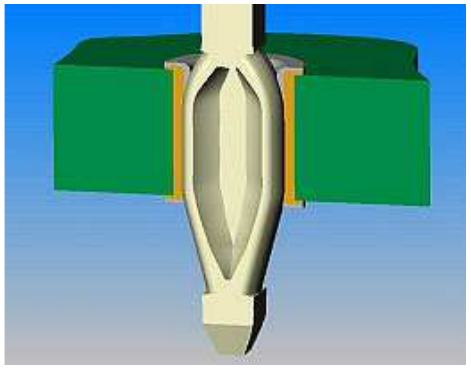

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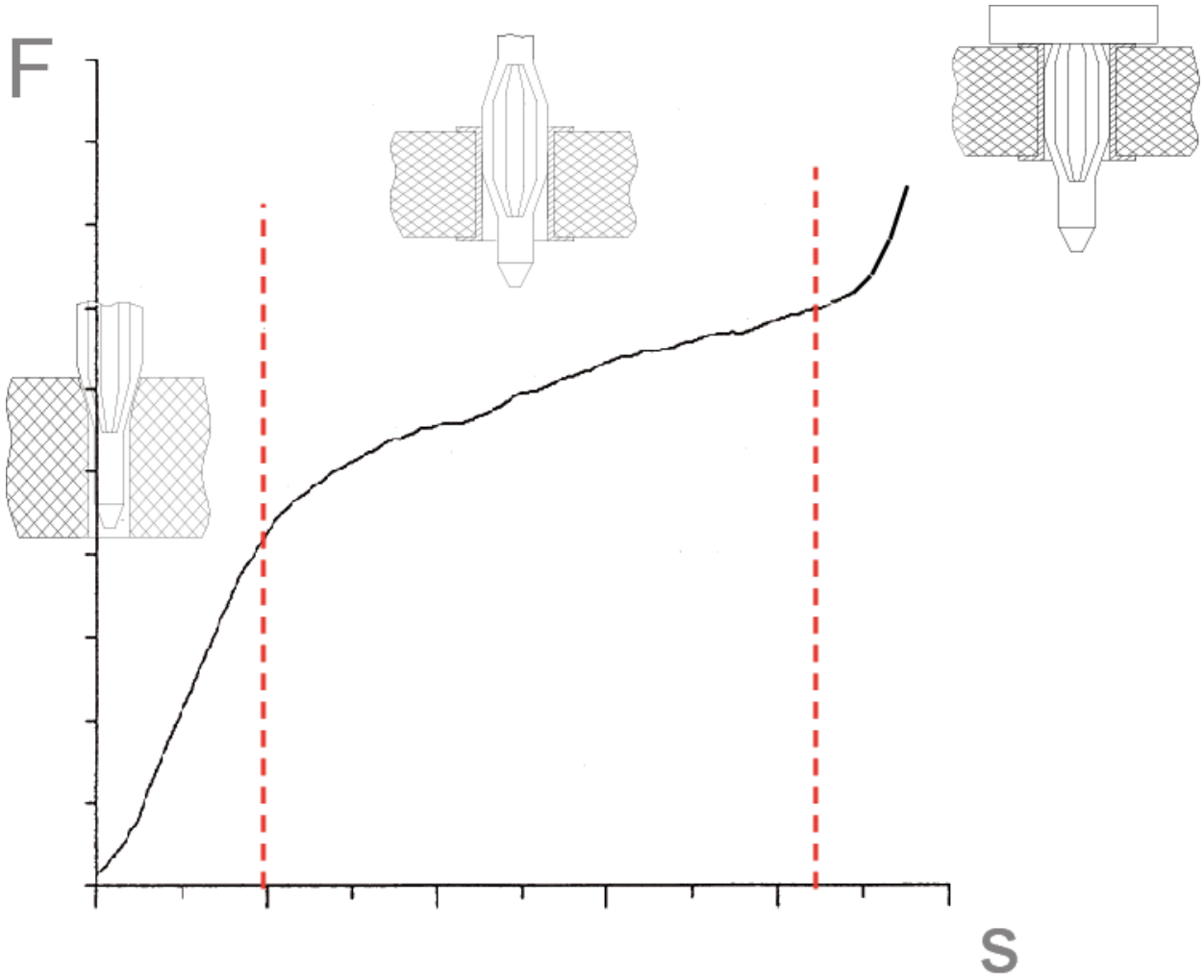
Insertion Force



