University of Huddersfield Repository

Mian, Naeem S., Fletcher, Simon, Longstaff, Andrew P., Myers, Alan and Pislaru, Crinela

Novel and Efficient Thermal Error Reduction Strategy For Machine Tool Performance Improvement

Original Citation

Mian, Naeem S., Fletcher, Simon, Longstaff, Andrew P., Myers, Alan and Pislaru, Crinela (2009) Novel and Efficient Thermal Error Reduction Strategy For Machine Tool Performance Improvement. In: University of Huddersfield Research Festival, 23rd March - 2nd April 2009, University of Huddersfield. (Unpublished)

This version is available at https://eprints.hud.ac.uk/id/eprint/5226/

The University Repository is a digital collection of the research output of the University, available on Open Access. Copyright and Moral Rights for the items on this site are retained by the individual author and/or other copyright owners. Users may access full items free of charge; copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational or not-for-profit purposes without prior permission or charge, provided:

- The authors, title and full bibliographic details is credited in any copy;
- A hyperlink and/or URL is included for the original metadata page; and
- The content is not changed in any way.

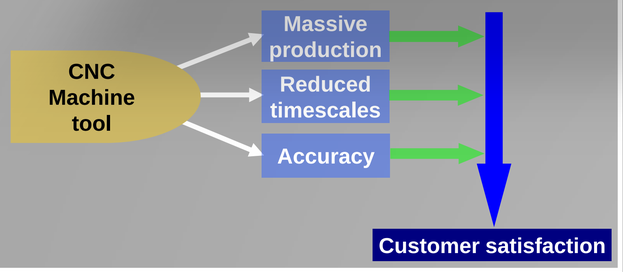
For more information, including our policy and submission procedure, please contact the Repository Team at: E.mailbox@hud.ac.uk.

http://eprints.hud.ac.uk/

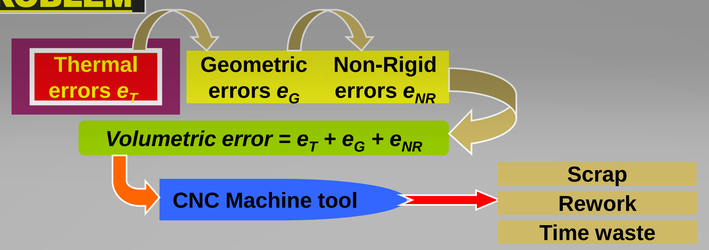
NOVEL AND EFFICIENT THERMAL ERROR REDUCTION STRATEGY FOR MACHINE TOOL PERFORMANCE IMPROVEMENT

N. S. Mian, S. Fletcher, A. P. Longstaff , A. Myers , C. Pislaru
University of Huddersfield, Queensgate, Huddersfield HD1 3DH, UK

1. INTRODUCTION

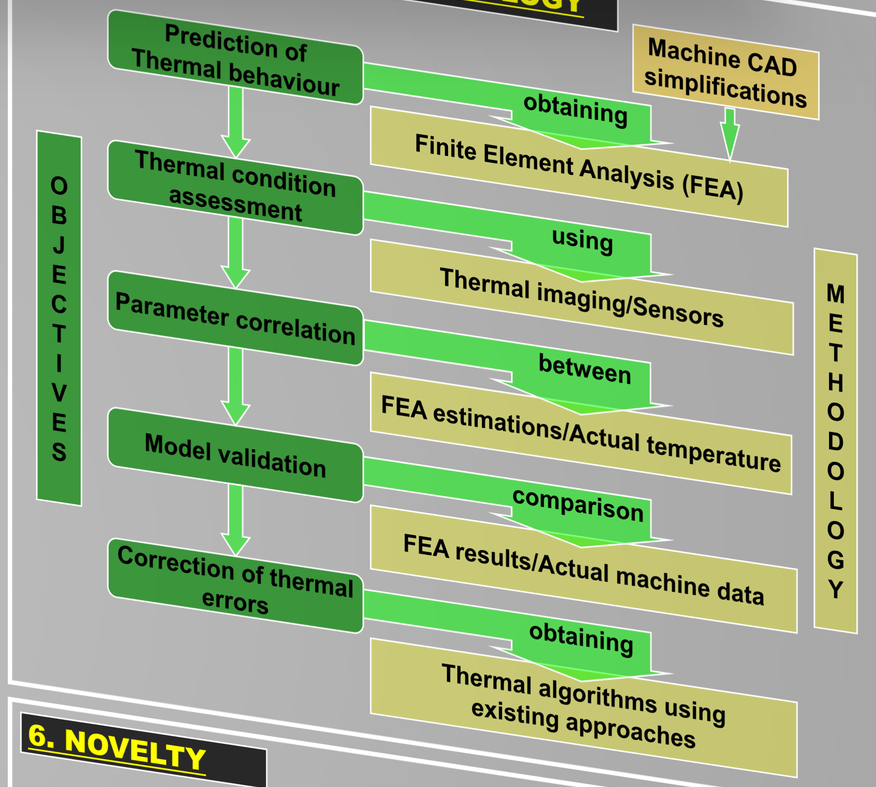


2. THE PROBLEM



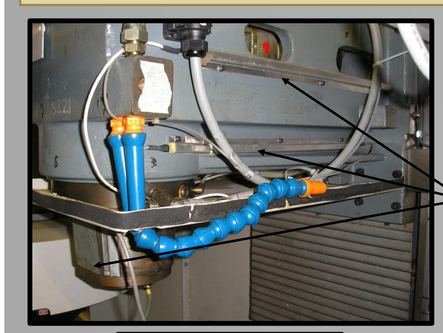
Thermal error represents 70% of the total volumetric error

