

QUALITY

LLE
Engine Bearing
Lai Luoh Enterprise Co., Ltd.

LLE
Engine Bearing

HISTORY



100% Bearing wall thickness inspection



Image Dimension Measurement System
Auto full dimension inspection



100% Bearing wall thickness inspection (auto)



Inductively Coupled Plasma(ICP).
Analyzing chemical composition



Online 100% inspection for bearing crush height

ENGINE BEARING BUSHING THRUST WASHER

For engines of Passenger Car, Truck, Tractor,
Construction Machinery, Agricultural Machinery,
Air Compressor, Military Vehicle, Marine Machinery &
Industrial Engines.



Established Year : 1962
Capital : US\$ 50,000,000
President : Jimmy Chen
Number Of Employees : 300

- 1962** · Factory moved and changed the company name as Lai Luoh Enterprise Co., Ltd.
- 1976** · Successfully developed bimetal sintering technology and set up the first set of slab sintering line.
 - Developed bushing production technology and started manufacturing.
 - Developed flange bearing production technology.
- 1988** · Factory expanded.
 - Completed improvement of sintering line and able to sinter material in coil strip.
- 1995** · Second factory completed and installed a MIBA (Austria) engine bearing transfer line.
- 1997** · Achieved ISO 9002 certification.
- 1998** · Achieved the Taiwan Military Engine Bearing Supplier Certification.
 - DU(PTFE) bushing was under developing.
 - Third factory was under Certification.
- 1999** · Achieved QS9000 Certification.
- 2003** · Began supply to Caterpillar (Italy), Nissan (Iran) & Mitsubishi (C.E.C.Taiwan).
- 2004** · Constructed the third factory in Chan-Sing industrial park, Changhua Country.
 - Implemented new plating system (know-how from Europe).
- 2005** · Began supply to YANMAR and John Deere (Europe).
- 2006** · Third factory completed.
 - Began supply to SUMITOMO (Japan) and BOMBARDIER (Europe).
- 2007** · Achieved the quality systems audit from GM.
 - Granted the certification of ISO 9001:2000 & ISO/TS 16949:2002.
- 2010** · Began supply to Knorr-Bremse (France) and Bendix (U.S.).
- 2011** · Began supply to Dresser, Inc., Dresser Waukesha (GE Energy) (U.S.).
- 2012** · Began supply to AGCO Agriculture Company (Finland)
- 2015** · Introduced fully automatic bearing dual-axis thickness processing equipment from MIBA (Austria).
- 2016** · Introduced Teflon spraying equipment.
- 2018** · Achieved IATF 16949 and ISO 9001 Certification.



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PRODUCT

Engine Bearing

for Crank (Main), Con. Rod (Big End) & Camshaft



Bushing

for Piston pin Rocker arm, Camshaft, Balance shaft, Intermediate shaft, King pin, Spring eyes, Roller, Transmission system, Gear, Trunnion, Oil pump, Drive shaft, and other application

