INOVAN

360° PROJECTS BY INOVAN

CONTACT PROFILES & CONTACT BIMETALS

360° PROJECTS BY INOVAN

CONTACT PROFILES

CONTENTS

360° PROJECTS BY INOVAN //--

THINK. THINKING IT THROUGH. THINKING IT THROUGH RIGHT FROM THE START.
THERE REALLY ARE DIFFERENCES //--

During implementation at the latest. When things take longer, become more expensive or turn out to be much more difficult than expected. So, by all means it is a kind of art: the art of thinking it through right from the start. It has a lot to do with years of experience, deeper understanding and overall implementation expertise.
Last but not least, these are success factors that are expressed in our material technology.

CONTACT PROFILES //--

CONTACT BIMETALS //--

THINKING IT THROUGH RIGHT FROM THE START

CONTACT PROFILES

INTRODUCTION

Contact profiles are extremely precise wires for setting up contacts which are mainly used for switching and leading currents. Their capacity ranges from low currents up to currents of 150 A. The materials and profile geometries are tailor-made to customer specific requirements according to their application.

When the contact profile wires are manufactured, a hot cladding process is used to join different wires together metallically; profile rollers give them their final shape.

Contact profile wires are used in the automotive sector, in telecommunication, industrial electronics/control technology, low-voltage technology and large electrical domestic appliances (washers, fridges etc.) as relays, contactors, switches, push buttons and regulators.

The complete development of contact and composite materials is an important contribution to the ongoing process of miniaturisation and cost-saving with electromechanical components.

Characteristics for the selection of the correct contact profile and material are the material properties, design parameters, switch loads and the required amount of switching operations of the component.

The required functionality of the component is achieved through the high standard of knowledge of our qualified employees about the application and proces- sing of different materials.

Our Key Competences are individual consultation and experience in design and dimensions of profile geometries, use of suitable materials and specific savings of precious metals.

The results of in-house developments and cooperation in international research projects are further pre-conditions for continued product improvement – to your advantage.

Please contact us. We are ready to help.

OUR PERFORMANCES INCLUDE //--

» 30 years of experience in
Production, Design, Material development,
Saving of precious metals

» 600 different micro contract profiles
for individual solutions

» Capacity range
Voltage: mV – 380 V
Current:: µA – 150 A

» AC and DC applications

» Areas of application:
Telecommunications – relays and switches
Automotive technology – relays, micro-switches
Switches for large electrical domestic appliances
Low-voltage technology

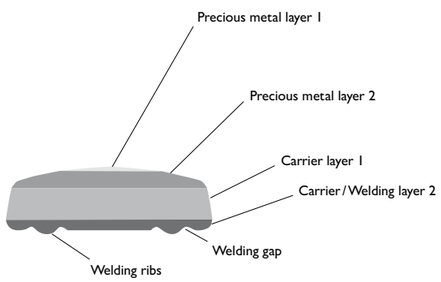
» Freely selectable precious metal alloy and layer thickness

» Form, layer thickness curve and material combination
adapted to the application case

» Multi-layer combinations

» Ideal design of contact part and tool thanks to
adjustable position of the profile sections

» **Minimum use of precious metals**



DIMENSIONS //--

	MIN. IN MM	MAX. IN MM
Profile thickness	0,12	2,0
Profile width	0,30	9,0
Thicknesses of bonded layers	1 µm	—
Thicknesses of electroplated layers	0,2 µm	10 µm

Dimensions of INOVAN contact profile wires and layer thicknesses

Dimensions and tolerances are specified according to the individual application case.

Comparison of the smallest and largest contact profiles

Application: Telecommunication relay Application: Low-voltage technology

PROFILE GEOMETRIES //--

The suitable profile form depends on the component system and electrical requirements. Carrier materials of the contact profiles which can be welded securely bond the contact with the carrier strip. The advantage of the welded contacts is the metallic bond between the contact part and the component carrier, which guarantees a long life time and safe carry of current.

The profile form and welding method are adjusted together. In case of shoulder and pointed profile geo- metries, the welding electrode has got a clearance in the contact area which allows the welding current to be transferred either via the shoulder or the flank of the profile and prevents the precious metal surface coming into contact with the welding electrode.

