ME 5990
Machining Dynamics
Paper Listing

Paper Set 0: Review of Basic Cutting Mechanics and Introduction to Machining Dynamics

— No Paper Presentations for this set.

ME 4610/5610 Notes, Chapters 2 and 8.4 of *Advanced Statics of Machining Processes*.

Paper Set 1: Historic Graphical Techniques for Machining Stability Analysis

— Paper Presentation 1a for Paper 1.1; Paper Presentation 1b for Paper 1.2.

1.1 Gurney, J. P., and Tobias, S. A., 1961, "A Graphical Method for the Determination of the Dynamic Stability of Machine Tools," *Int. J. Mach. Tool Des. Res.*, 1, 148-156.

1.2 Merritt, H. E., 1965, "Theory of Self-Excited Machine-Tool Chatter: Contribution to Machine-Tool Chatter Research – 1," *ASME J. Engg. for Ind.*, 87, 447-454.

1.3 Kegg, R. L., 1965, "Cutting Dynamics in Machine Tool Chatter: Contribution to Machine-Tool Chatter Research – 3," ASME J. Engg. for Ind., 87, 464-470.

1.4 Sweeney, G., and Tobias, S. A., 1969, "Survey of Basic Machine Tool Chatter Research," *Int. J. Mach. Tool Des. Res.*, **9**, 217-238.

Paper Set 2: Analytical Stability Solutions for 1-D, Linear, Time-Invariant Machining Processes

— Paper Presentation 2a for Paper 2.1; Paper Presentation 2b for Paper 2.3.

2.1 Tobias, S. A., and Fishwick, W., 1958, "The Chatter of Lathe Tools Under Orthogonal Cutting Conditions," *Trans. ASME*, 80, 1079-1088.

2.2 Tlusty, J., and Polacek, M., 1963, "The Stability of the Machine Tool Against Self-Excited Vibrations in Machining," *ASME Prod. Engg. Res. Conf.*, Pittsburgh, 454-465.

2.3 Nigm, M. M., 1981, "A Method for the Analysis of Machine Tool Chatter," *Int. J. Mach. Tool Des. Res.*, 21, 251-261.

2.4 Ozdoganlar, O. B., and Endres, W. J., 1997, "A Structured Fully-Analytical Approach to Multi-Degree-of-Freedom Time-Invariant Stability Analysis for Machining," *Proc., Symp. on Predictable Modeling in Metal Cutting as Means of Bridging Gap Between Theory and Practice*, ASME IMECE, **MED-6-2**, 153-160.

2.5 Endres, W. J., 1996, "A Quantitative Energy-Based Method for Predicting Stability Limit as a Direct Function of Spindle Speed for High-Speed Machining," *Trans. NAMRI/SME*, **24**, 27-32.

Paper Set 3: Nonlinearities – Structural Dynamics, Size Effect and Process Geometry

— Paper Presentation 3a for Paper 3.2; Paper Presentation 3b for Paper 3.5.

3.1 Hanna, N. H., and Tobias, S. A., 1974, "The Theory of Nonlinear Regenerative Chatter," *ASME J. Engg. for Ind.*, 96, 247-255.

3.2 Endres, W. J., and Loo, M., 2002, "Modeling Cutting Process Nonlinearity for Stability Analysis — Application to Tooling Selection for Valve-Seat Machining," *5th CIRP Int'l Workshop on Modeling of Machining*, 71-82.

3.3 Ozdoganlar, O. B., and Endres, W. J., 2000, "An Analytical Representation of Chip Area for Corner-Radiused Tools Under Depth-of-Cut and Feed Variations," *ASME J. Mfg. Sci and Engg.*, **122**, 660-665.

3.4 Endres, W. J., and Ozdoganlar, O. B., 2002, "Existence and Effects of Overlap Factors Greater than Unity and Less than Zero," *J. Manuf. Proc.*, **4**, 67-76.

3.5 Ozdoganlar, O. B., and Endres, W. J., 1998, "Stability of Turning Processes with Corner-Radiused Tools," in review, *ASME J. Mach. Sci. Tech.*

Paper Set 4: Periodic Time Variation – Intermittency and Kinematics

— Paper Presentation 4a for Paper 4.2; Paper Presentation 4b for Paper 4.4.

4.1 Corpus, W. T., and Endres, W. J., 2000a, "Added Stability Lobes for Machining Processes that Exhibit Periodic Time Variation – Part 1: A Simulation and Physical Study," in review, *ASME J. Mfg. Sci. and Engg.*

4.2 Corpus, W. T., and Endres, W. J., 2000b, "Added Stability Lobes for Machining Processes that Exhibit Periodic Time Variation – Part 2: An Analytical Solution," in review, *ASME J. Mfg. Sci. and Engg.*

4.3 Davies, M. A., Pratt, J. R., Dutterer, B. S., and Burns, T. J., 2000, "The Stability of Low Radial Immersion Milling," *CIRP Annals*, **49**, 37-40.

