Intelligent alloys for automotive

Material Drives Production Performance

bedra
intelligent alloys

Reliable connections for tomorrow's mobility

Production proven quality that enables confident decisions.

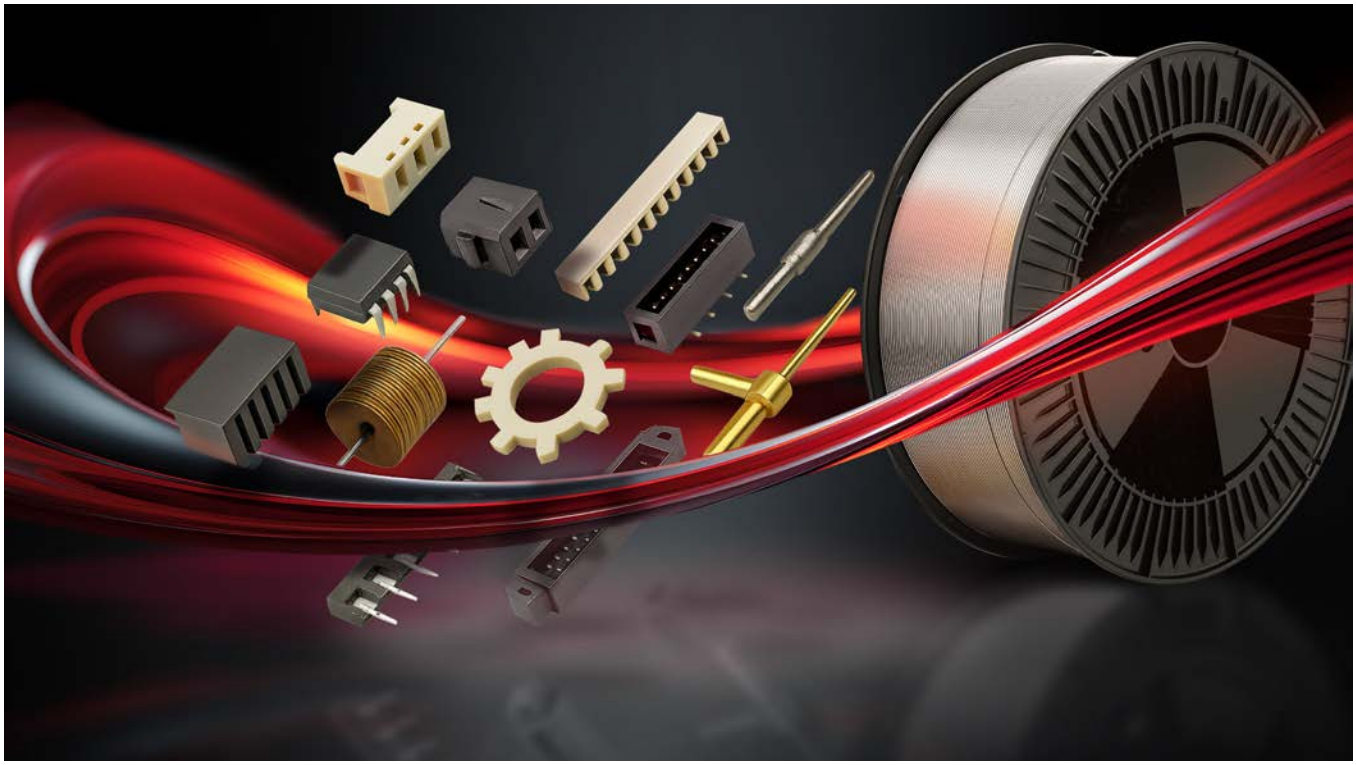
Electronic and resistance wires made of copper and copper base alloys - from alloy development to finished wire - with tightly controlled processes and reproducible performance.
Production ready solutions for connectors, sensors, actuators, and heating applications - in ICE, EV, FCEV, and H_2.

For generations, bedra has supplied the metallic foundation for highly reliable electrical connections. Our semi finished products made of copper and copper base alloys form the basis of countless components in mobility, electronics, and heating - from contact pins and heating resistors to micro interconnects inside control units. With in-house alloy development, precise geometries, and state of the art surface finishing, we ensure stable properties across the entire life cycle.

