



**Automotive** Electronics Materials

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Indium Corporation provides a comprehensive line of solder products to fit the varied facets of automotive electronics assembly. With the continued surge in the prevalence of electronics in cars, trucks, off-road vehicles, heavy equipment, and agricultural equipment, it's more important than ever to have the highest quality and widest selection of materials. The many operating environments of these vehicles led to a variety of material constraints; here they are broken down into common automotive terms. For further alloy and material choices, visit [www.indium.com](http://www.indium.com) or email [askus@indium.com](mailto:askus@indium.com).

## Product Listing

### Die-Attach Solder Materials

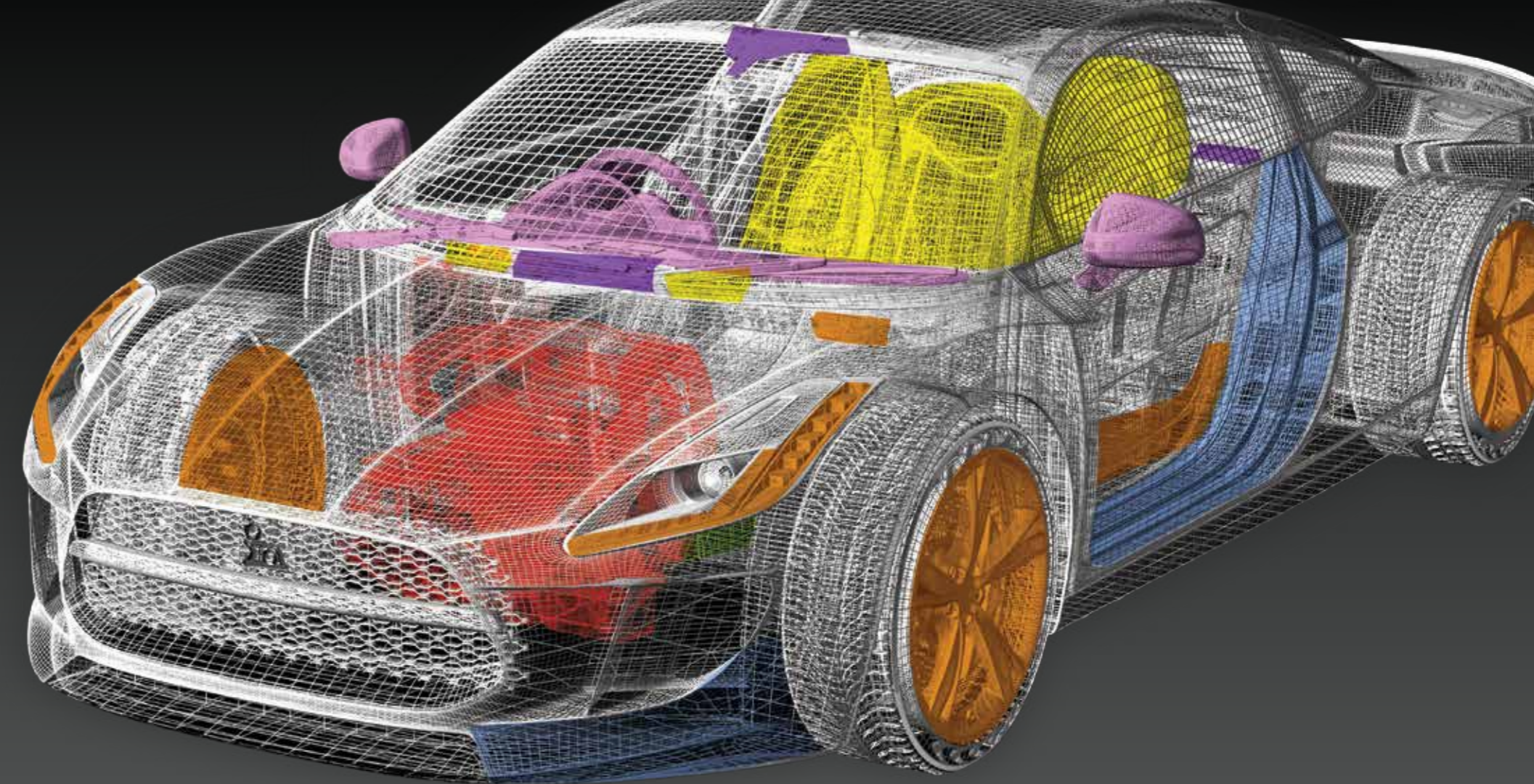
- Lead-free die-attach paste
- High-temp die-attach paste
- NanoFoil®
- Gold alloys
- BiAgX®

### Solder Preforms

- Solder preforms in tape
- Melting point and fusible alloys
- Indium sealing
- TIMs

### PCB Assembly

- Solder paste
- Rework/repair materials
- Wave solder materials



E

### Engine

Electronics in the engine reside in the most extreme conditions and also are critical-to-function. The engine control unit is central in the function of vehicles and is indeed a very demanding electronics application. High operating temperatures, as well as vibration and mechanical requirements, narrow alloy choices to high-Pb alloys and newly developed Pb-free options for high reliability applications.

T

### Transmission

Similar to engine applications, transmission electronics and the transmission control unit are critical-to-function and important for safety. Operating temperature is dependent on the orientation of the control unit within the car, so a variety of alloys is available with a wide array of properties.

C

### Chassis

Chassis systems combine braking, traction, and stability control. Depending on the location of these electronic control systems, high-Pb alloys and Pb-free alloys for PCB assembly are used, with consideration for the thermal and mechanical requirements.

