Bimetallic Machining

Precision Manufacturing Research Consortium

Industrial Advisory Board

Georgia Institute of Technology

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Goal and Motivation

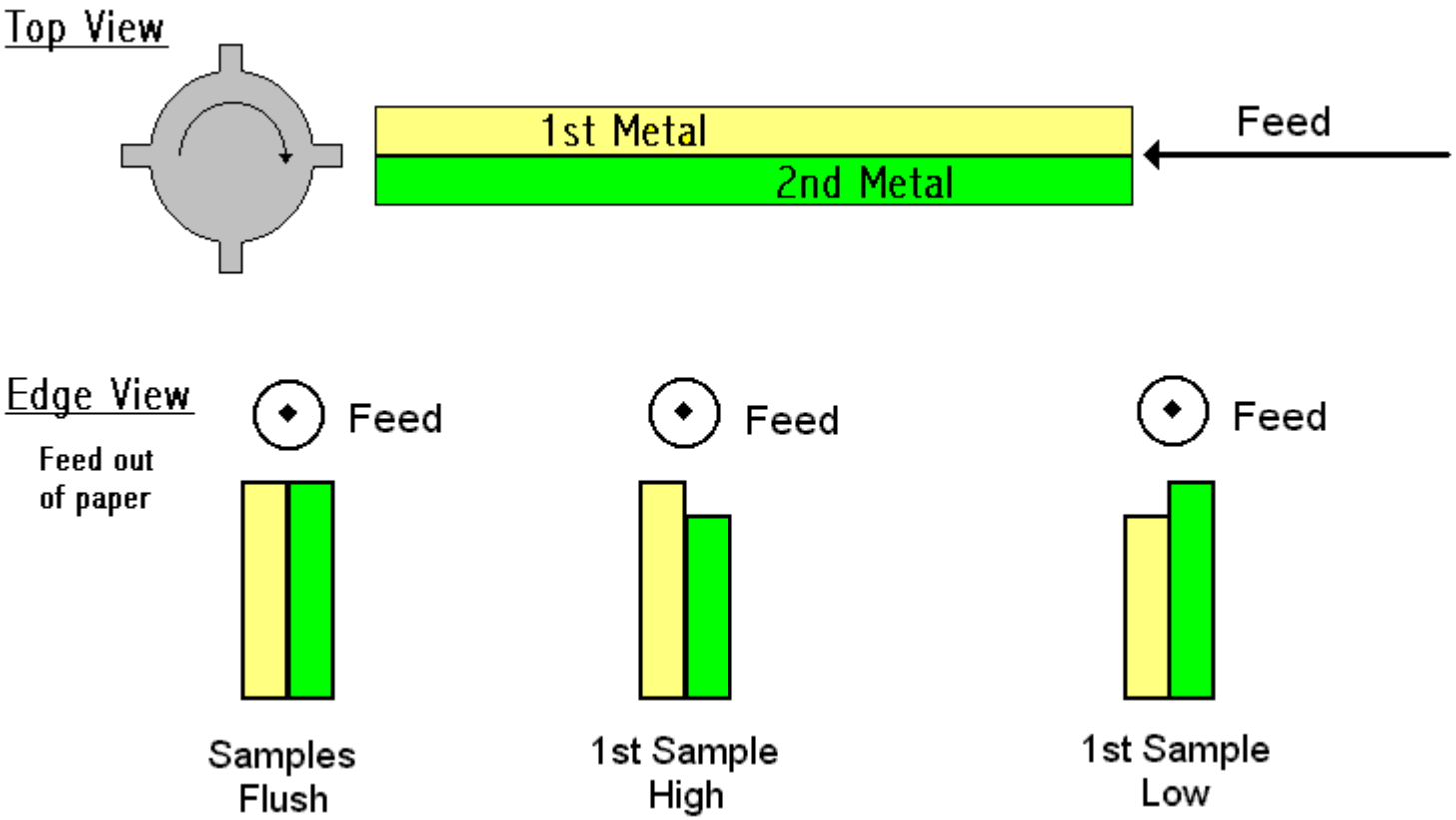
- To examine the process of milling bimetals and vary experimental parameters in order to determine statistically significance factors in achieving a superior surface finish.

