



LMF: Economic Solution for Forging of Aluminium

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Forged aluminium components are a current trend



- Forged aluminium components contribute to automotive light weight and can today be found in many modern cars



- Light weight is a permanent topic in the aircraft industry
- Forged aluminium components cover a wide range of dimensions

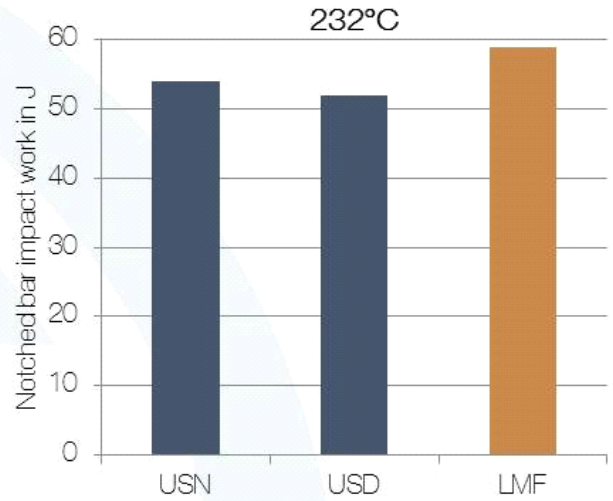
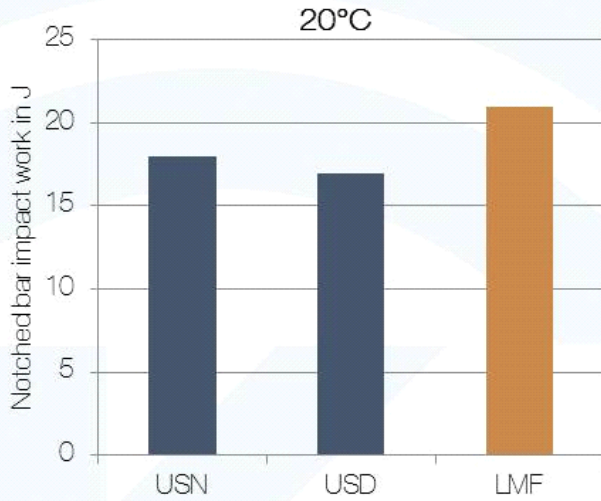
Process parameters	Loads on tools	Requirements
<ul style="list-style-type: none"> • Slow forging process • Long contact times 	<ul style="list-style-type: none"> • High thermal loads on dies 	<ul style="list-style-type: none"> • High tempering resistance and high-temperature strength
<ul style="list-style-type: none"> • Friction/sticking between aluminium and die 	<ul style="list-style-type: none"> • Stresses induced in surface of the die 	<ul style="list-style-type: none"> • High toughness
<ul style="list-style-type: none"> • Hard Al oxide layers 	<ul style="list-style-type: none"> • Abrasive wear of the die 	<ul style="list-style-type: none"> • High wear resistance

LMF with a concept tailored for aluminium forging

LMF 5% chromium steel with reduced content of silicon

- LMF has an analysis and production concept tailored to heat resistance and toughness
- Pre-sorted scrap selection ensures high purity even without ESR
- Increasing the toughness by lowering Si content
- Alloying with niobium increases the austenitizing temperature, resulting in higher hardness

Density g/cm ³	Coefficient of thermal expansion 10 ⁻⁶ m/mK			Thermal conductivity W/mK		
	20°C	20-100°C	20-400°C	20-600°C	20°C	200°C
7,8	11,5	12,6	13,1	29,3	30,2	30,2

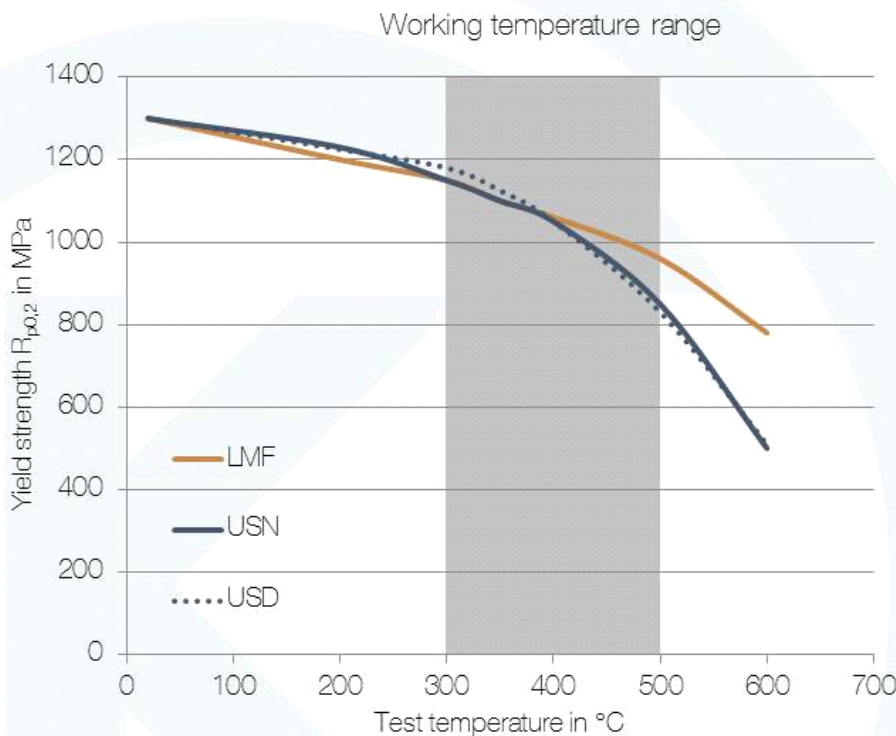


- LMF shows improved toughness at room temperature
- High toughness prevents cracking

- LMF shows great toughness even at increased temperature

Hardness: 45HRC
 Sample shape: ISO-V, 55x10x10mm³
 Sample position: transversely, transition zone
 quenched + tempered in laboratory

At higher working temperatures, LMF shows its heat resistance



- With regard to their high temperature strength - represented by the 0.2% yield strength Rp0.2 - the steels shown behave the same up to a test temperature of approx. 350 ° C.
- With further increasing test temperatures (in the range of typical working temperatures), the hot-working steel LMF shows its higher heat resistance.



Processing type	Condition	Cutting speed v_c in m/min	Feed F_z in mm	Cutting depth a_p in mm
Face milling	annealed	150-180	0,20-0,50	2,0-4,0
	QT	30-70	0,20-0,30	2,0-4,0
drilling	annealed	50-90	-	0,10-0,25
	QT	40-60	-	0,10-0,25

Contact

Kind & Co., Edelstahlwerk, GmbH & Co. KG

Bielsteiner Str. 124-130 • 51674 Wiehl

Telefon: 02262/84-0 • Telefax: 02262/84-175

Web: www.kind-co.de • Email: info@kind-co.de