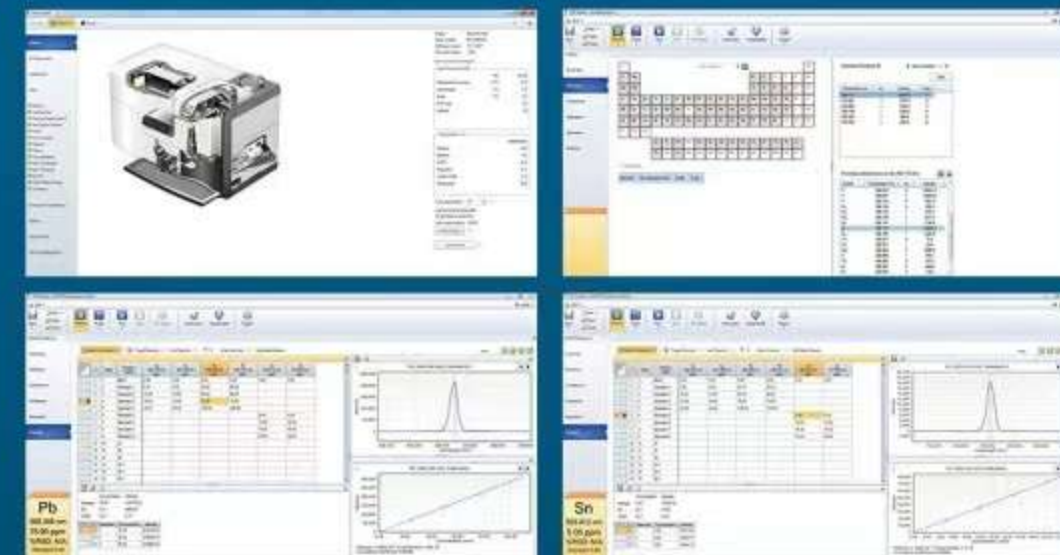


Thrust Washer, Side Plate & Spacer

for Crankshaft, Transmission system & Oil pump

Bearing Material

LLE SPEC NO:	EQUIVALENT STANDARDS		CHEMICAL COMPOSITION	APPLICATIONS
	SAE	ISO		
F1	12	SnSb8Cu4	7.5%Sb, 3.25%Cu, 0.5%Pb (Max), Sn Remainder	Low load bearings, bushings and washers
F23	15	PbSb14As	15.0%Sb, 1.0%Sn, 1.0%As, 0.5%Cu (Max), Pb Remainder	
F81		CuSn8Ni	8.0%Sn, 1.0%Ni, Cu Remainder	High load bushings (Lead free)
F83		CuSn10Bi3	3.0%Bi, 10.0%Sn, Cu Remainder	High load bushings (Lead free)
F100	792 797	CuPb10Sn10	10.0%Pb, 10.0%Sn, 0.03%Pb (Max), Cu Remainder	High load bushings and washers
F140			14.0%Pb, 3.0%Sn, Cu Remainder	High load bearings of crankshaft & Con. Rod (overlay available)
F147	780		6.0%Sn, 1.5%Si, 1.0%Cu, 0.5%Ni, 0.7%Fe (Max), Al Remainder	Manufacture of bushings & washers
F250	794 799	CuPb24Sn4	23.0%Pb, 3.5%Sn, 0.03%Pb (Max), Cu Remainder	Manufacture of bearings, bushings & washers
F780	49	CuPb24Sn	25.0%Pb, 2.5%Sn, 0.03%Pb (Max), Cu Remainder	High load bearings of crankshaft & Con. Rod (overlay available)
F785		AlZn5Si2CuPb	5.0%Zn, 1.5%Si, 1.0%Cu, 1.0%Pb, Al Remainder	
F810	788		12.0%Sn, 3.0%Si, 1.0%Cu, Al Remainder	Mid load bearings of crankshaft & Con. Rod.
F820	783	AlSn20Cu	20.0%Sn, 0.8%Cu, 0.4%Fe (Max), Al Remainder	Also bushings & washers
		CuZn31Si1	66-69%Cu, 0.7-1.3%Si, Zn Remainder	Piston pin bushing (Lead free)



Inductively Coupled Plasma(ICP).

