

All that glitters ain't gold.

... But not everything that's gold glitters either.

Contact surfaces in the mating area



1

• Why is the contact surface important?

2

• What contact surfaces does ept offer?

3

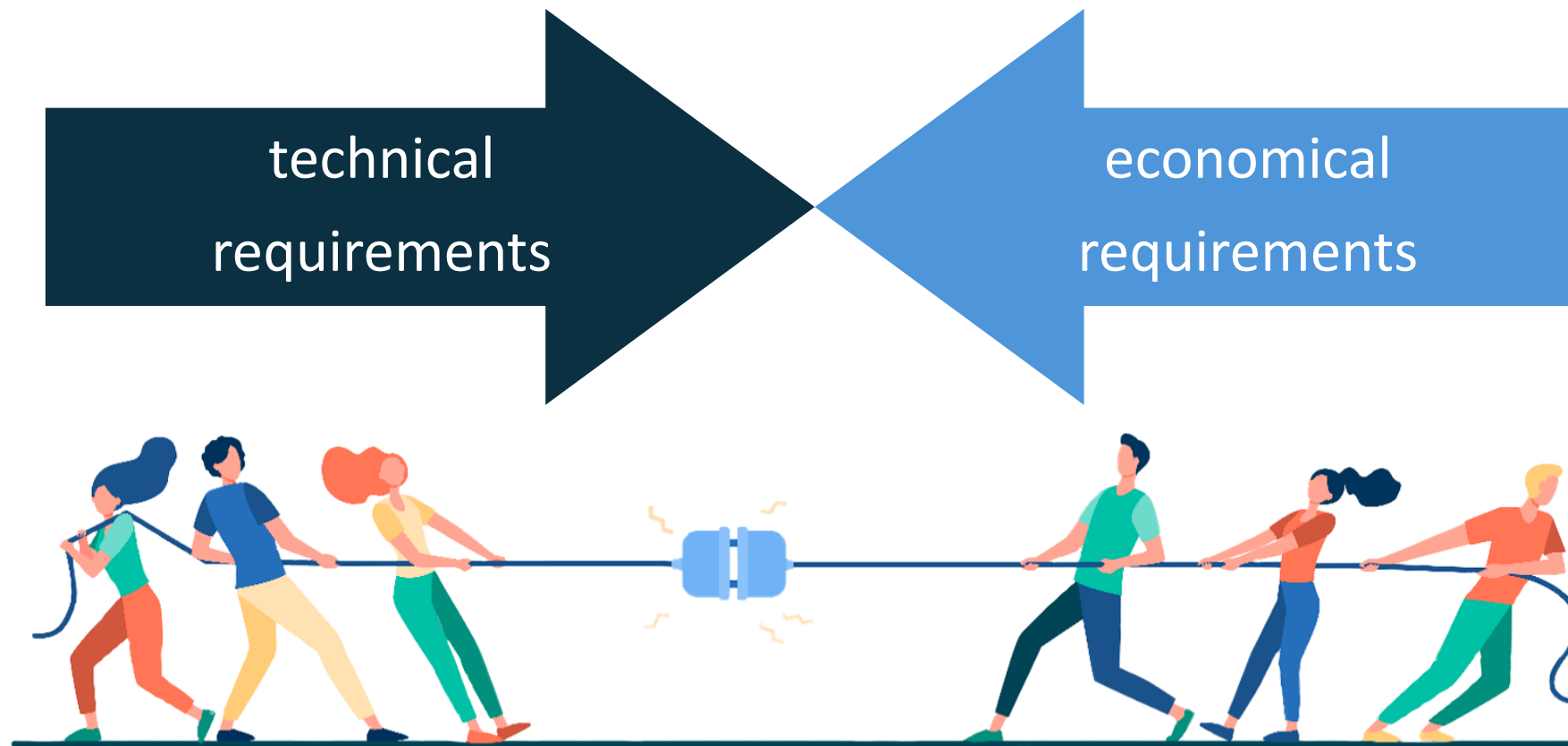
• How does ept manufacture its products?

4

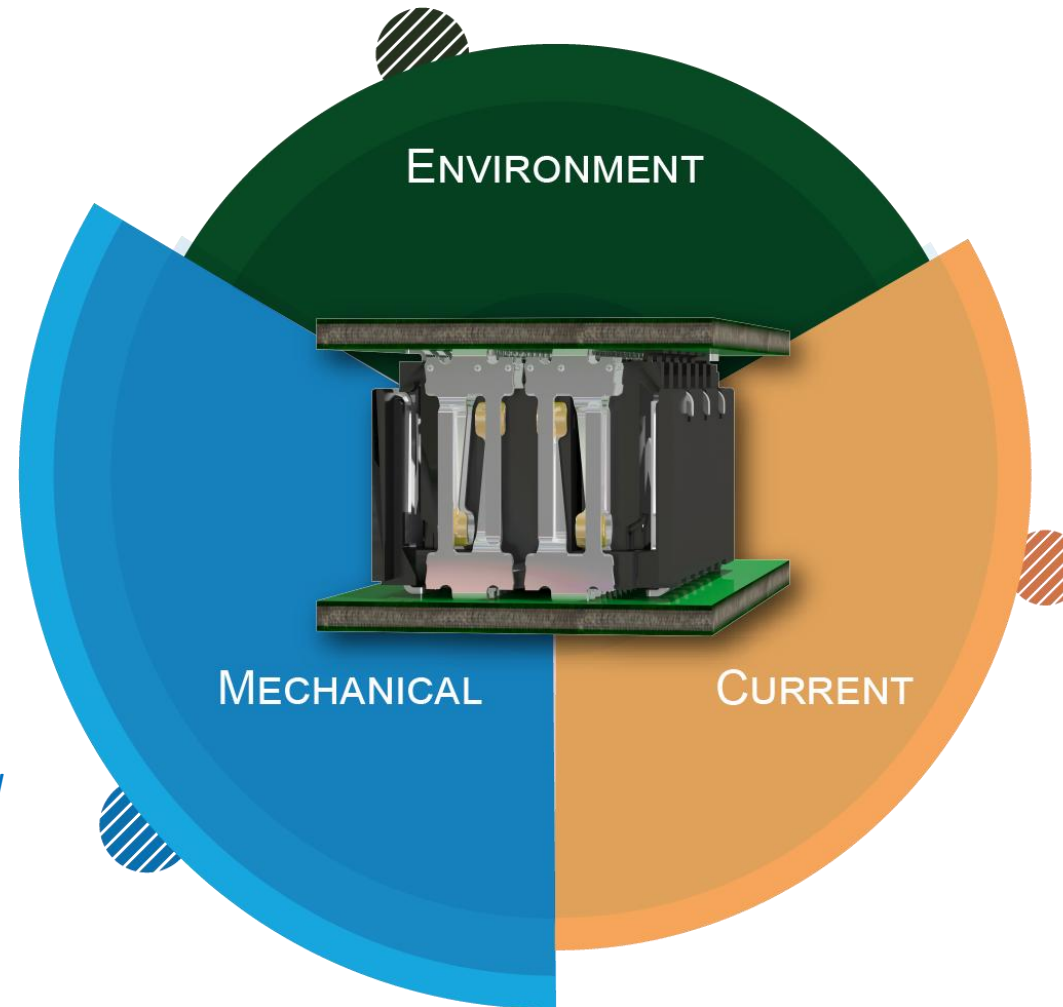
• What are the advantages for customers?

Customer requirements for connectors

What must a connector be able to do and at what price?