Pointed profile

Shoulder profile

Trapezoidal profile

Contact profile with round welding ribs

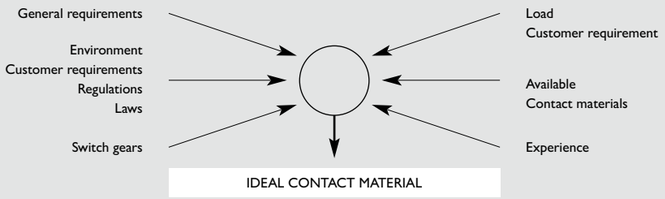
Contact profile with flat welding ribs

Special shape

Welding ribs can be rolled into the underside of the contact profile to improve welding process.
The number and shape depends on the material combination and the welding task. Welding ribs support the welding process and specifically melt and weld the material.

Contact profiles can be produced with or without a number of welding ribs being agreed between the customer and INOVAN. The width of these ribs is between 0.05 and 0.5 mm and the height between 0.03 and 0.15 mm.

THE WAY TO THE RIGHT CONTACT MATERIAL //--



CONTACT MATERIALS FOR AC / DC APPLICATIONS //--

APPLICATIONS	SWITCHING TASK CURRENT RANGE	SUITABLE CONTACT MATERIAL
Switches Push buttons	Transfer of information I < 100mA	Au(diff.) + AgNi0,15 Au(diff.) + AgNi10 AuAg8; AuAg26Ni3
Micro switches Relays for telecommunications	Switching and carrying currents I < 1A	Au(diff.) + AgNi0,15 Au(diff.) + AgNi10 AuAg8 + AgNi0,15 AuAg26Ni3 + AgNi10 AgPd30–60 AgNi0,15
Appliance & Control Large domestic appliances Relays	Switching and carrying currents I < 16A	AgNi0,15 AgNi10; AgNi20
Low-voltage technology	Switching and carrying currents I < 150A	AgNi10–20 $AgSnO_2$12

Au(diff.)… Au-layer diffused into the Ag-alloy

CONTACT MATERIALS FOR AUTOMOTIVE APPLICATIONS //--

LOAD TYPE IN VEHICLES	SWITCHING TASK CURRENT RANGE	SUITABLE CONTACT MATERIAL
Transfer of information	Switching and carrying currents I < 100mA	Au(diff.) + AgNi0,15 Au(diff.) + AgNi10 AuAg8, AuAg26Ni3
Low-current applications Micro switches	Switching and carrying currents I > 100mA; I < 10A	Au(diff.) + AgNi0,15 Au(diff.) + AgNi10 AuAg8 + AgNi0,15 AuAg26Ni3 + AgNi10 AgNi0,15, AgNi10
Motors Valves Relays	Switching currents I > 10A with inductive loads	AgNi0,15 $AgSnO_2$ 12
Lamp loads (e.g. H4) Relays	Switching on high peak currents I > 50A	$AgSnO_2$ 12
Indicator loads Relays	Switch-pulse operation I > 100mA; I < 10A	PdCu15(anode) Ag(cathode) Replacement for PdCu15: $AgSnO_2$ 12

Au(diff.)… Au-layer diffused into the Ag-alloy

CARRIER MATERIALS //--

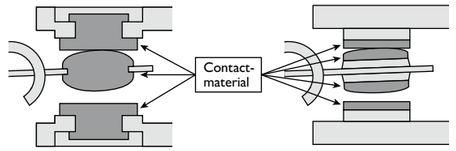
CARRIER MATERIALS	
Alloys	CuNi30Fe, CuNi44, CuNi9Sn2, Ni
Special alloys	DC04 soft iron

SAVING PRECIOUS METALS //--

Our development and manufacturing processes are the basis for specific precious metal savings. Special profile forms and combinations of materials enable minimum use of precious metals without restricting the functionality of the component.

» Specific saving of the precious metals gold, silver, palladium and platinum.
» Reduction of the layer thickness by replacing the basic material results in higher electrical conductivity.
» Optimum adaptation of the layer curve according to the switching function.