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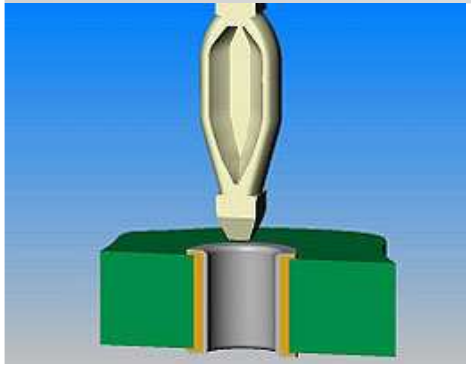

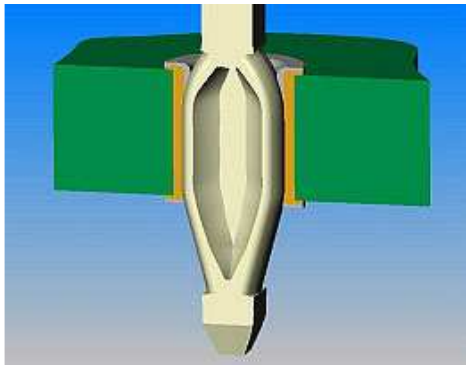

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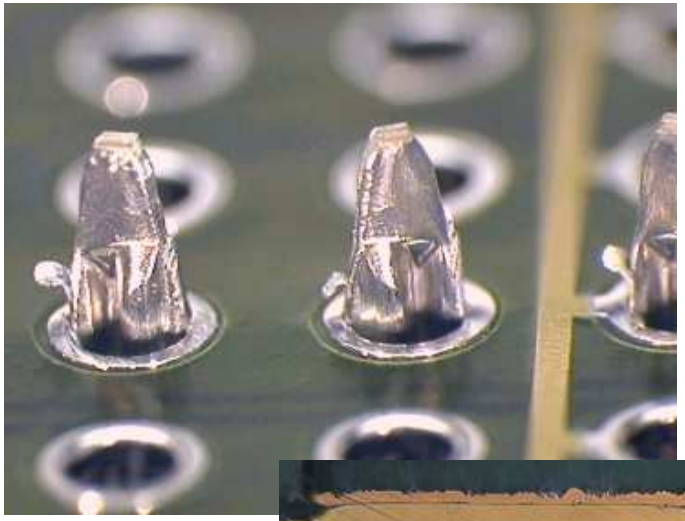