4.4 Davies, M. A., Pratt, J. R., Dutterer, B. S., and Burns, T. J., 2002, "Stability Prediction for low Radial Immersion Machining," *ASME J. Man. Sci. Engg.*, 124, 217-225.[WJE1]

4.5 Taylor, S. G., and Endres, W. J., 2002, "A General Classification of Machining Stability Problems," in preparation, *ASME J. Mfg. Sci. and Engg.*

Paper Set 5: Milling Stability

— Paper Presentation 5a for Paper 5.1; Paper Presentation 5b for Paper 5.2.

5.1 Tlusty, J., 1986, "Dynamics of High-Speed Milling," *ASME J. Engg. for Ind.*, 108, 59-67.

5.2 Budak, E., and Altintas, Y., 1998, "Analytical Prediction of Chatter Stability in Milling – Part I: General Formulation," *ASME J. Dyn. Sys., Meas. and Contr.*, 120, 22-30.

5.3 Budak, E., and Altintas, Y., 1998, "Analytical Prediction of Chatter Stability in Milling – Part II: Applications," *ASME J. Dyn. Sys., Meas. and Contr.*, **120**, 31-36.

Paper Set 6: Process Damping

— Paper Presentation 6a for Paper 6.1; Paper Presentation 6b for Paper 6.2.

6.1 Wu, D. W., 1988, "Application of a Comprehensive Dynamic Cutting Force Model to Orthogonal Wave-Generating Processes," *Int. J. Mech. Sci.*, 30, 1-20.

6.2 Delio, T., Smith, S., Tlusty, J., and Zamudio, C., 1990, "Stiffness, Stability, and Loss of Process Damping in High-Speed Machining," *Proc., ASME Symp. on Fundamental Issues in Machining in Honor of B. F. Von Turkovich*, PED-43, 171-191.

Paper Set 7: Vibration Analysis

— Paper Presentation 7a for Paper 7.1; Paper Presentation 7b for Paper 7.2.

7.1 Radulescu, R., Kapoor, S. G., Endres, W. J., and DeVor, R. E., 1993, "An Investigation of the Vibration of the Face Milling Process During High Speed Machining," *Trans. NAMRI/SME*, 21, 237-246.

7.2 Endres, W. J., 1997, "An Energy-Based Approach Towards Obtaining an Analytical Solution for Chatter Vibration Level," *Tech. Papers of NAMRI/SME*, 25, 27-32.

Paper Set 8: Modeling Effects of Edge Condition

— Paper Presentation 6a for Paper 6.1; Paper Presentation 6b for Paper 6.2.

8.1 Merchant, M. E., 1944, "Basic Mechanics of the Metal-Cutting Process," *ASME J. of Appl. Mech.*, **66**, A-168 to A-175.

8.2 Abdelmoneim

8.3 Endres, W. J., DeVor, R. E., and Kapoor, S. G., 1995, "A Dual-Mechanism Approach to the Prediction of Machining Forces: Part 1 – Model Development," *ASME J. of Engg. for Ind.*, Vol. 117, pp. 526-533.

8.4 Endres, W. J., DeVor, R. E., and Kapoor, S. G., 1995, "A Dual-Mechanism Approach to the Prediction of Machining Forces: Part 2 – Model Validation," *ASME J. of Engg. for Ind.*, Vol. 117, pp. 534-541.

8.5 Manj.

8.6 Schimmel

Paper Set 9: Thermal Modeling

— Paper Presentation 7a for Paper 7.2; Paper Presentation 7b for Paper 7.3.

7.1 Trigger, K. J., and Chao, B. T., 1951, "An Analytical Evaluation of Metal-Cutting Temperatures," *Trans. ASME*, Vol. 73, p. 57.

7.2 Loewen, E. G., and Shaw, M. C., 1954, "On the Analysis of Cutting-Tool Temperatures," *Trans. ASME*, Vol. 76, pp. 217-231.

7.3 Kececioglu, D., 1958, "Shear-Zone Temperature in Metal Cutting and its Effects on Shear-Flow Stress," *Trans. ASME*, Vol. 80, pp. 541-546.

Paper Set 10:

— Paper Presentation 8a for Paper 8.2; Paper Presentation 8b for Paper 8.3.

8.1 Liu, C. R., and Barash, M. M., 1976, "The Mechanical State of the Sublayer of a Surface Generated by Chip-Removal Process; Part 1: Cutting With a Sharp Tool," *ASME J. of Engg. for Ind.*, Vol. 98, pp. 1192-1201.

8.2 Liu, C. R., and Barash, M. M., 1976, "The Mechanical State of the Sublayer of a Surface Generated by Chip-Removal Process; Part 2: Cutting With a Tool With Flank Wear," *ASME J. of Engg. for Ind.*, Vol. 98, pp. 1202-1208.

8.3 Lin, Z.-C., and Pan, W.-C., 1993, "A Thermoelastic-Plastic Large Deformation Model for Orthogonal Cutting with Tool Flank Wear—Part II: Machining Application," *Int. J. of Mech. Sci.*, Vol. 29, pp. 295-303.