P

### Passenger Comfort

Passenger comfort systems are present in many different areas of the car. This segment includes climate control inside the car, heated seats, interior lighting, headlights, wipers, and mirror adjustment. Connectors, cable assemblies, controllers, and LED applications use solder preforms, solder paste, and fusible links of various alloys.

I

### Infotainment

Infotainment combines music, GPS, and personal electronics connectivity in one safe and powerful system. PCB assembly for these units relies on all of the newest components (utilizing advanced die-attach materials) and technologies to deliver the multi-functionality consumers desire. Often, conventional Pb-free alloys are used in this area, but for novel applications, preforms and other materials are available.

D

### Driver Assistance

Improvements in driver assistance have made driving easier by putting all of the content and controls at the driver's fingertips. Increasingly, this system will include blind spot and parking assist cameras/displays, in addition to dashboard displays and dynamic cruise control. These systems also rely on sensors, connectors, cables, and the full range of solder material forms.

A

### Active Safety

Active safety systems are advancing the automatic, collision-diverting functions of your car. A system of sensors and innovative new controls monitor conditions on the road and assist the driver by avoiding imminent collisions. Preforms are commonly used in sensors, as well as PCB assembly materials for the controls.



# Automotive Alloy Table

Alloy Grouping	Indalloy® #	Common Name	Composition	Melting Temp (°C)		Density (g/cm³)	Forms Available						Features		
				Solidus	Liquidus		Solder Paste	Cored Wire	Solid Wire	Bar Solder	Spheres	Ribbon		Preforms	
Low temp	#281	BiSn	58Bi/42Sn	138		8.56	•		•		•	•	•	Good low temp Pb-free alloy for electronics assembly; good for thermo-electric applications and CTE mismatches	
	#282	BiSnAg	57Bi/42Sn/1Ag	139	140	8.57	•		•		•	•	•	Similar to #281, addition of Ag for improved malleability and ductility	
SnPb near-eutectic	#106	Sn63	63Sn/37Pb	183		8.40	•	•	•	•	•	•	•	Most widely used SnPb for electronics assembly (not recommended for soldering to gold thicker than 0.5 microns)	
	#100		62.6Sn/37Pb/0.4Ag	176	182	8.40	•	•	•	•	•	•	•	Low cost near-eutectic, contains Ag to minimize tombstoning in legacy applications	
	#130		60Sn/40Pb	183	238	9.28		•	•	•		•	•	Tin-lead commonly used in wire form, especially for large solder joints due to wider melting range than Sn63	
	—	Sn62	62Sn/36Pb/2Ag	179	180	8.41		•	•	•		•	•	Ag-containing for hybrid circuitry and Ag-terminated components	
Pb-free for electronics assembly	#241	SAC387	95.5Sn/3.8Ag/0.7Cu	217	220	7.40	•		•		•	•	•	Nearest-to-eutectic SAC alloy, adopted early in Pb-free transition for balanced properties	
	#256	SAC305	96.5Sn/3.0Ag/0.5Cu	217	220	7.40	•	•	•	•	•	•	•	Most widely used SAC alloy for electronics assembly	
	#121		96.5Sn/3.5Ag	221		7.50	•		•		•	•	•	Excellent thermal fatigue properties	
	#246	SAC405	95.5Sn/4.0Ag/0.5Cu	217	225	7.40	•	•	•	•	•	•	•	High-Ag SAC for improved thermal cycling reliability	
	#258	SAC105	98.5Sn/1.0Ag/0.5Cu	215	227	7.32	•		•		•	•	•	Low-Ag SAC for high drop shock resistance	
	#268	SACm™	98.5Sn/0.5Ag/1.0Cu+Mn	217	227	7.32	•	•	•	•	•	•	•	Low-Ag proprietary composition for combined drop shock resistance and thermal cycling reliability; comparable to SAC305	
	#263	SAC0307	99Sn/0.3Ag/0.7Cu	217	227	7.31	•		•		•	•	•	Lowest Ag SAC for lowest cost; high drop shock resistance	
	#262	Sn995	99.5Sn/0.5Cu+Co	227		7.32	Sn992	•	•	•		•	•	•	Low-cost Pb-free alloy for wave soldering; shiny finish
	#132	SnAg	95Sn/5Ag	221	240	7.39	•		•		•	•	•	High-temp Pb-free alloy for electronics assembly	
High Pb	#151		92.5Pb/5Sn/2.5Ag	287	296	11.02	•		•		•	•	•		
	#228	Sn10	88Pb/10Sn/2Ag	267	290	10.75		•	•	•		•	•	Solders better than #266, but is more rigid	
	#266	HMP	93.5Pb/5Sn/1.5Ag	296	300	11.02	•	•	•	•		•	•		
	#159		90Pb/10Sn	275	302	10.75	•		•		•	•	•		
	#163		95.5Pb/2.5Ag/2Sn	299	304	11.20	•		•		•	•	•		
	#164		95Pb/5In/2.5Ag	300	310	11.02	•		•		•	•	•	Good thermal fatigue; minimal Au-leaching properties for InPb alloys; often used in reducing atmosphere	
	#171		95Pb/5Sn	308	312	11.06	•		•		•	•	•		
Gold alloys	#182	AuSn	80Au/20Sn	280		16.00	•		•		•	•	•	Very strong solder alloy with excellent thermal fatigue resistance, especially for soldering to Au; high thermal conductivity	
	#183	AuGe	88Au/12Ge	356		14.67	•		•		•	•	•		

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