



DEPARTMENT OF MECHANICAL ENGINEERING Purdue School of Engineering and Technology

SPRING 2006 SEMINAR SERIES

Date: **Thursday, March 30, 2006**

Time: **11:00 am - 12:00 pm**

Room: **SL 165**

Reception at 10:45 am (cookies and refreshments served)

Everyone is invited

Investigating Machining Impact on Fatigue Variance: A Machining Quality Perspective

Dr. Xiaoping Yang
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Abstract. Fatigue life of nominally identical structures under nominally identical loading conditions can scatter widely. This study has investigated the impact of machining processes on such scatters. After Ti 6Al-4V samples were surface ground and face turned, they were subject to constant amplitude four-point bending fatigue tests under room temperature. The best-case scenario of process capability ratios of fatigue for these samples were evaluated with assumed tolerances of fatigue life. Based on these ratios, the numbers of nonconforming parts were estimated. Under the machining conditions from the *Machining Data Handbook* (Machining Data Center, Cincinnati, 1980), up to 39% of samples due to one process are expected to be nonconforming, whereas only up to 0.6% of samples due to the other process are expected to be nonconforming. The ramifications in terms of cost for machining quality control due to the different capability ratios have been discussed. The current findings indicate an urgent need to further the study of this issue in a scientific manner.

About the Speaker. Dr. Xiaoping Yang joined Cummins Inc. after he received his Ph.D. degree from Purdue University in 2001. He has published ten technical papers in referred journals and conference proceedings since 1999. He co-authored two handbook chapters on Design for Manufacturing. He is a member of ASME MED Quality and Reliability Technical Committee and co-organized a symposium in 2005 IMECE.

At Cummins Inc., Dr. Yang has been involved in various engine manufacturing projects including machining and engine testing. He received the Certificate of Achievement for 6-Sigma Belt Training in 2002 and completed a 6-Sigma project with an annualized saving of over \$160,000.