3. OBJECTIVES AND METHODOLOGY

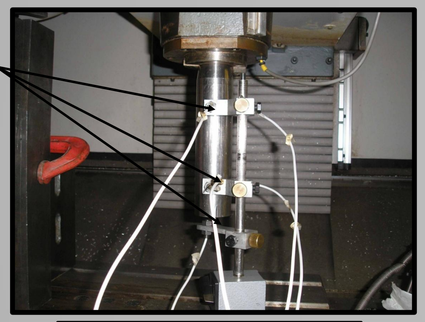


4. THERMAL ANALYSIS

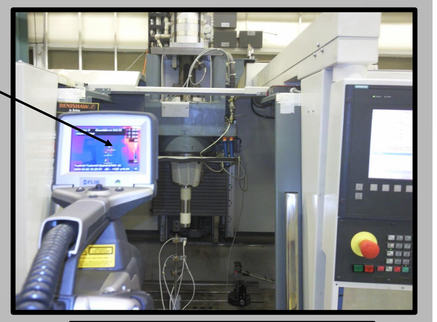
4.1 EXPERIMENTAL MACHINE TESTING - ONLINE ANALYSIS



Machine head

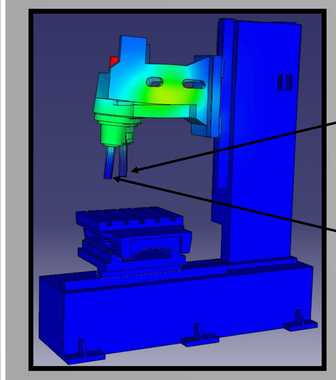


Tool

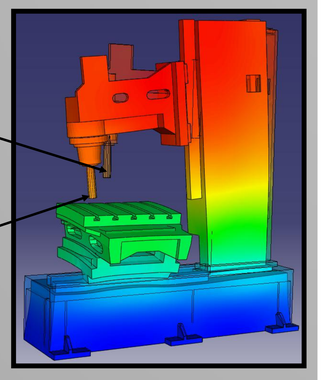


Machine's front view

4.2 FINITE ELEMENT ANALYSIS (FEA) - OFFLINE ANALYSIS

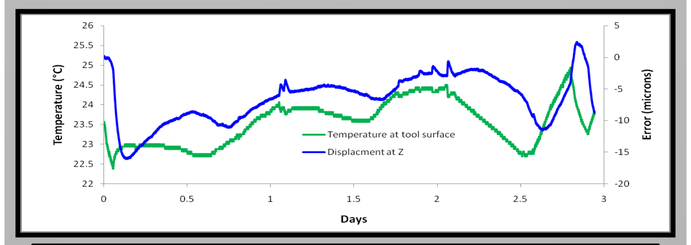


Deformation due to internal heating

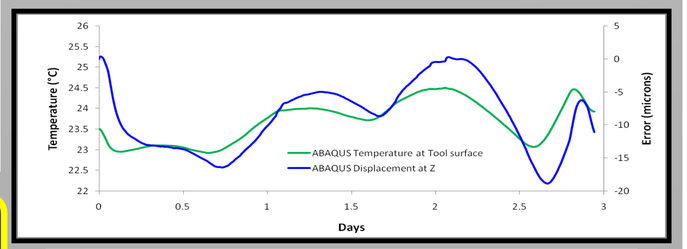


Deformation due to environmental variations

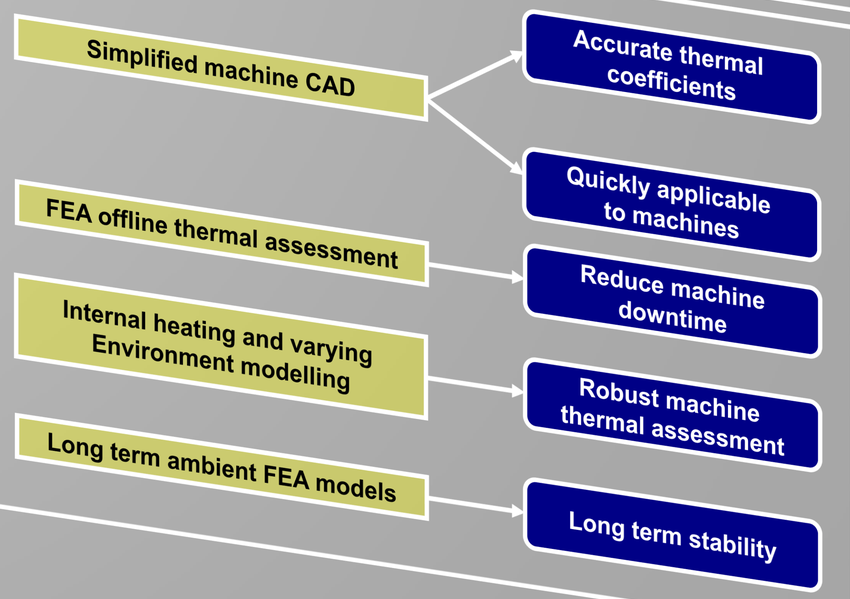
5. RESULTS



Experimental temperature and displacement profiles



Simulated temperature and displacement profiles

70% to 86% correlation achieved in experimental and FEA simulated displacement results

6. NOVELTY