Conversion from solid contact rivets to multi-layer contact profiles

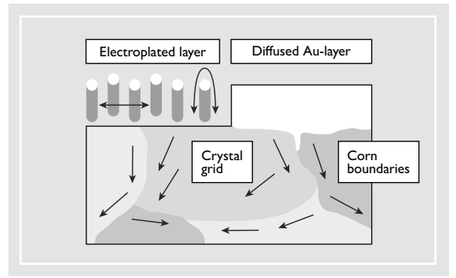


Solid contact rivets — Multi-layer contact profiles

DIFFUSED GOLD LAYERS //--

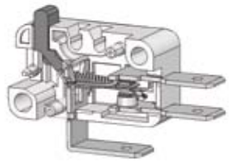
Diffused gold layers have proved their worth in the fields of micro-switches and telecommunication relays. This method developed by INOVAN combines ideal properties with minimum use of precious metals:

» Au-layers 2–10µm thick have been replaced by diffused Au-layers of 0.5µm.
» Up to 90 % savings on gold.
» The influence of price fluctuations of precious metals is minimized.

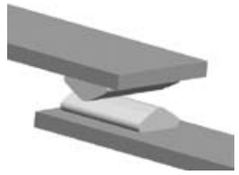


APPLICATION EXAMPLES //--

INOVAN contact profiles are used in signal relays, micro-switches, switches, push buttons and regulators, relays and power switches.



Application of contact profile as a switching contact used for a micro switch.



Schematic representation of a cross point contact.

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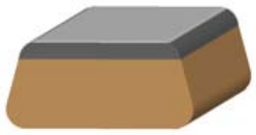
CONTACT PROFILES

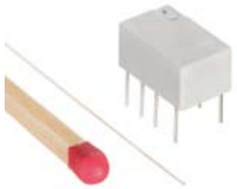
APPLICATION EXAMPLES

Gas Pressure Switch
Application range: Control technology

Thermostat
Application range: Automotive



Telecommunication relays
Application range: Telecommunication



Power control
Application range: Large electrical domestic appliances

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CONTACT BIMETALS

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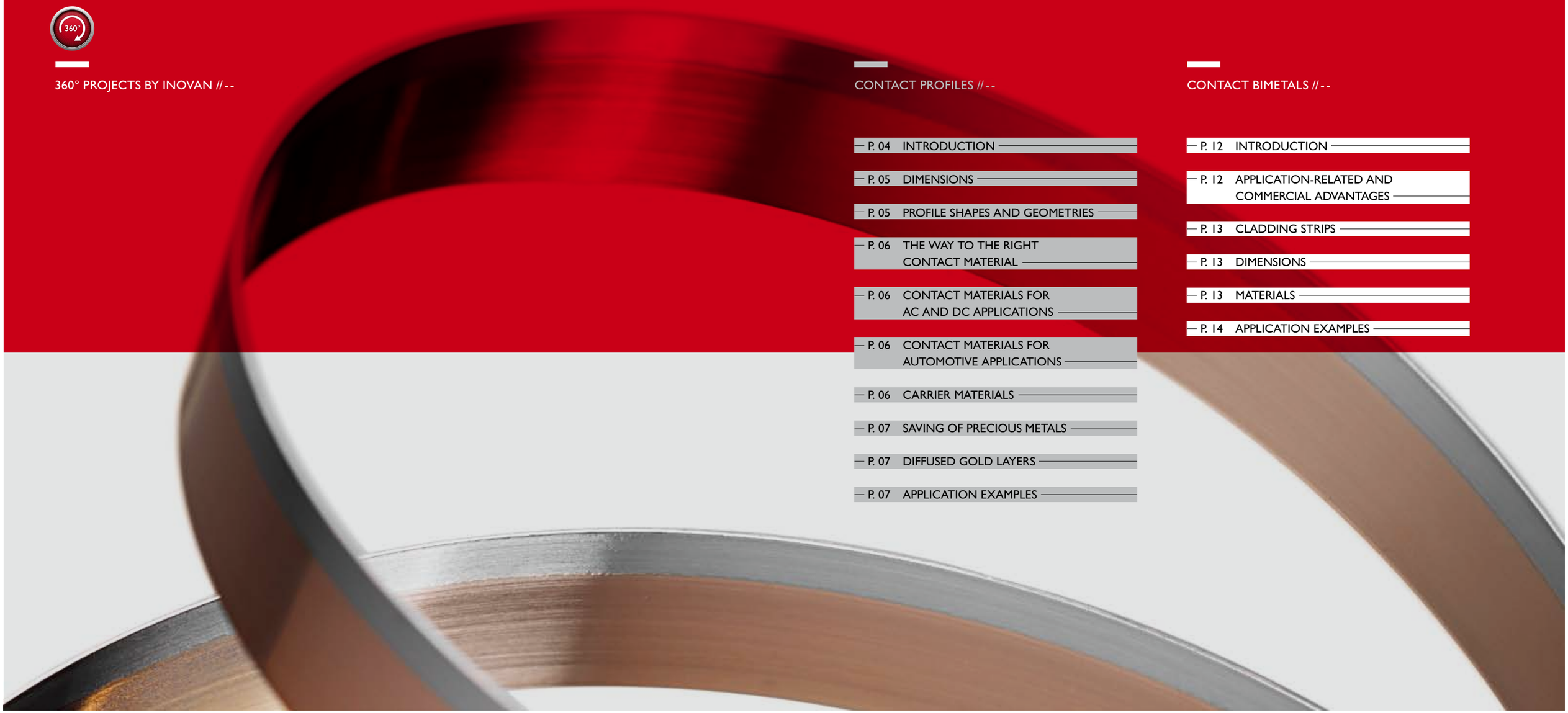