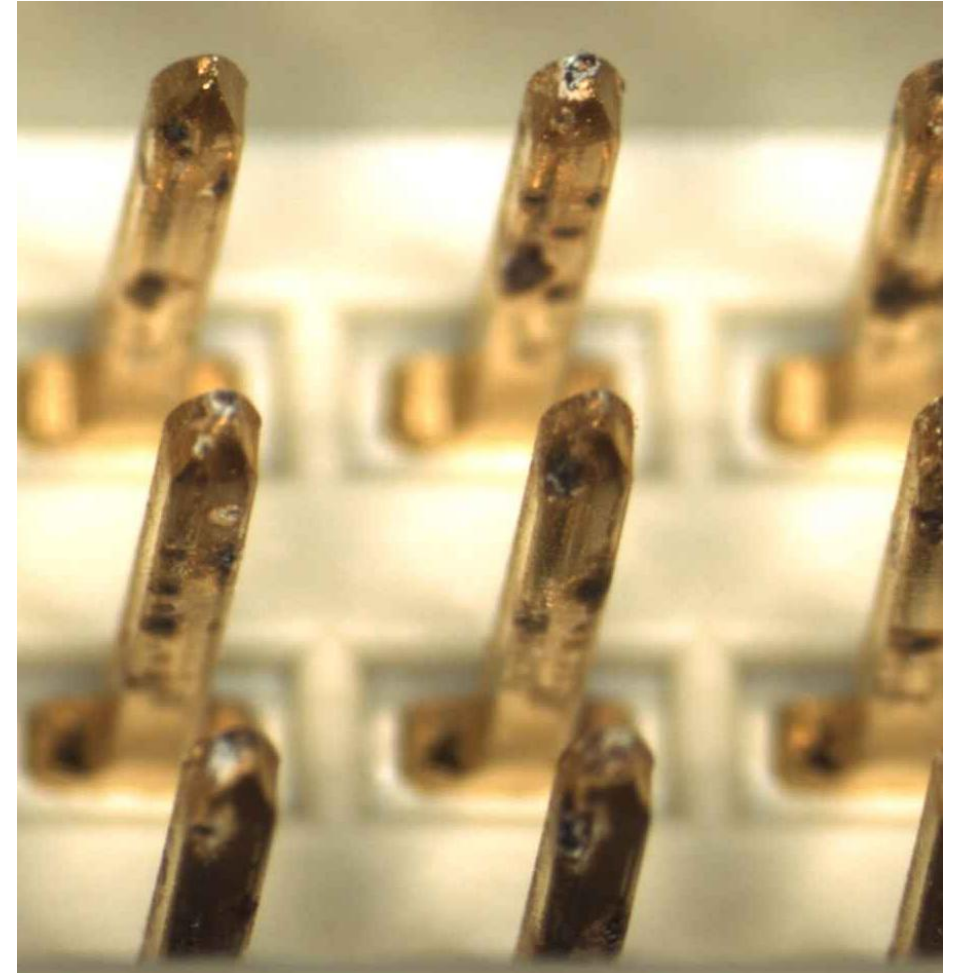
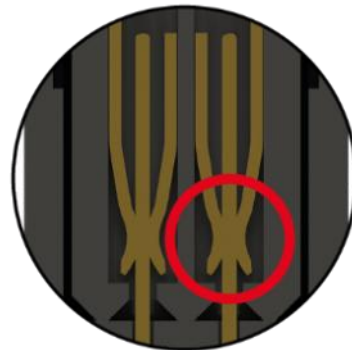
Operating conditions



Ask for our Rugged-Webinar!

Defect or misuse?

- Wear after mating cycles and corrosive gas test
- Pores in the precious metal top layer enable / promote corrosion