At a glance:

- **Risk reduction:** process capability, tight tolerances, traceability, and change control.
- **Quality & governance:** ISO systems; application dependent, verifiable claims.
- **Supply & scaling:** scalable processes; standardized multi sourcing and site flexibility across bedra worldwide.

Enabling progress since 1889



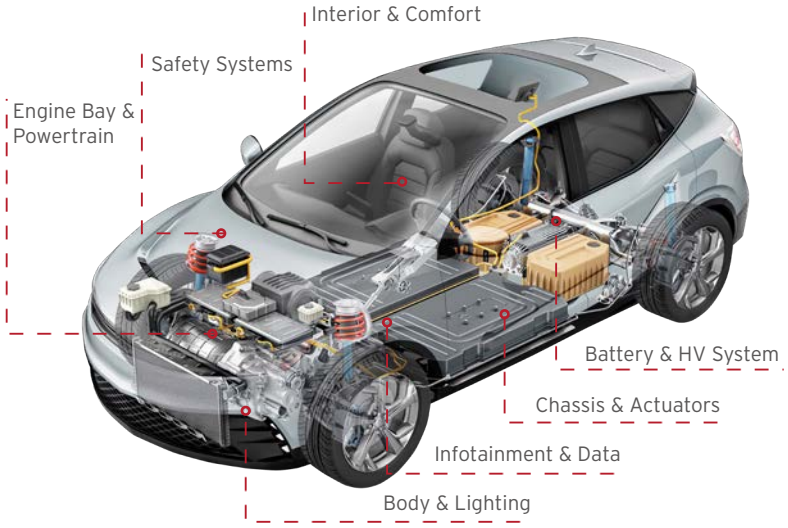
Challenges & the bedra response

Your challenges (selection):
Miniaturization & package space | Lightweighting | EMI/EMC integrity | Thermal cycling | Corrosion & media resistance | Tolerances & process capability | Traceability

Our response—materials, geometries, surfaces:

- **Materials expertise:** In-house foundry and 100+ alloy variants (including tin bronzes, brasses, nickel silver, and specialty alloys) engineered for defined electrical and mechanical properties.
- **Geometry breadth:** Square, rectangular, octagonal, flat, and round wire - smooth, knurled, coated or uncoated - each to customer specific parameters.
- **Process precision:** Ultra tight dimensional, across flat/diagonal, and corner radius tolerances; accurate knurling; optimal straightness; precision layer winding.

Resistance wire / heating elements (bercotherm®):
Resistance alloys for efficient conversion of electrical energy into heat - for seat, steering wheel, mirror, front/rear window, and tank/line heating. **berco**therm® options as alternatives to classical CuNi alloys.



Modern surface finishing & compliance

Electroplating & coatings:
Pure tin, nickel/copper barrier layers, and multilayer technology - on robust lines with lab monitoring to ensure consistently high surface quality. Reflow tinning reduces whisker risk and supports modern manufacturing (e.g. SMT compatible requirements).

Contact performance & processing:
Improved solderability through high purity tin anodes; solderable/weldable and process reliable - for reproducible joints over long service life.

Environment & compliance:
Strict adherence to applicable environmental regulations; RoHS compliance verified by external, certified test bodies.

ESG note:
Environmental & energy management per ISO 14001/50001; quality management per ISO 9001 - the foundation for governance compliant supply chains.

Note: All performance data are application dependent.