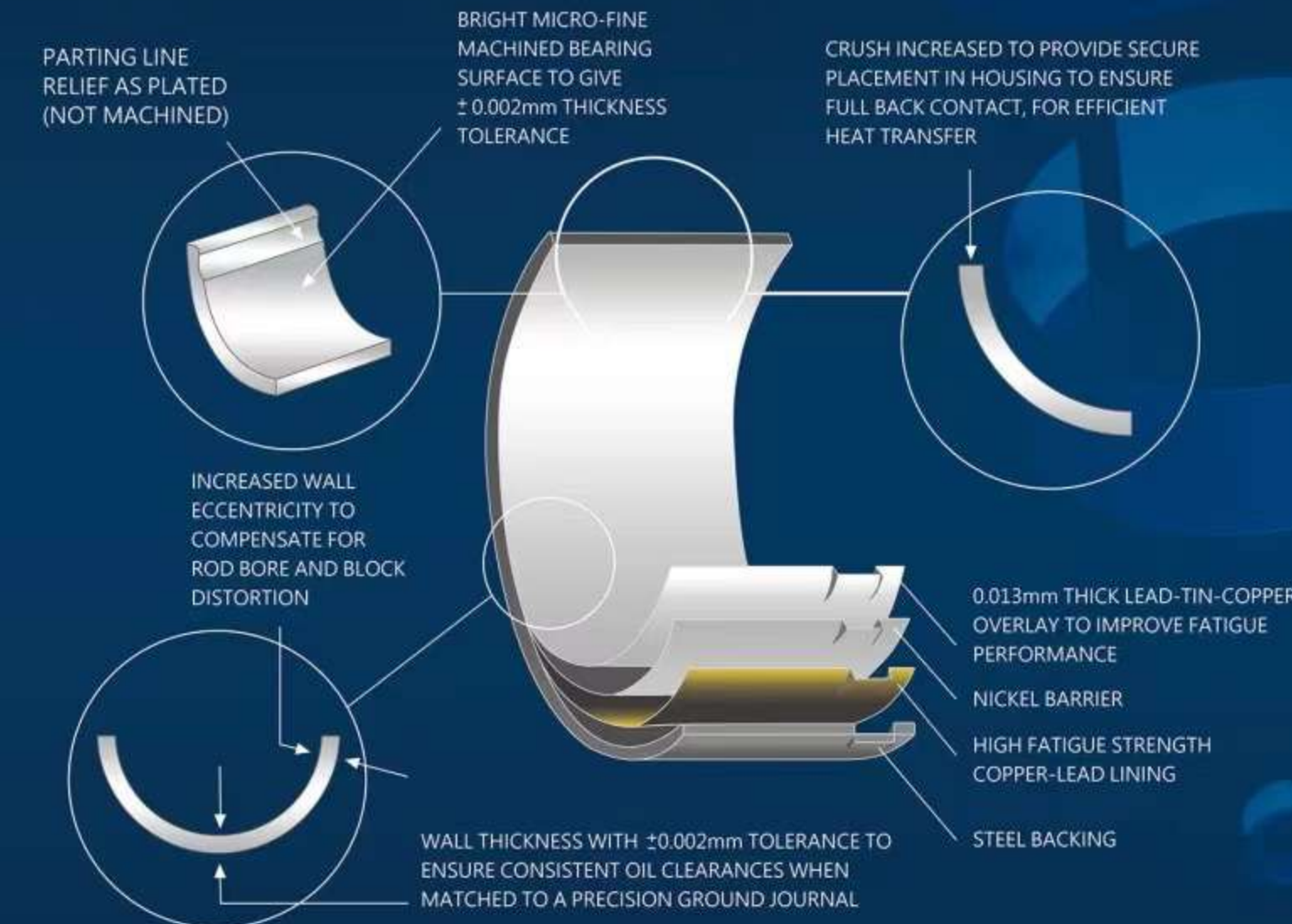
For analyzing chemical composition, capable of analyzing up to 77 elements.

Microstructures

- F81**
Lead free Copper Alloy
Cu : 91%
Ni : 1%
Sn : 8%
- F100**
Copper-Lead Alloy
Cu : 80%
Pb : 10%
Sn : 10%
- F140**
Copper-Lead Alloy
Cu : 83%
Pb : 14%
Sn : 3%
- F250**
Copper-Lead Alloy
Cu : 73.5%
Pb : 23%
Sn : 3.5%
- F780**
Copper-Lead Alloy
Cu : 72.5%
Pb : 25%
Sn : 2.5%
- F820**
Aluminium-Tin Alloy
Al : 79.2%
Sn : 20%
Cu : 0.8%

High Performance Engine Bearing

F780 copper lead material provides a 20% higher load carrying capacity than any other material. Also, it will provide longer life in normal operation and significantly improved fatigue resistance under extreme operating conditions.



Relative load carrying capacity

	UNIT LOAD	0.25	0.5	0.75	1.0	1.25
Babbitt F23 Micro-Bimetal		██████████				
Aluminium F820 Bimetal		██████████	██████████			
Sintered Copper-lead F770 Trimetal		██████████	██████████	██████████	██████████	
Sintered Copper-lead F780 Trimetal		██████████	██████████	██████████	██████████	██████████

MATERIAL DESIGNATION	BEARING TYPE	INTERNAL LAYER NOMINAL COMPOSITION %			NICKEL DAM	OVERPLATE NOMINAL COMPOSITION %			OVERPLATE THICKNESS	MACHINING TOLERANCE WALL THICKNESS
		COPPER	LEAD	TIN		LEAD	TIN	COPPER		
F780	SINTERED TRI-METAL	72.5	25	2.5	YES	87.5	10	2.5	0.013mm	±0.002mm

EQUIPMENT



Fully automatic bearing production line (From Miba, the bearings supplier to Mercedes Benz & BMW)



Bimetal bearing material sintering furnace



Bushing forming press



Fully automatic bearing production line