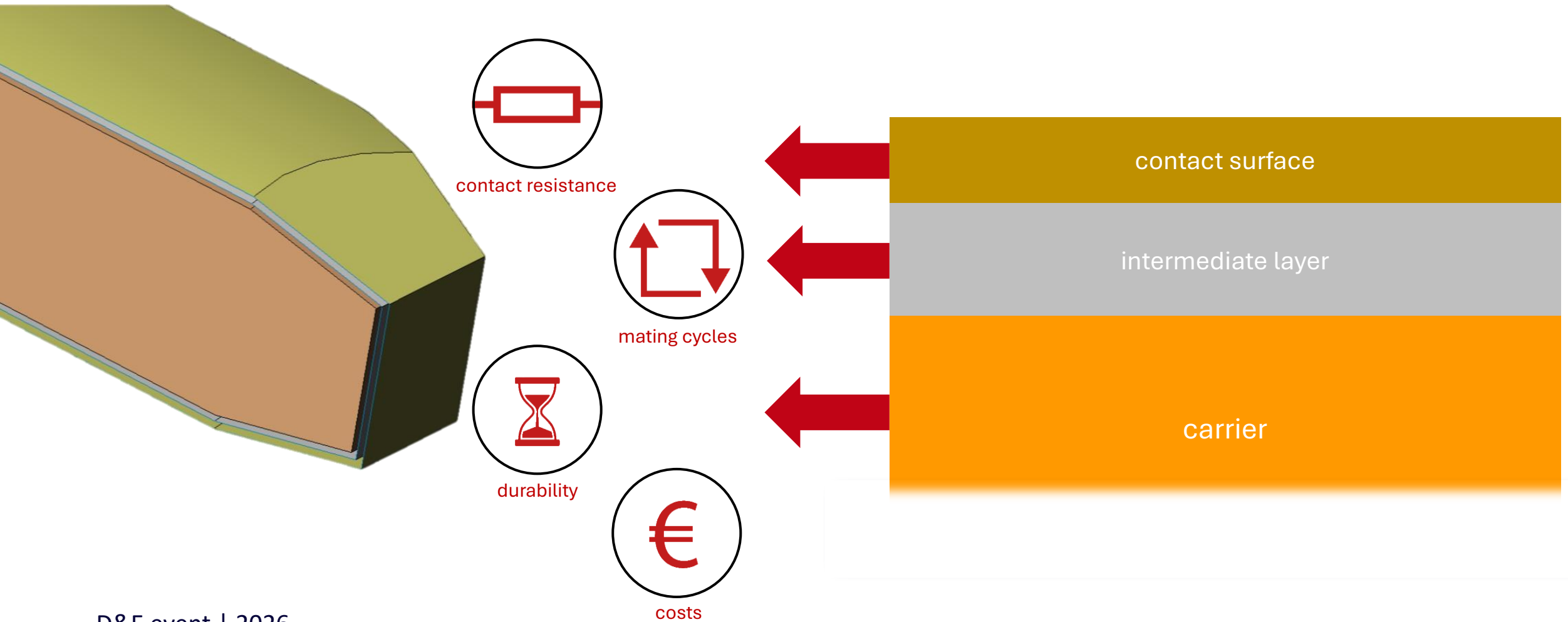


Customer requirements for connectors

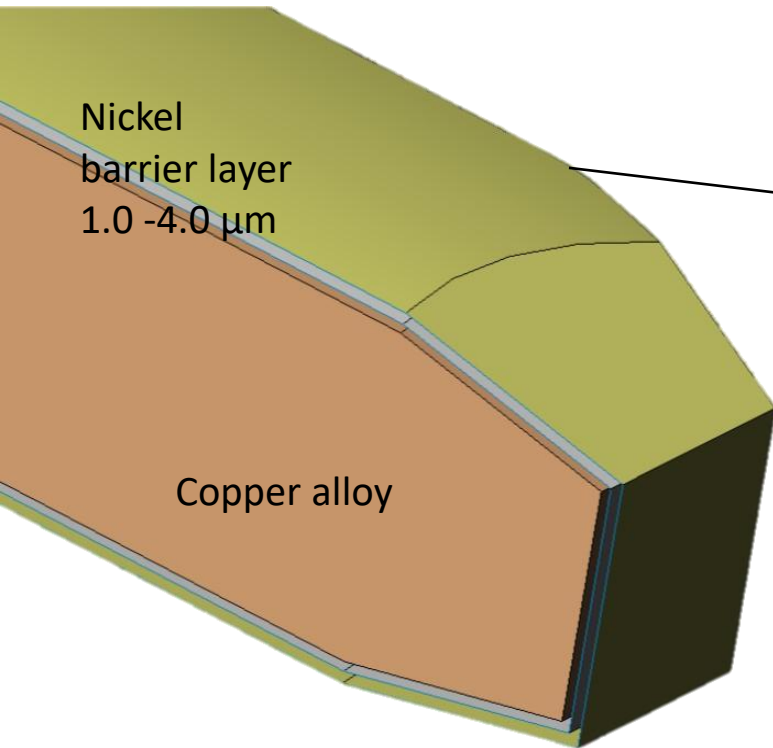
„I need a reliable connector!“



Contact surface basics



Contact surface basics

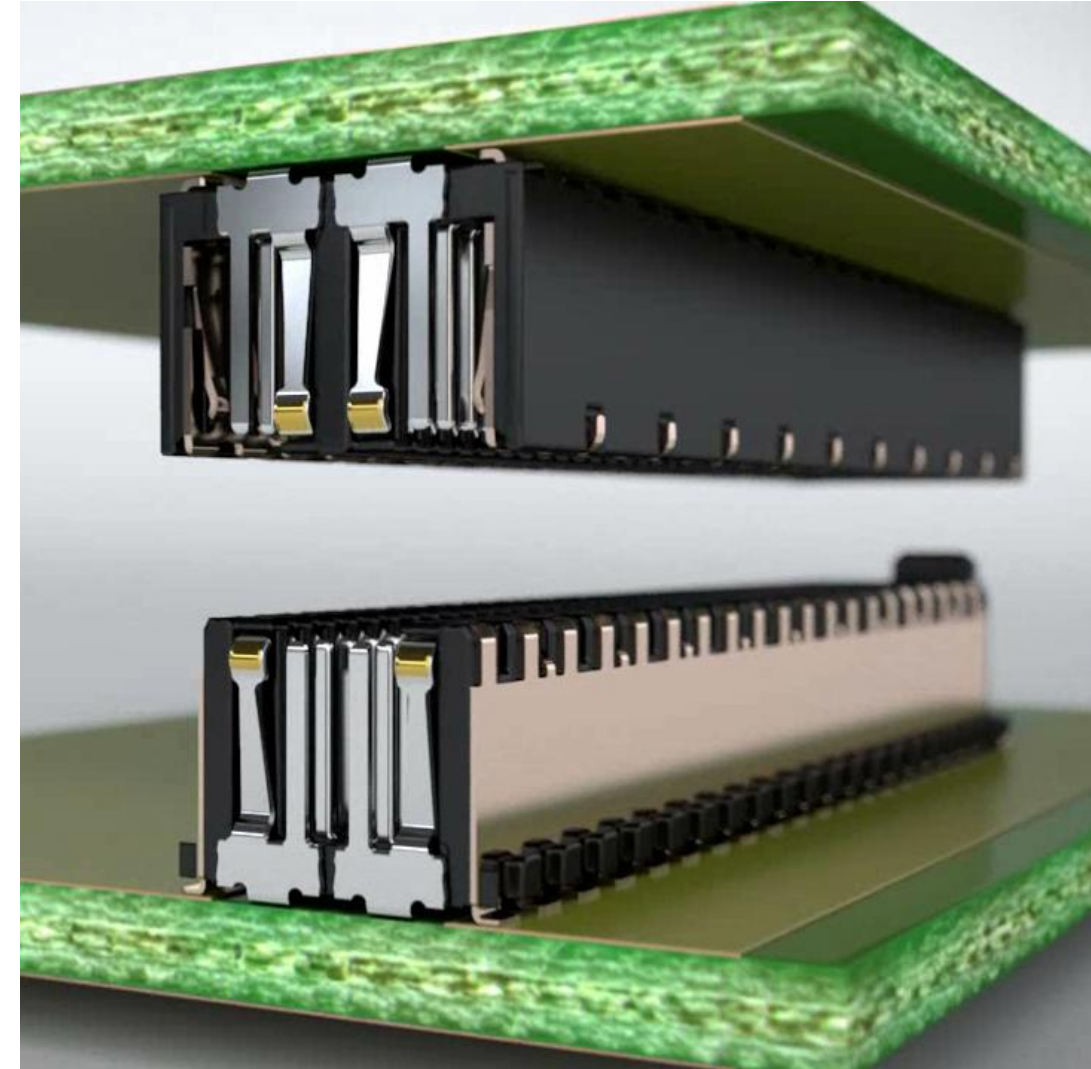


Material	Thickness
Au	0.50 μm – 1.27 μm

Contact surfaces of connectors

...at ept

Gold



Defect or misuse?

- Plugging track male connector; complete wear of the gold layer after 350.000 mating cycles within qualification.
