Feasibility Evaluation of Metal Matrix Composites Used for Gears of Lathe Machine

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ABSTRACT

In many automotive and metal cutting tool applications, gear tooth loading is insignificant and geometrical, environmental and manufacturing factors dictate the choice of material and the gear design .The gears generally fail when tooth stress exceeds the safe limit .Therefore, it is essential to explore alternate gear material .stainless steel materials provide good mechanical and excellent formability but it has poor tribological property due to its low hardness. The metal matrix composite type has excellent mechanical properties of metals such as ductility and toughness and good wear and corrosion resistance of ceramics.

Noise generation is a major concern in all types of machines .Gear noise can be particular problem either because of unpleasant audible noise or because of the effect noise has on the operating characteristics of the machine. Thus gear needs to be redesigned providing energy saving by weight reduction, providing internal damping, reducing lubrication requirements, reducing noise without increasing cost. Therefore _the objectives of the present work is concerned with the replacement of existing metallic's gears with composite material gears in order to make it lighter and increasing the efficiency of mechanical machines.

CONCLUSION

The following conclusions are drawn from the present work:

1. The Al-7072 matrix material has greater ultimate tensile strength and tensile force than Al-6061 and Al-6063 matrix materials
2. When the matrix materials are reinforced with SiC and Al203 particles, The AL6061 based composite has greater ultimate tensile strength and tensile force than AL7072 and A L6063 based composites.
3. The AL6061 based composite is subjected to ductile fracture whereas AL7072 based composite results in brittle fracture. The AL6063 based composite faces ductile — brittle fracture.
4. From the studies in overall it can be concluded that AL203/AA 6061 composites exhibits superior mechanical and tribological properties.
5. The composite materials can take up higher tensile force than alloys. The preferred material for gears used for lathe is Al203 /AA 6061 composite.

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