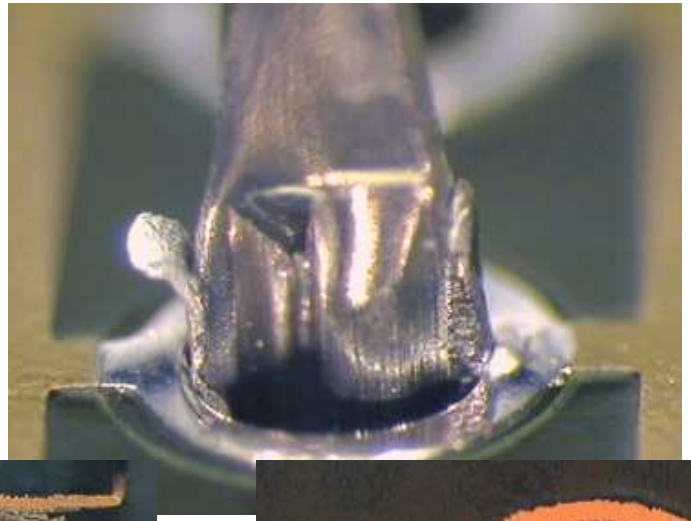

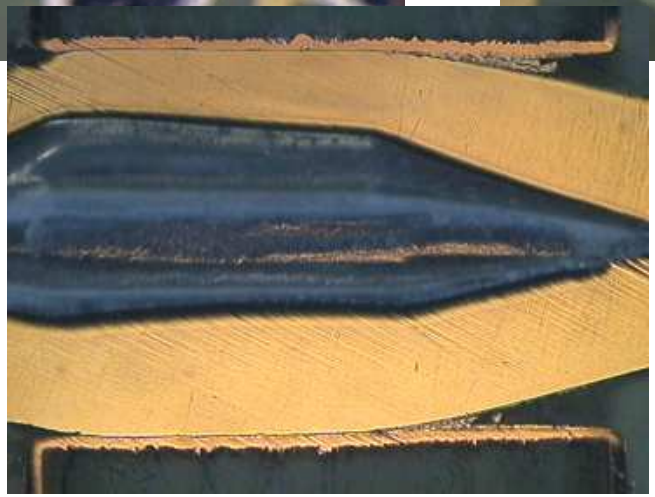

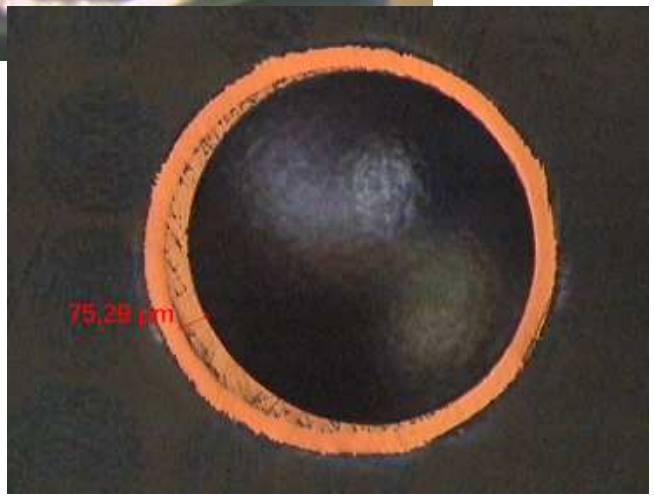

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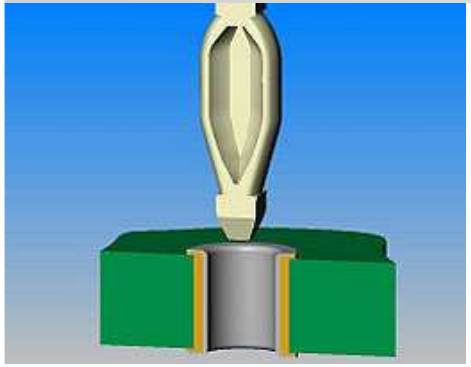

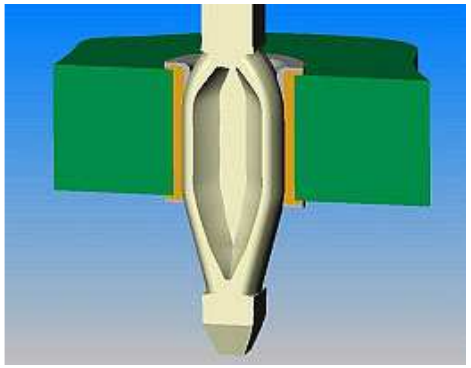

Contact resistance (<1mΩ / millivolt-method)

Retention force

Insertion force

Prevention of tin chips

Minor pull down effect

Minor hole deformation

Obliquely positioned (pins)