- Requirements (DIN 41612 connector)
 - Performance level 1: 500 mating cycles
 - Performance level 2: 400 mating cycles

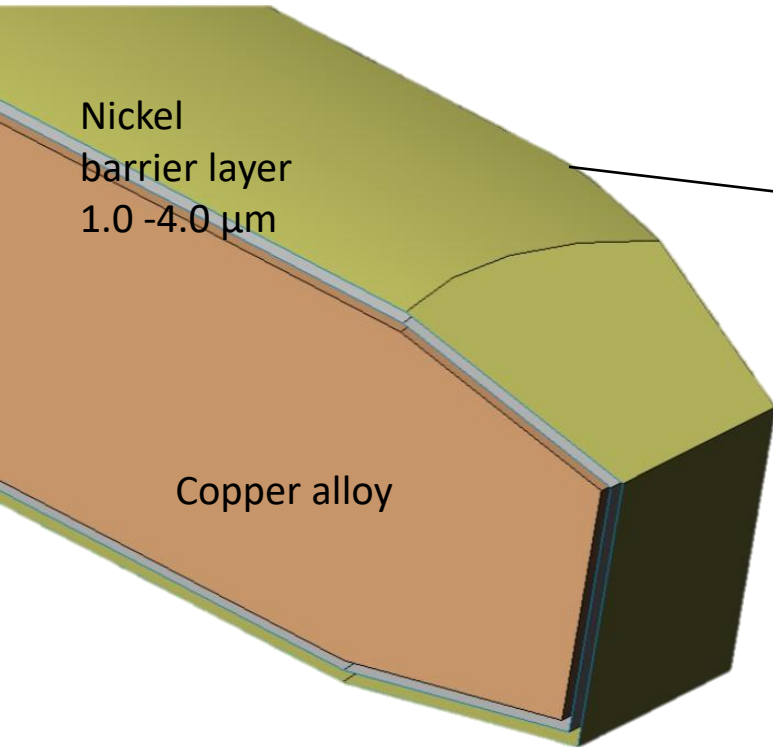


Customer requirements for connectors

„Can it be cheaper?“



Contact surface basics



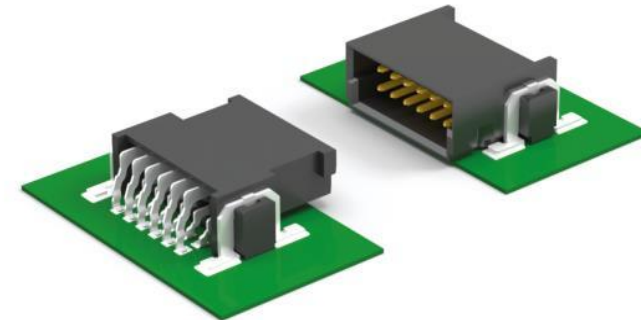
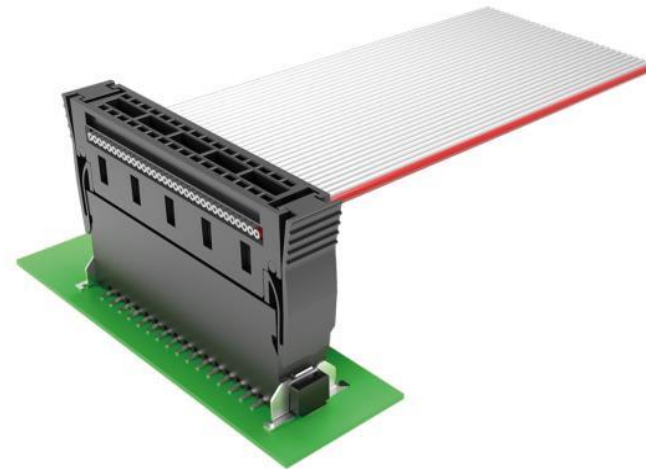
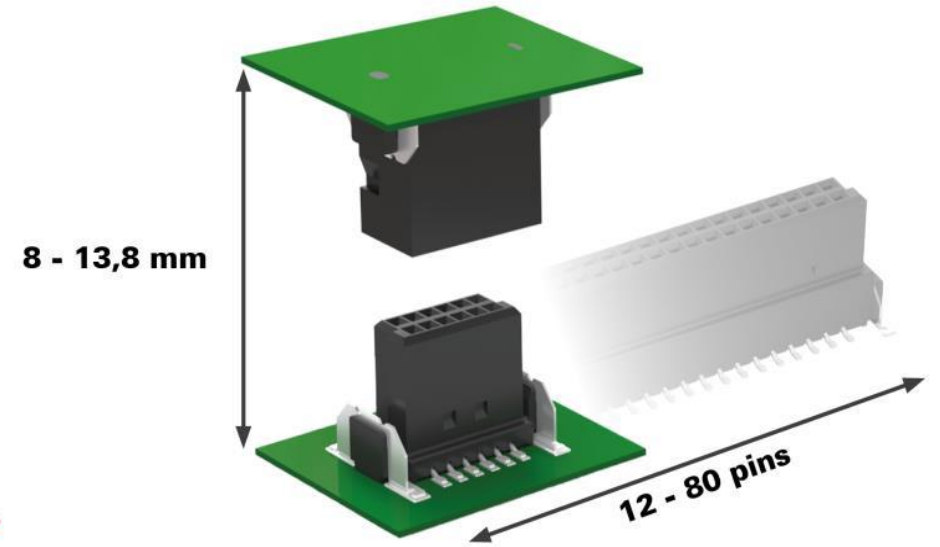
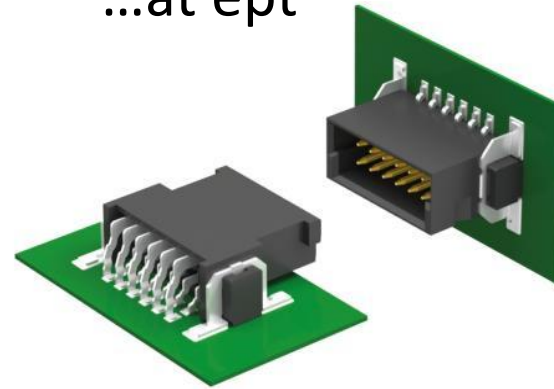
Material	Thickness
Au	0.50 μm – 1.27 μm
Au über PdNi	0.05 – 0.1 μm Au 0.4 – 0.8 μm PdNi

