Tribological Studies Of Laser Textured Tool Inserts In Turning Operation

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Introduction

Manufacturing is a very important component of any engineering realization. It is worth noting here that high percentage of GDP of many nations comes from the manufacturing sector. It is worth noting here that setting up of large manufacturing industries for boosting the GDP and providing the employment can harm the nature through its emissions and effluent disposals. Thus a need arises for development of energy efficient green manufacturing for protecting the environment. Even a small energy saving per ton of manufacturing saves huge amount of resources and money.

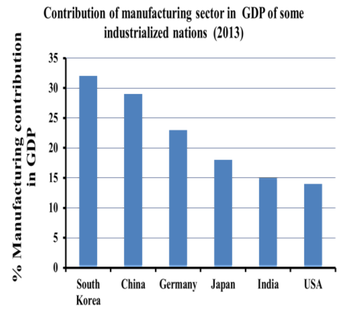
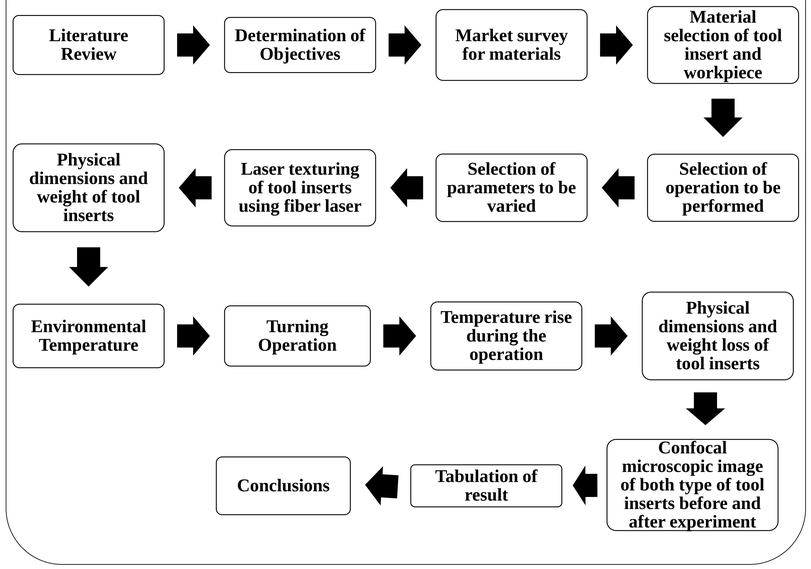


Figure 1: Contribution of manufacturing in GDP of top 6 countries in 2013

Project Objectives

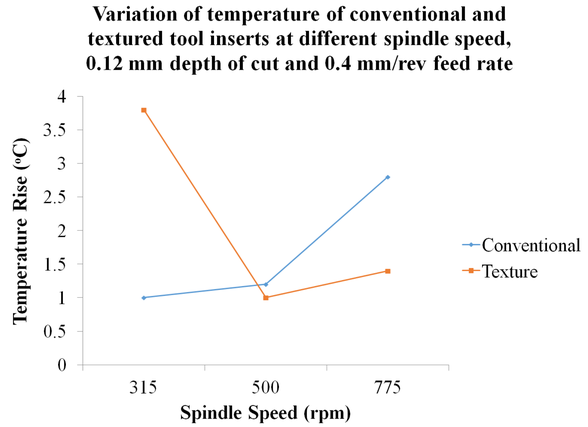
- Tribological studies of **conventional tool inserts** employed in the turning process of carbon steel (C-20) at various operating parameters for dry condition.
- Tribological studies of **textured tool inserts** employed in the turning process of carbon steel (C-20) at various operating parameters for dry condition.
- Comparisons of tribological parameters achieved with conventional and textured inserts.

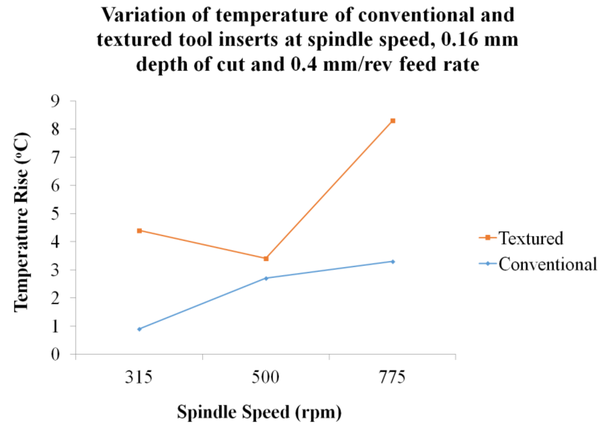
Methodology

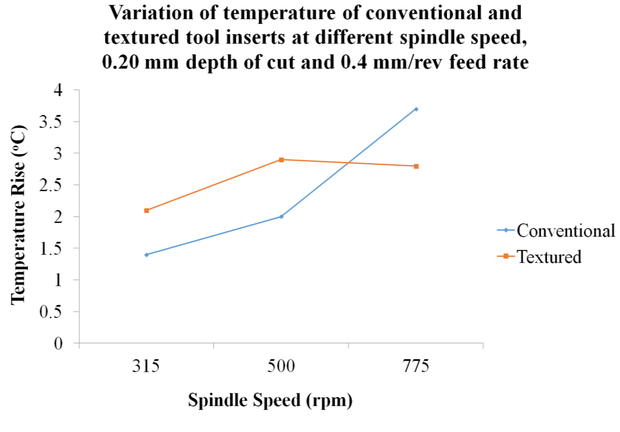


Results and Discussion

1. Rise in temperature for both type of tool inserts at various parameters.







2. Wear in conventional and textured tool inserts.

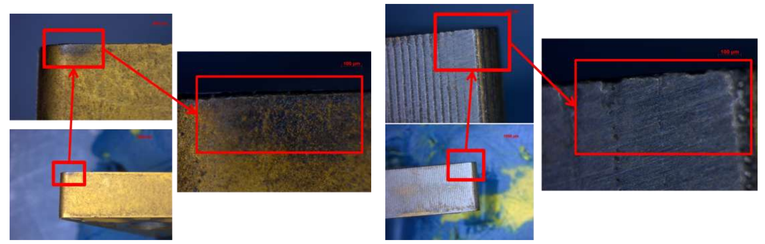


Figure 3: Confocal microscopic image of conventional and textured tool insert.

Conclusions

- Temperature rise is in increasing order when the spindle speed, feed rate and depth of cut is increased for both textured and conventional tool insert. The rise in temperature of textured tool insert is less in comparison to conventional tool insert.
- Weights of conventional tool inserts have decreased after the turning operation. Whereas the weight of textured tool inserts has increased because the chips of workpiece and tool insert articles gets trapped inside the texture.
- Wear of conventional and textured tool inserts changes with change in parameters like spindle speed, feed rate and depth of cut. Wear is more for conventional tool inserts in comparison to textured tool inserts.

References

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