Repairable

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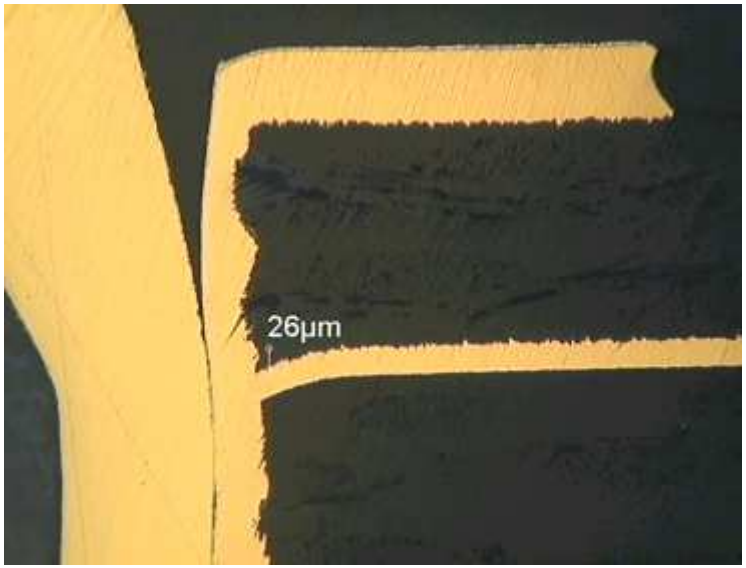
Pull down Effect

Minor pull down effect



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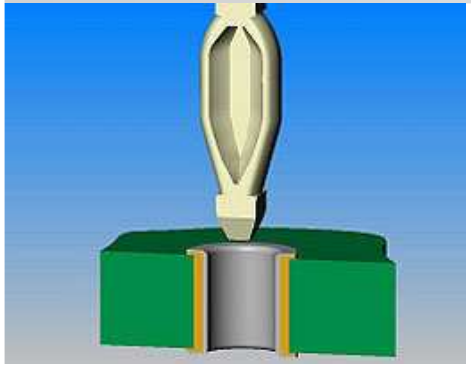

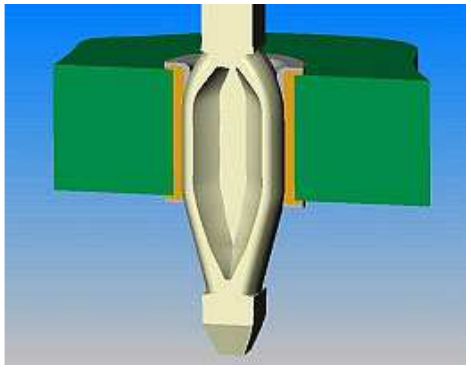

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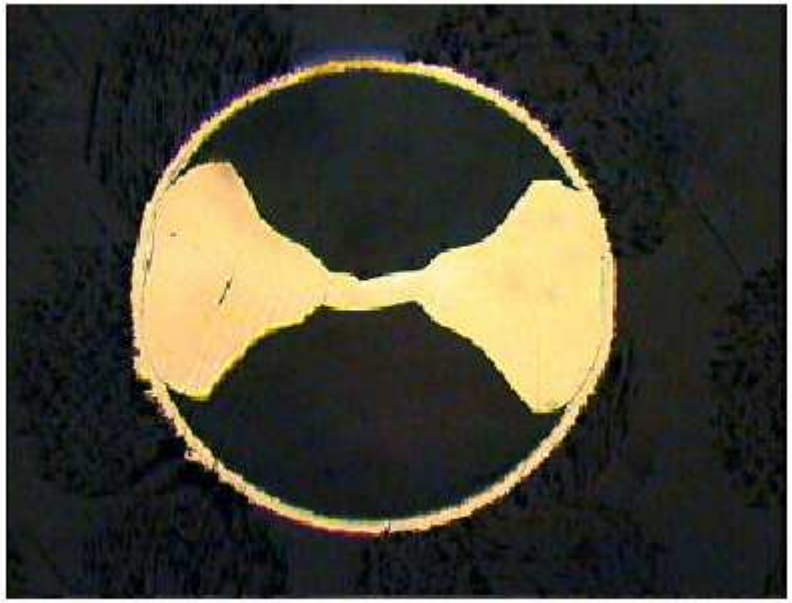
Hole Deformation