Contact surfaces of connectors

...at ept

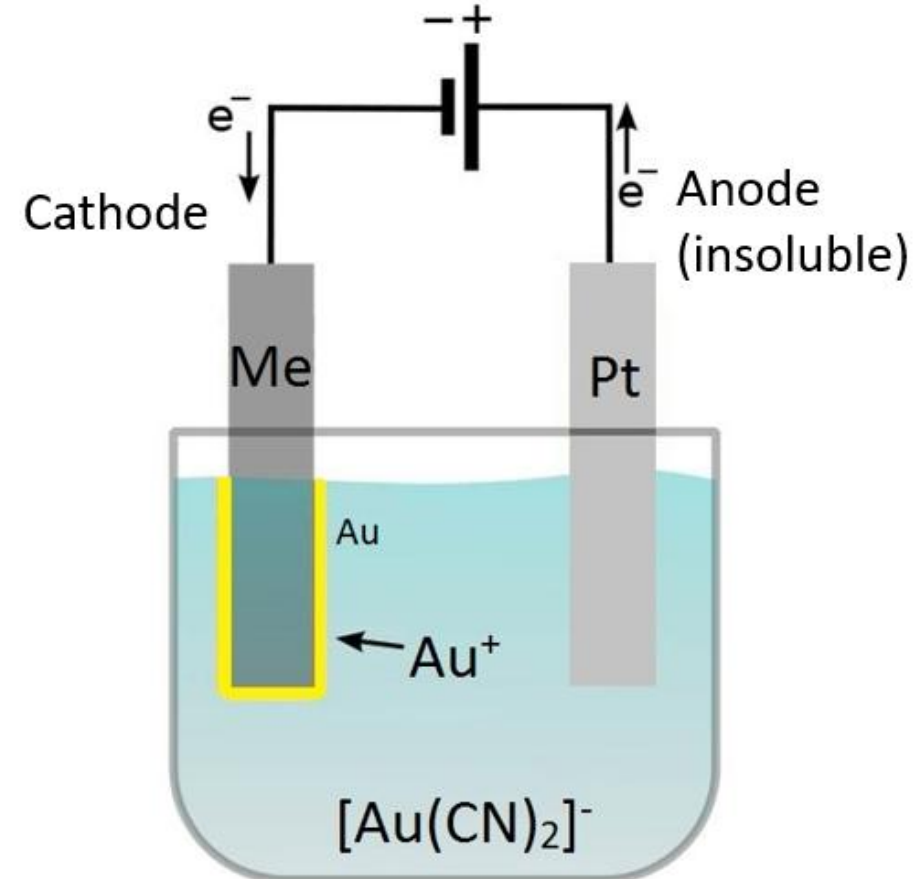
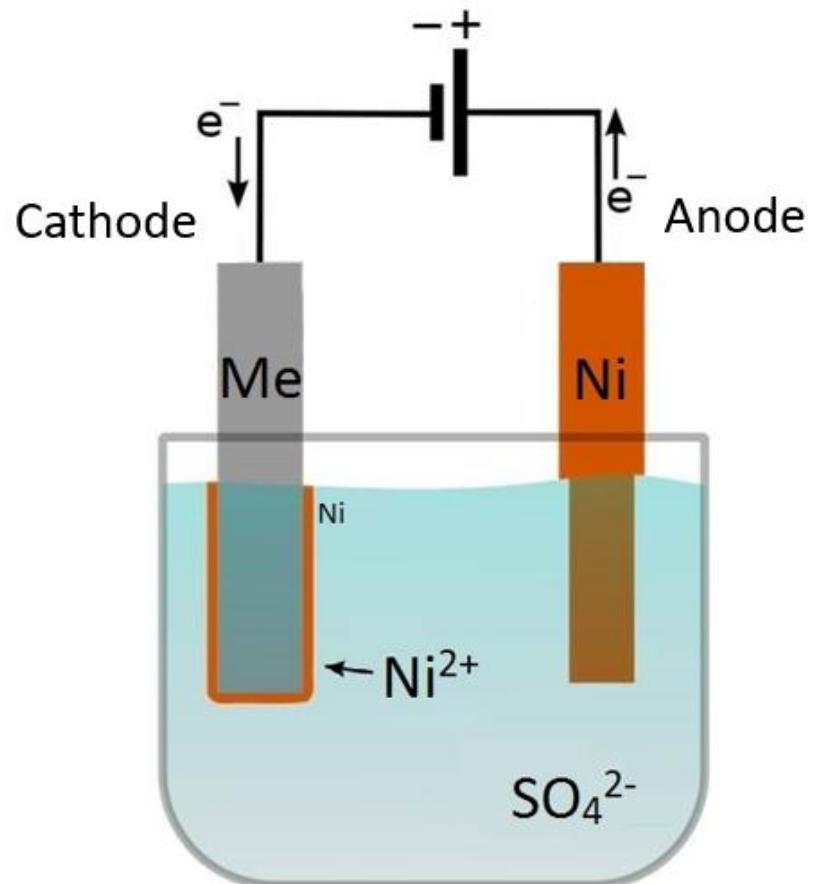
Gold