Examples of Bimetallic Machining

- Steel sleeves in aluminum engine blocks
- Machining over welds
- Aluminum space frames with steel joints
- Composite space frames with metallic joints
- Interrupted cutting (air and metal)

5-Axis Mill

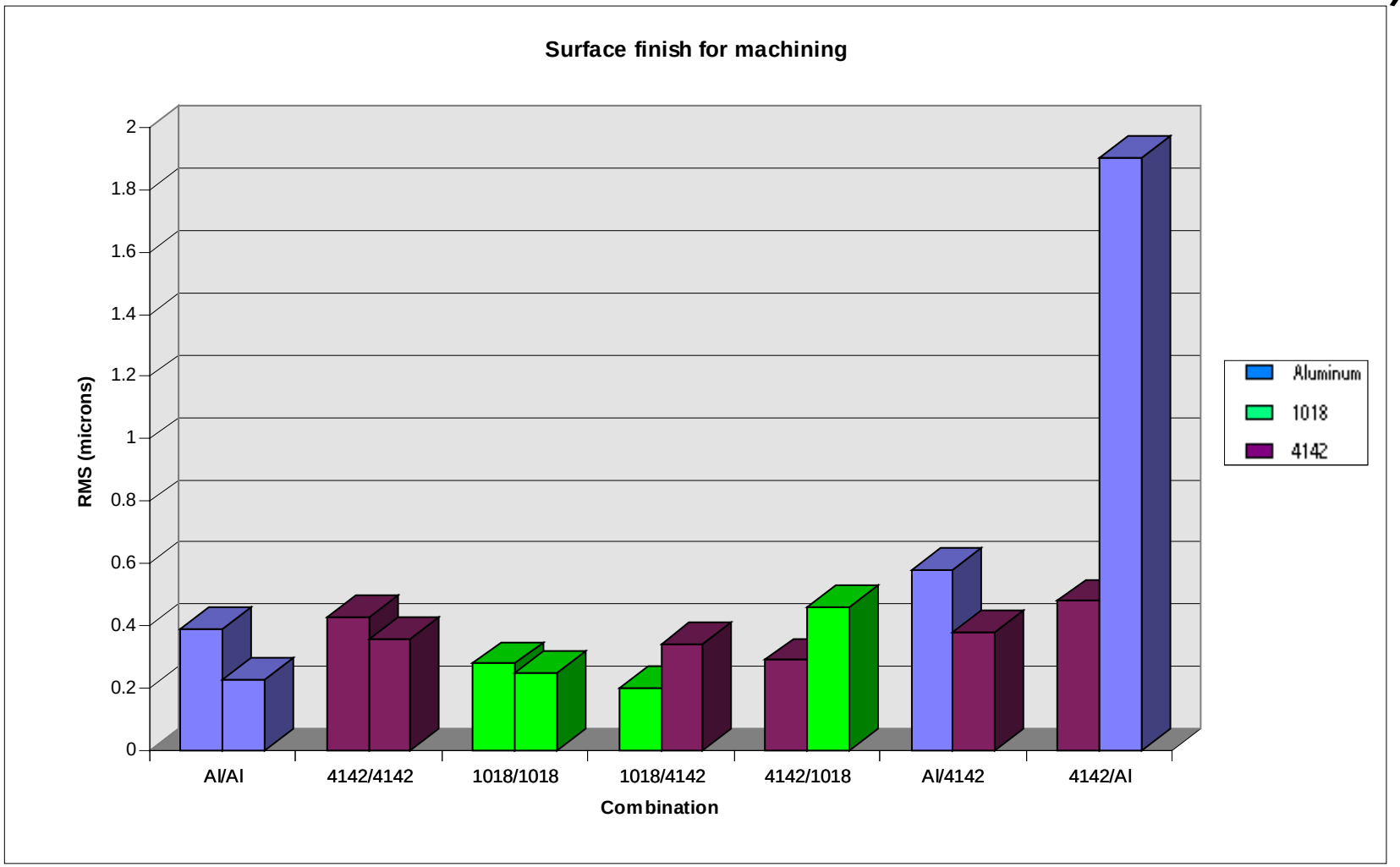
Milling Configurations



Items of Investigation

- Up-milling versus Down-milling
- Impact order
- Variation of material removal effects
- Vibrational characteristics

RMS Surface Measurements



Present Conclusions

- The softer the first material, the better the surface finish of the second
- The more material removed from a harder first material the worse finish there is on a softer second material
- A larger magnitude in vibration does not necessarily produce a worse surface finish

Future Work

- More vibrational measurements of process
- Cutting force measurements
- Effects of tool parameters (rake, edge radius, etc.)
- More advanced analysis of surface finish (microscopic analysis)
- Three dimensional metrology of surface