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Composites in machine tools & Work-holding

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With the growing need to build faster, efficient and economic machines, light weight and fatigue control are key considerations in the engineering of rotating machine elements. As the main concern for machining is higher air cutting times or idle times which is due to the weight of the structures constraining the quick acceleration and deceleration cycles. Also while concentrating on light weight machine elements, we also need to consider their high damping and static stiffness requirements to ensure the engineered geometries, required rates of production and acceptable surface finish are achieved economically. Composite materials, by the virtue of their high stiffness to weight ratio can meet the above objectives by reducing the impact of inertia if used for the structural components in machine tools. Work-holding components in the machine tools play a very crucial role in achieving the required part accuracies. Different conventional material combinations and geometric optimization are already in place to explore the possibility of machining the most complex components with high levels of accuracy. Moving ahead by exploiting the low weight and low cost properties of composites and the flexibility it provides for manufacturing, the possibility of having more efficient machine tools and work-holding systems will be discussed. Conclusion: By understanding the feasibility of material combinations and new degrees of freedom in the manufacturing involved, the feasibility of moving towards strong and economic engineered solutions with the initial probable trails to be made will be shown.

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