Palladium - Nickel



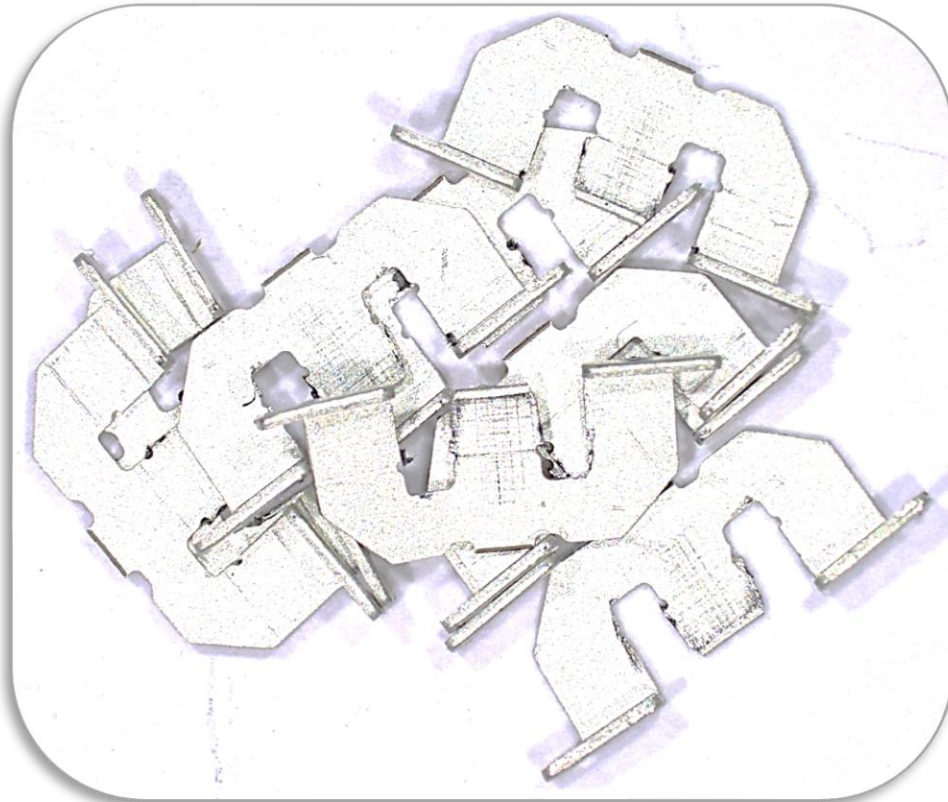
Electroplating process

Application of decorative or functional coatings



Electroplating process

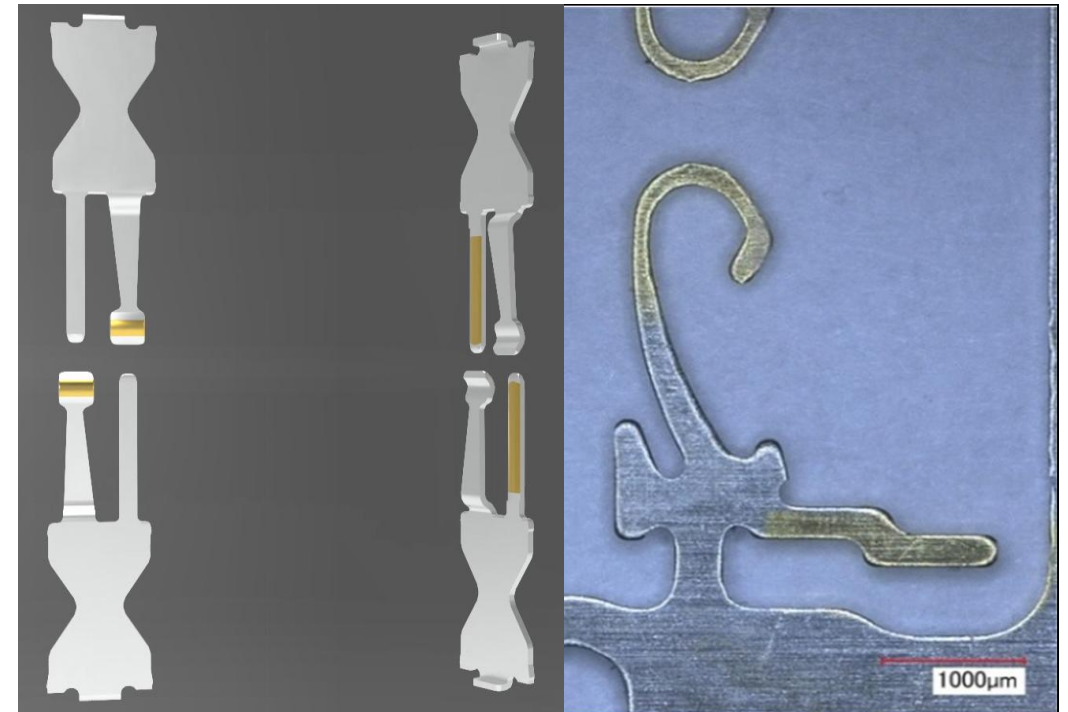
Types of electroplating



electroplating at ept in Peiting

Strip electroplating

Coating techniques at ept



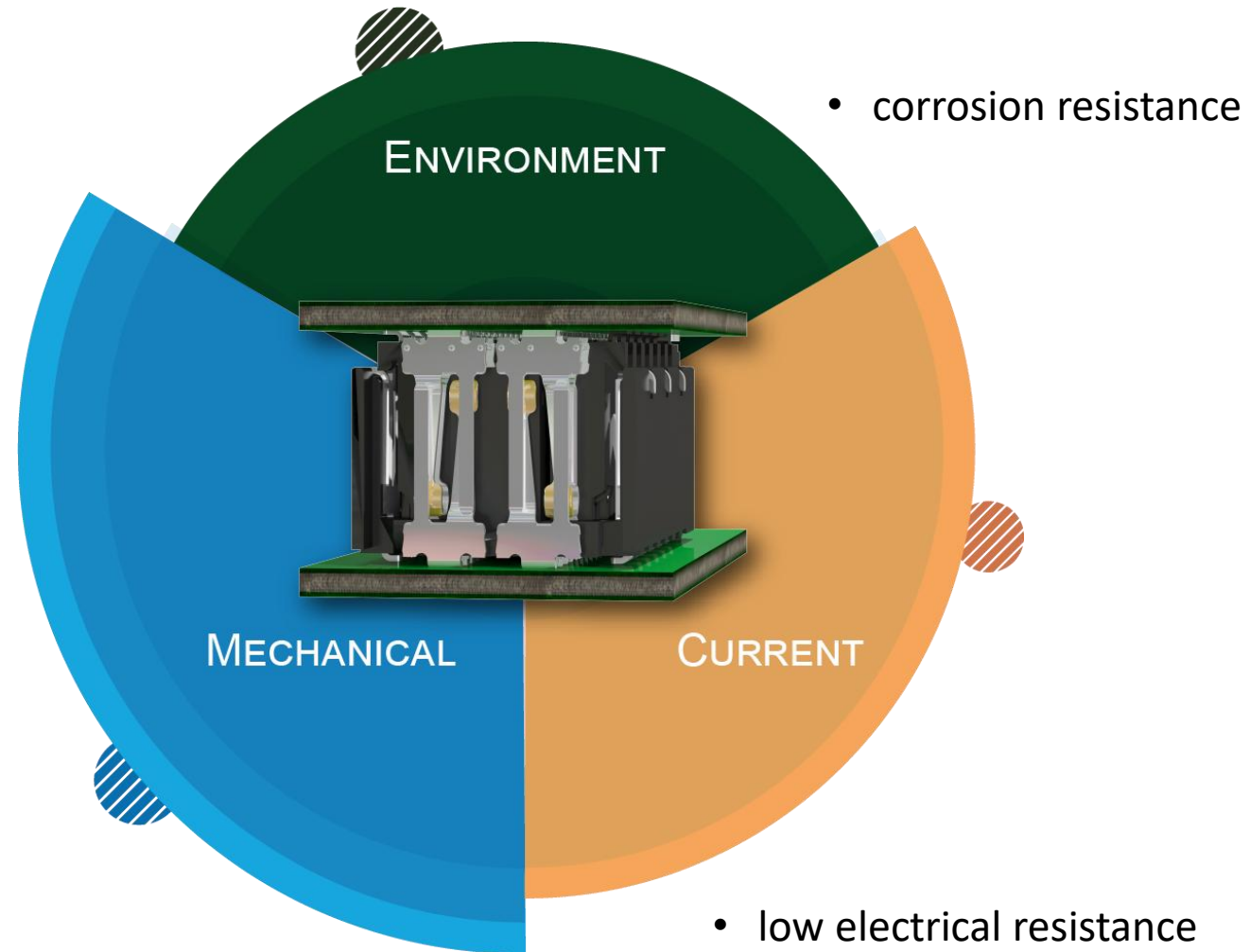
Customer requirements for connectors

„Are there disadvantages to Palladium / Nickel?“

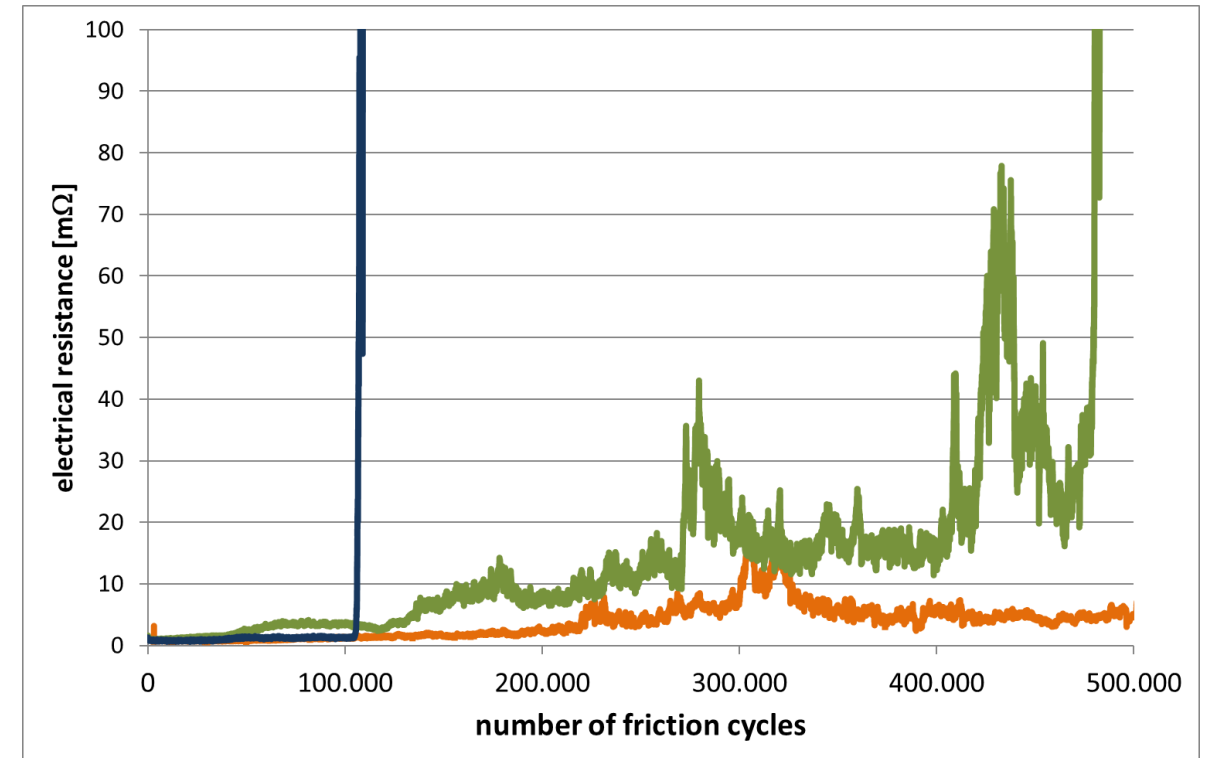


The connector as a compromise

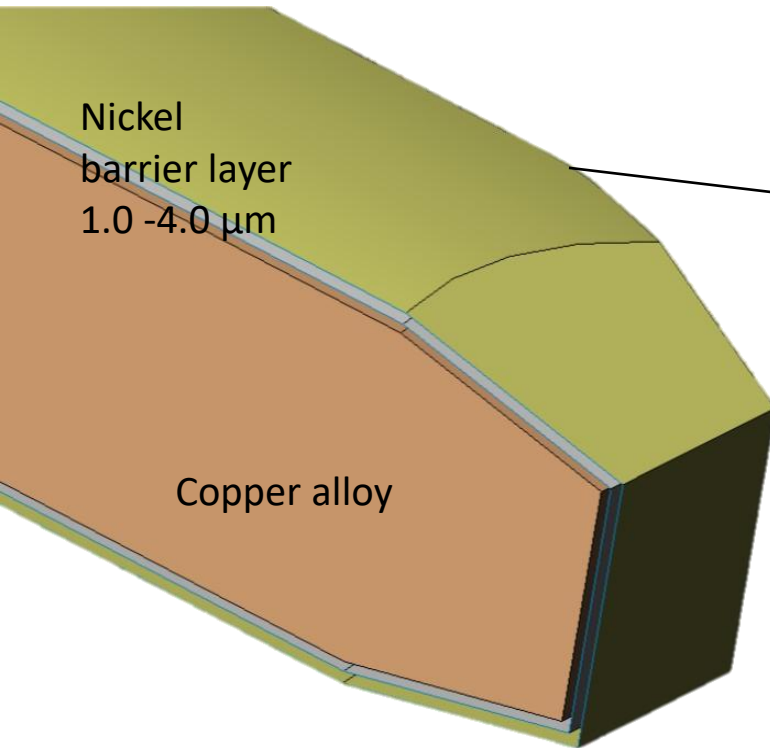
- low wear
- low insertion force
- high pull out force



Defect or misuse?