Minor hole deformation

t=0,8mm

min. hole diameter



max. hole diameter

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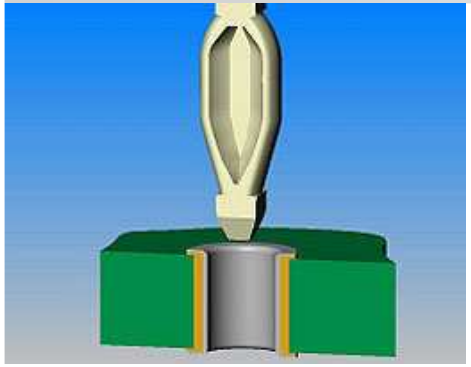

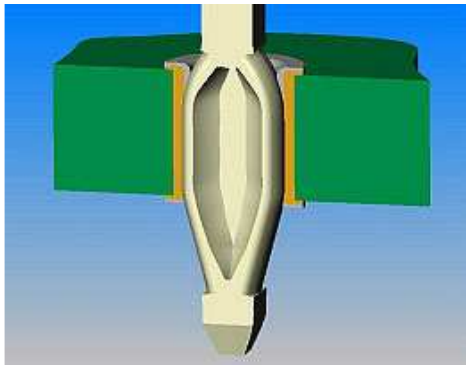

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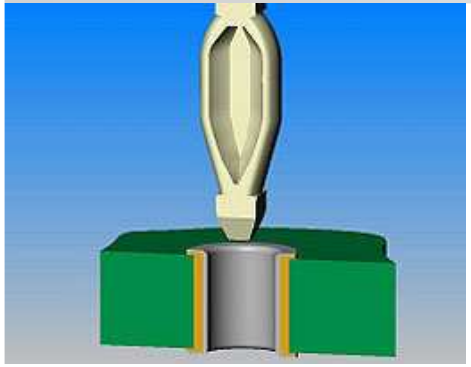

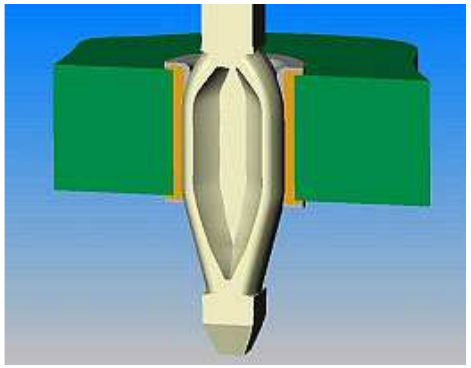

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Amperage Capacity

- Current is not the problem, only the **resulting heat** is the cause of issue.
- The **press-fit pin is not** the critical element.
- The Connection is generally limited by the **glass-point of the PCB**

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Hightemperature Tests

- Reliable press-fit connections are possible in environments of **up to 150℃**
- **Standard Base materials** of contacts are usable
- PCB‘s with an **aligned glass-point (TG)** must be used
- Even **at 150℃** the retention force of the press-fit component does not vary very much when compared to ambient room temperature

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Reliability

- **Vibration:**
  Such a tests, just with pins are useless, because there is almost no mass which will cause a force at acceleration. Such test are always performed in context with a certain application. Hence there is no standard reliability statement possible.
- **Retention force after temperature cycling:**
  The criteria for the retention force are met even after more than 1.500 cycles between -40℃ and +150℃ (PCB´s with proper TG)
- **Experience from real applications:**
  ept sold in the last 10 years > 10 billion contacts in press-fit technology to the high demanding automotive industry, as of today ept has no reported field failure of the press-fit zone from customers.