CONTACT PROFILES //--

CONTACT BIMETALS //--

THINKING IT THROUGH RIGHT FROM THE START

CONTACT BIMETALS

INTRODUCTION

INTRODUCTION //--

Contact bimetals consist of a contact material and a carrier strip.
These two materials are merged into a metallic composite material by mechanical bonding.
INOVAN contact bimetals are used in applications in a wide range of branches:

Circuit breakers
» Contactors

Semiconductors
» Automotive
» Electronics

Motors
» DC motors
» AC motors

Switching contacts
» Automotive switches
» Switches
» Temperature fuses
» Large domestic appliances / control technology
» Household installation switches (light switches)

Bondable aluminium surfaces

The contact material is defined according to the following criteria:
» Electrical load range
» Chemical behaviour
» Material properties

APPLICATION-RELATED AND COMMERCIAL ADVANTAGES //--

Ideal adapted contact material
» Alloys can be used to match the application.
» Precious metal alloys (e.g. AuAg26Ni3) replace high-grade gold layers.

Combination between cold cladded and electroplated layers
» The combination of the various coating methods makes an optimum adaptation to the respective application possible.

Favourable stamping costs
» Contact parts made out of contact bimetal strips are punched and bent in only one production process.

Optimum adhesion
» During cold cladding the bonding partners enter a metallurgic connection.

Good ductility
» No cracks are produced during stamping.

CLADDING STRIPS //--

» Cold cladded Inlay strip
» One-sided, both-sided, one or more inlays
» Bimetals with cladding all over (non precious cladding also possible)
» Trough-lay, cladded all through

COLD ROLL-CLADDING

Inlay clad on one side

Inlay clad on both sides

Overlay clad on one side

Overlay clad on both sides

HOT-PRESS WELDING – LINGOT

Edgelay strip

Troughlay, cladded all through

CLADDED CONTACT BIMETALS WITH ELECTROPLATED TIN/SILVER LAYERS

Galvanic coating on all sides
Contact area left out

Selective galvanic coating

DIMENSIONS //--

	MIN IN MM	MAX IN MM
Strip thickness	0,06	6,0
Strip width	2	150
Layer thickness	0,0008 (0,8 µm)	6,0
Width of precious metal	1,0	150

Dimensions of INOVAN contact bimetal strips

MATERIALS //--

CONTACT MATERIALS	
Gold alloys	AuNi5, AuAg8, AuAg25, AuAg25Cu5 AuAg25Pt6, AuAg26Ni3, AuAg35Pd35
Silver alloys	Ag1000 AgNi0,15, AgNi10, AgNi20 AgCu3, AgCu10, AgCu20 AgPd20, AgPd30, AgPd40, AgPd50, AgPd60
Silver metal oxide	$AgSnO_2$ 2–12
Special alloys	AuAg35Pd35 IS6
BONDABLE SURFACES	
Aluminium bond surface	AlSi 1, Al99,5
CARRIER STRIP	
Bronze alloy	CuSn6, CuSn8
Brass alloy	CuZn10, CuZn15, CuZn28
Alloys	CuAg2, CuNiSi, CuNi9Sn2, CuNi18Zn20, CuFe2, CuSn0,15, Cu-HCP, DC04, RFe60, FeNi36
Special alloys	Low alloyed copper alloy Al99,5

Because of Inovan's Cladding Technology, contact materials manufactured by melting-metallurgy and powder- metallurgy can successfully be cladded.