Contact surface basics



Material	Thickness
Au	0.50 μm – 1.27 μm
Au über PdNi	0.05 – 0.1 μm Au 0.4 – 0.8 μm PdNi
Au über NiP	0.05 – 0.1 μm Au 0.4 – 0.5 μm NiP

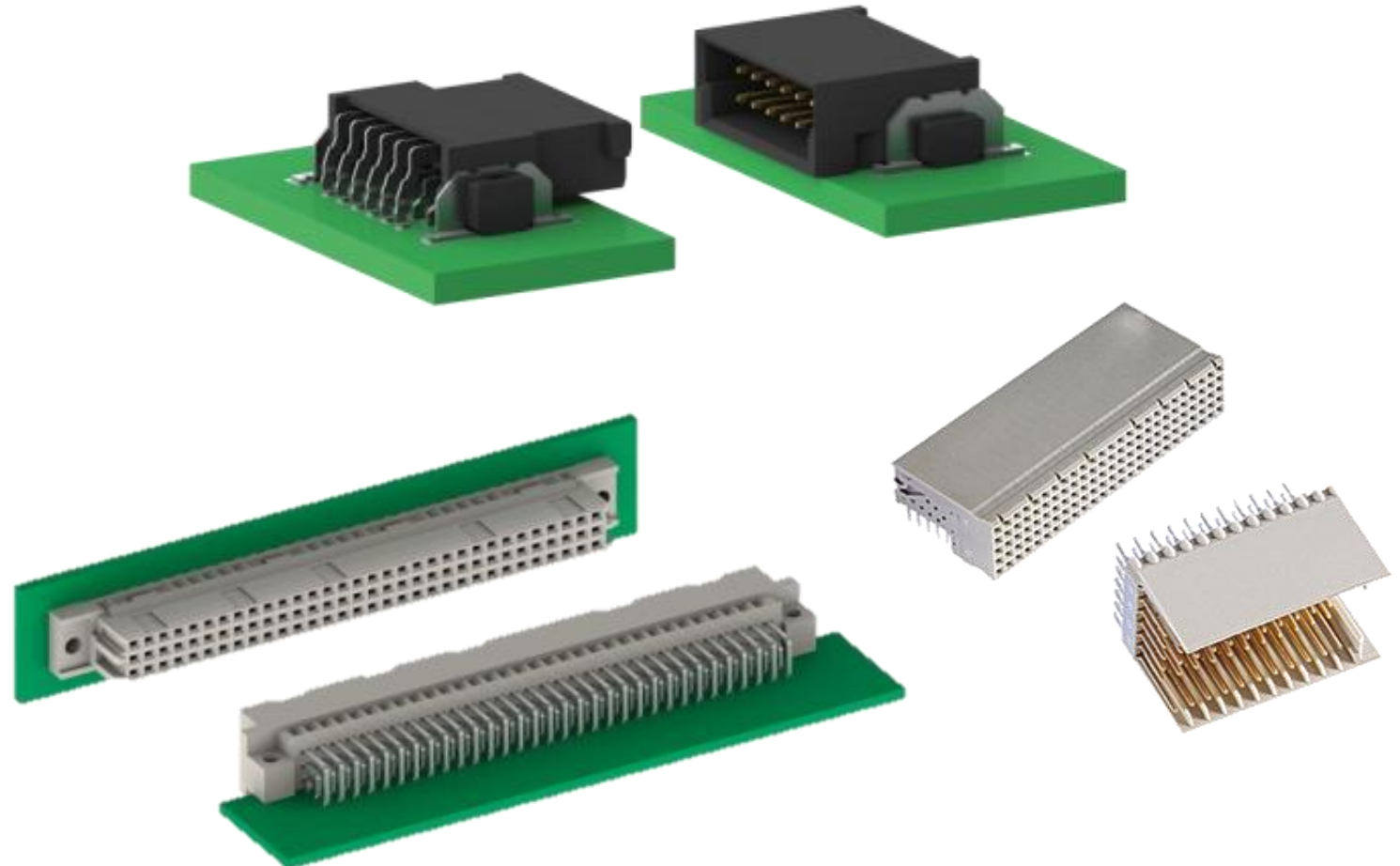
Contact surfaces of connectors

...at ept

Gold

Palladium - Nickel

Nickel - Phosphor



Cost share

Cost factor of the coating

Goldpreis Chart in Euro - Max

Optionen ▼ Währung: EUR ▼

Intraday 1W 1M 3M 1J 3J 5J **MAX**



Palladiumpreis Chart in Euro - Max

Optionen ▼ Währung: EUR ▼

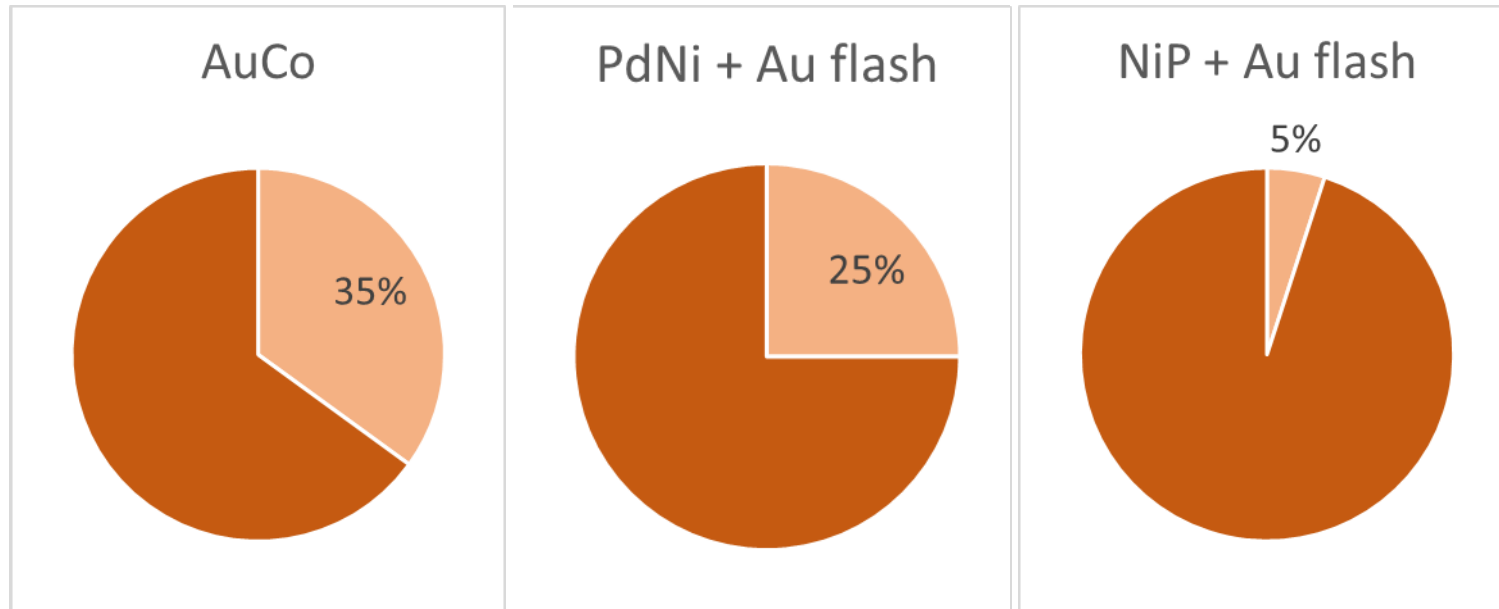
Intraday 1W 1M 3M 1J 3J 5J **MAX**



Image source: finanzen.net

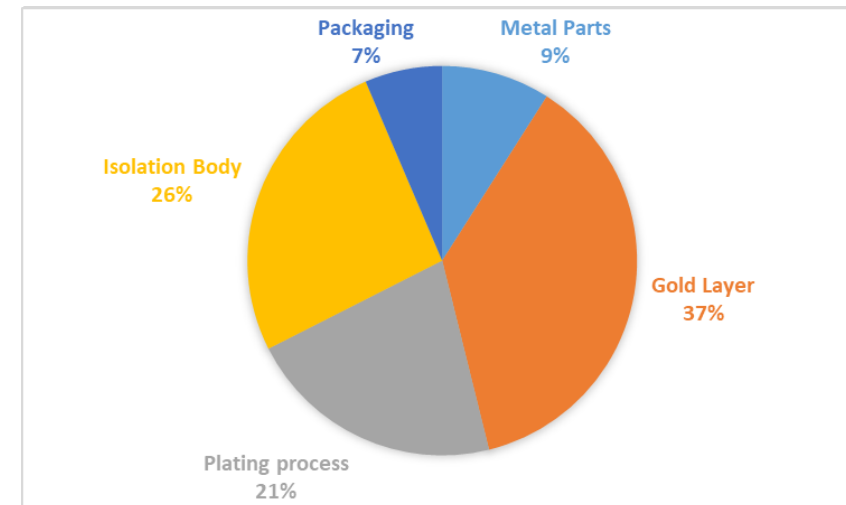
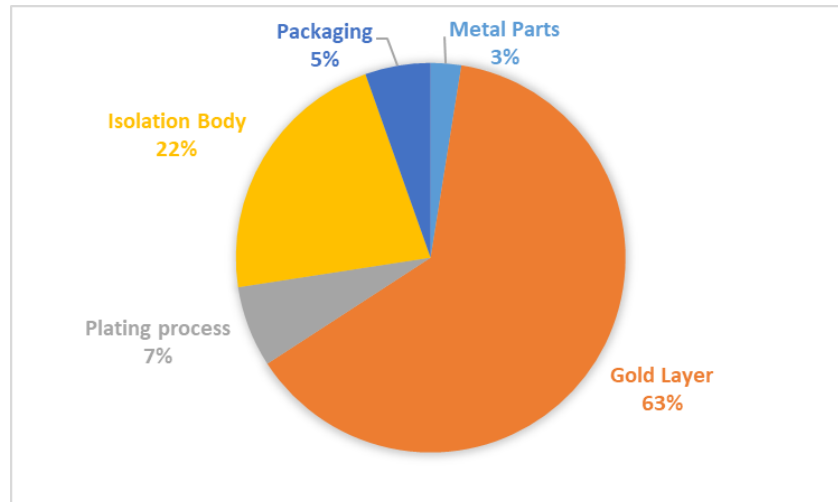
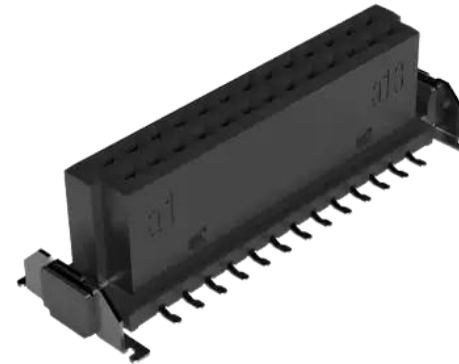
Cost share

Share of the surface in the manufacturing costs of the connector



Environmental impact

Effects of the different coating options on the CO2e value

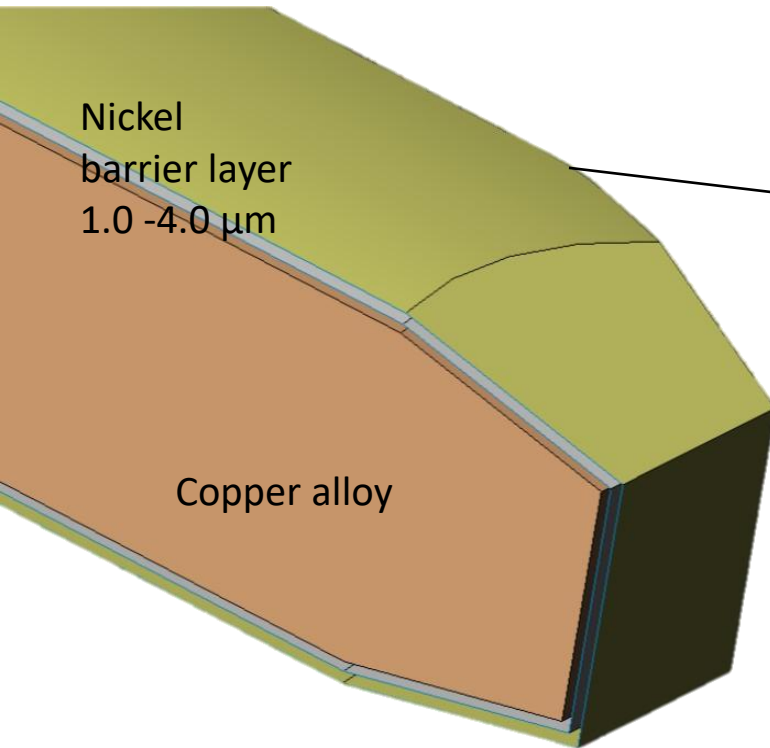


Customer requirements for connectors

„Is there more“



Contact surface basics



Material	Thickness
Au	0.50 μm – 1.27 μm
Au über PdNi	0.05 – 0.1 μm Au 0.4 – 0.8 μm PdNi
Au über NiP	0.05 – 0.1 μm Au 0.4 – 0.5 μm NiP
Ag	2.0 – 4.0 μm
Sn	2.5 – 4.0 μm

Contact surfaces of connectors

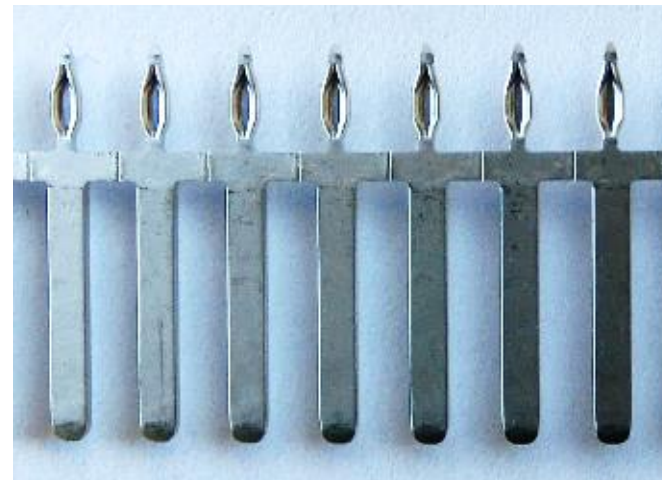
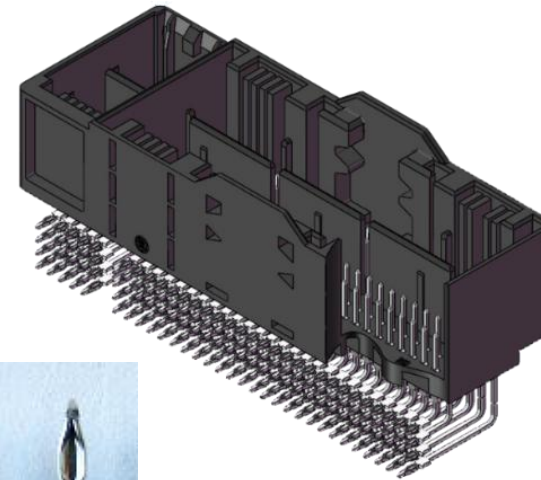
...at ept