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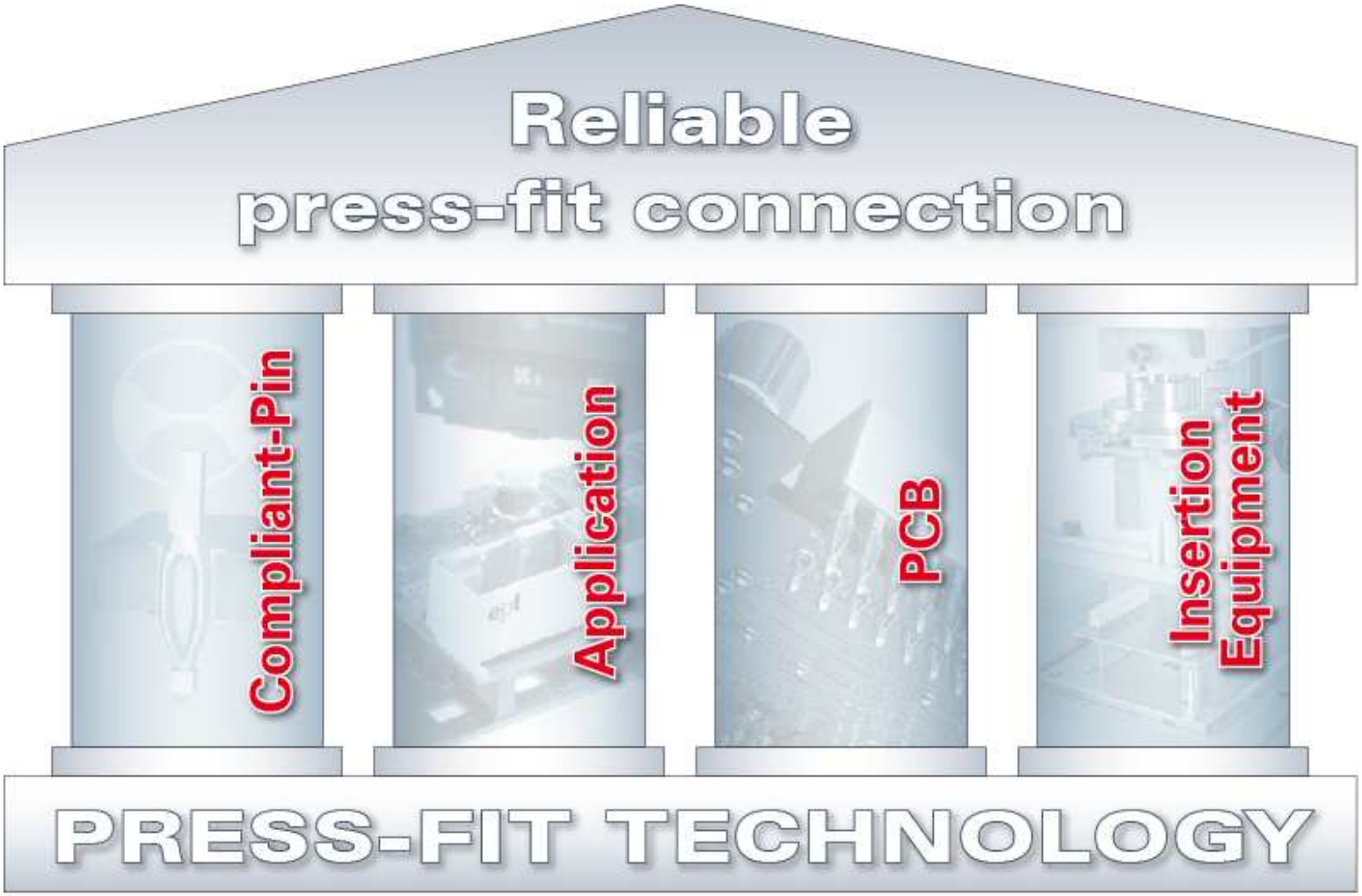
Säulen der Einpresstechnik



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