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CONTACT BIMETALS

APPLICATION EXAMPLES

Automotive switches
Combination of cladded contact bimetal strip
with electroplated layer

Collector for micro-motors

Protector switch for single-phase
AC motors

Thermo-switches, Thermostats

360°

LET US THINK YOUR PROJECT THROUGH
RIGHT FROM THE START.
PLEASE CONTACT US.

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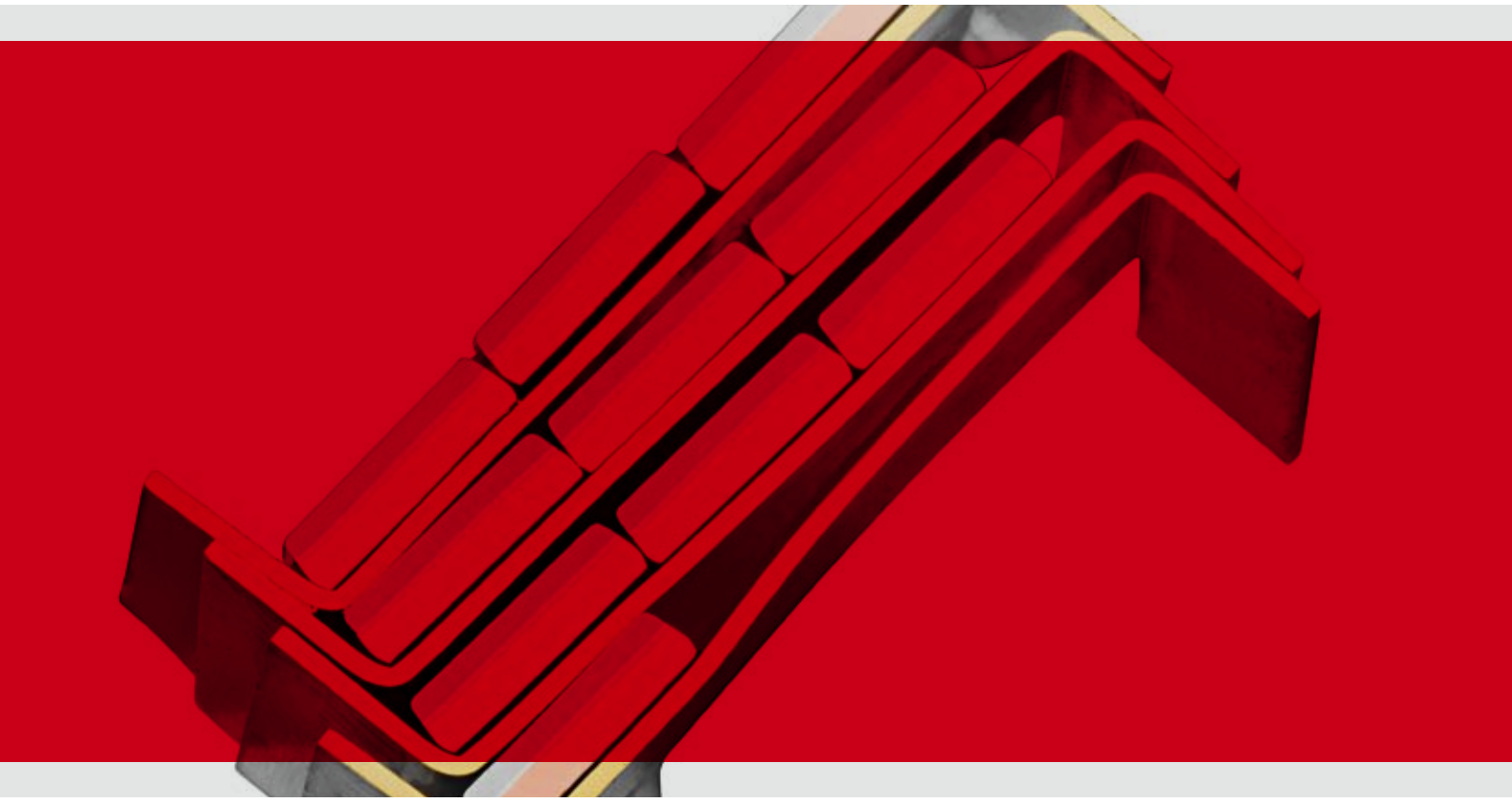

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