Gold

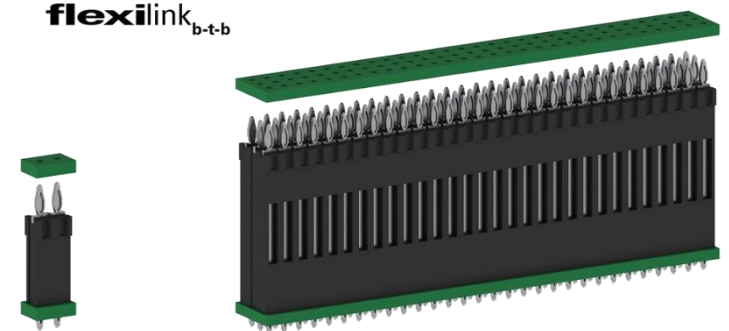
Palladium - Nickel

Nickel - Phosphor

Silver
Tin

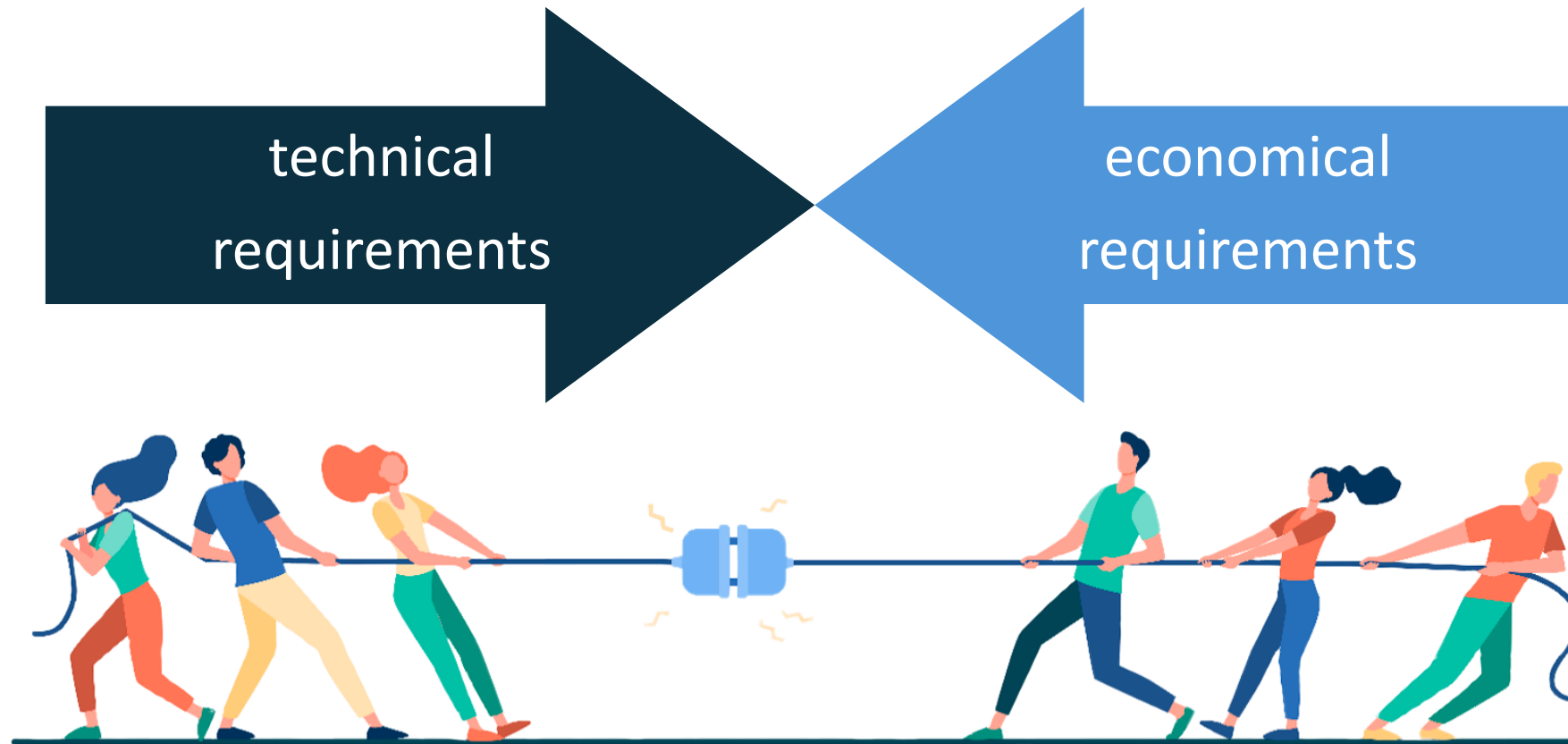


flexilink_{b-t-b}



Customer requirements for connectors

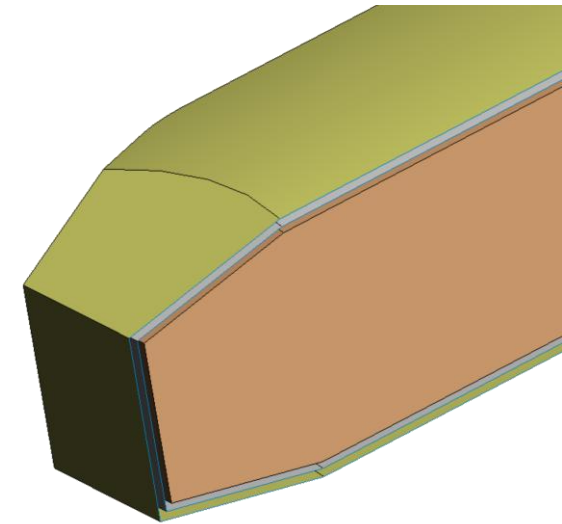
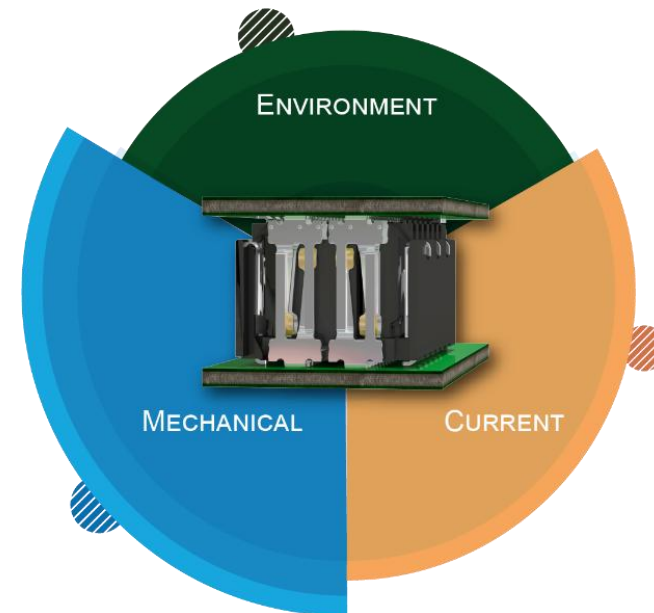
What must a connector be able to do and at what price?



Summary

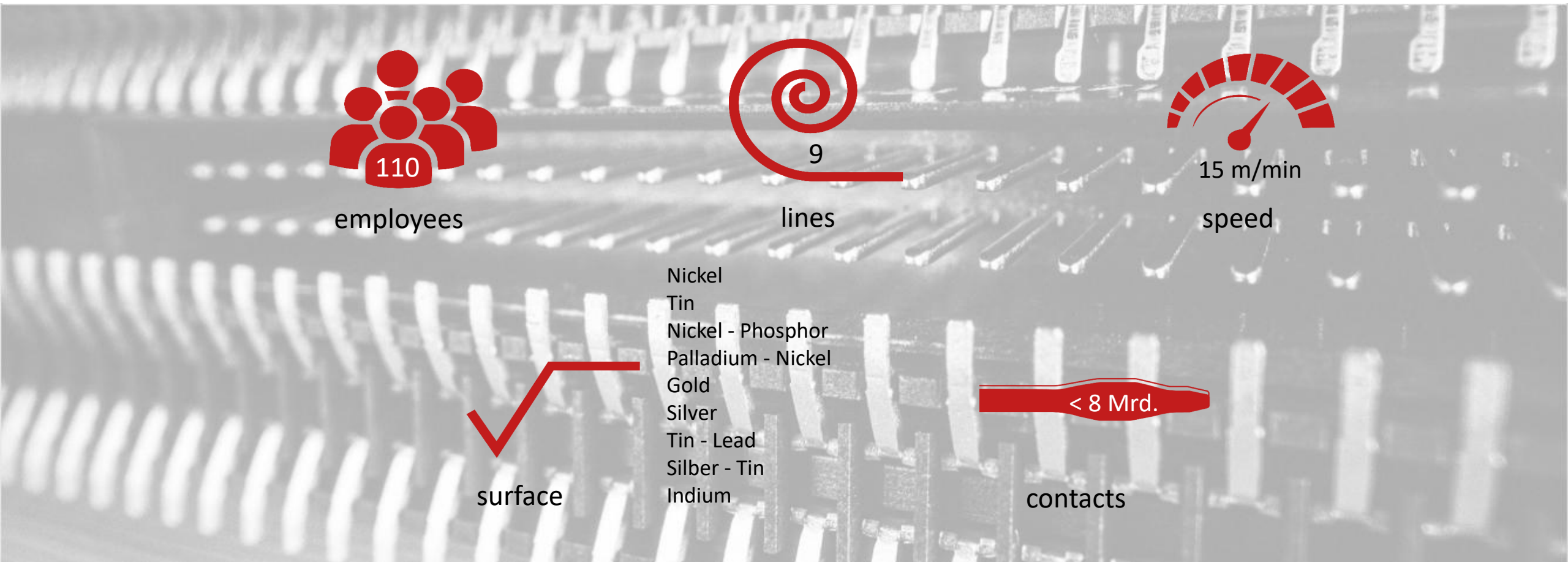
Interaction of contact surfaces

- Reliability of connector pairs strongly depend on contact material and contact layer structure
- Contact material and contact layers are influenced by
 - electrical properties
 - mechanical properties
 - environmental requirements
 - cost situation



Electroplating

Figures – Data - Facts



THANK YOU



ept GmbH



Schnatz, Christoph



+49 8861/ 2501 456

christoph.schnatz@ept.de