Automotive applications (use case portfolio)

Electronics manufacturing:
connectors, spring/crimp contacts, sensor pins, micro interconnects
Electromechanics:
actuators, relays, switches, coil formers
Heating technology:
resistance wires for seat/steering wheel/mirror/front/rear/tank heating
Precision/consumer goods:
fine wires for drives, fine windings

Requirements by application group

Sensors/actuators
stable signals, defined resistances → precise response

Heating/control
uniform heat, constant ohmic values → comfort & safety

EMI/EMC shielding
assured electromagnetic integrity → interference free power and data flow

LED/ECU
process reliable interconnects & heat dissipation → long lived assemblies

Displays/signal
repeatable conductivity → clear signals across temperature cycles

HV cables
appropriate materials & finishes → high electrical load capacity

Relays/coils/actuators
geometry & tolerance fidelity → consistent magnetics

Bobbins

Connerctors

Heating

Material examples by application (qualitative)

Assembly (Vehicle Area)	Application Group (Function)	Examples (Components/Products)	bedra Alloy	Benefit	Key Properties
Engine Bay & Powertrain	Sensors/Actuators	Connector, PCB	CuSn4 CuNi3Si CuNi10	Precise signal integrity	Tight tolerances, corrosion resistant, solderable
Safety Systems	Connectors for airbag, ABS/ESP & ADAS	Crash and ignition system	CuSn6 CuNi3Si CuNi Cu OF1 (OF Cu)	Reliable function under stress	Conductivity, stability, corrosion protection, temperature resistance
Interior & Comfort	Heating/Control	Heating elements	CuNi6 CuNi23Mn Cu OF1 (OF Cu)	Consistent resistance values	Thermally stable, uniform heat, process reliable
Body & Lighting	LED / Electronic Control Unit (ECU)	LED modules, ECUs, lighting systems	CuSn5 CuMg0.1 CuSn8	Reliable interconnection	Defined conductivity, dimensionally stable, contact durable, solderable & weldable
Chassis & Actuators	Electromechanical drives	Relays, coils, actuators	CuSn5 CuMg0.1 CuNi2	Reproducible magnetics	Suitable for winding, mechanically robust
Infotainment & Data	Signal and data transmission, EMI/EMC shielding	Displays, control and communication modules, shielding braids, contact springs, connectors	CuSn4 CuSn6 CuNi3Si CuZn30 CuFe2P	Stable signals, EMI/EMC ready	Smooth surface, tight dimensional tolerances, corrosion resistant, defined conductivity, dimensionally stable, contact durable
Battery & HV System (EV/HEV only)	Power distribution & interconnection	High voltage cables, battery contacts, power modules	CuSn8 CuZn30 CuFe2P Cu OF1 (OF Cu) Cu ETP	High electrical load capacity	Good conductivity, robust insulation, temperature resistant

Alloy group	Chemical term	bedra term	term	Term in the standard	Term UNS
Copper-Zinc	CuSn4	Bl4	DIN CEN/TS 13388:2015	CW450K	C51100
Copper-Zinc	CuSn5	Bl5	DIN CEN/TS 13388:2015	CW451K	C51000
Copper-Zinc	CuSn6	B65	DIN CEN/TS 13388:2015	CW452K	C51900
Copper-Zinc	CuSn8	Bl80	DIN CEN/TS 13388:2015	CW453K	C52100
Copper-Nickel	CuZn30	MS70	DIN CEN/TS 13388:2015	CW505L	C26000
Copper-Nickel	CuNi2	bercotherm N2	DIN 17471:1983	2.0802	/
Copper-Nickel	CuNi6	bercotherm N6	DIN 17471:1983	2.0807	/
Copper-Nickel	CuNi10	bercotherm N10	DIN 17471:1983	2.0811	/
Copper-Nickel	CuNi15	bercotherm N15	/	/	/
Copper-Nickel	CuNi44Mn1	bercotherm N44	/	/	/
Copper-Nickel	CuNi23Mn	bercotherm N23	DIN 17471:1983	2.0811	/
Copper-Nickel-Silicon	CuNi3Si1	CuNi3Si	DIN CEN/TS 13388:2015	CW112C	/
Copper	Cu-OF1 (OF-CU)	bercotherm C58	DIN CEN/TS 13388:2015	CW007A	C10200
Copper	Cu-ETP1	Cu-ETP1	DIN CEN/TS 13388:2015	CW004A	/
Copper - low alloyed	CuFe2P	CuFe2P	DIN CEN/TS 13388:2015	CW107C	C19400
Copper - low alloyed	CuMg0,1	CuMg0,1	/	/	/

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Schedule a technical consultation
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Legal notice:
Specifications are application dependent; subject to change.

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