Post-Conference Training

June 6-7, 2012 (Wed-Thur), 9a-5p, **University of Michigan-Dearborn**
(two days, includes light continental breakfast at 8:30am, lunch each day)

Please Note: Final course selection, BASED ON REGISTRATION RESPONSE, will be announced May 1, 2012.
Registration Confirmations will be sent to registered students after this date.

Course Fee: $450 (Students with valid ID: $250)

Using LS-DYNA® for Heat Transfer with Hot Stamping Applications

Instructor: Art Shapiro

The course objective is to provide an understanding of computational finite element heat transfer. Presentations 1-6 focus on the various heat transfer modeling issues one must understand in using LS-DYNA. This is followed by presentations 7 and 8 which are an introduction to thermal-stress problems with a focus on sheet metal forming. The final presentation ties everything together by discussing the methodology for modeling hot stamping. The Numisheet 2008 benchmark problem BM03 was selected as the model problem to be solved.

Presentations include:

1. Introduction – Learn to create a KEYWORD input file to solve for the thermal expansion of an aluminum block. Lean how to interpret LS-PrePost temperature fringe plots to gain knowledge of the physical process.
2. Mathematical Theory – brief, but can't be avoided.
3. Equation Solvers - Learn the advantages and disadvantages between the Gauss direct solvers & conjugate gradient iterative solvers in LS-DYNA.
4. Time Step Control – Learn how to select a time step size, use the variable time step option, and understand the difference between explicit, implicit and Crank Nicolson time integration methods.
5. Nonlinear Problems – Learn the nonlinear heat transfer keyword parameters and how Newton's nonlinear method works. Applications discussed are radiation problems and a phase change problem.
6. Boundary Conditions – Learn how to define temperature, flux, convection, and radiation boundary conditions. Learn how to hand calculate a convection heat transfer coefficient.
7. Thermal Contact – Learn thermal contact modeling issues with sheet metal forming applications.
8. Thermal-stress coupling – An introduction to coupled thermal stress modeling. Topics include conversion of plastic work to heat, conversion of sliding friction to heat, and calculation of thermal expansion. Thermal-mechanical material constitutive models are also presented.
9. Modeling Hot Stamping - This presentation is a review of the preceding topics. Presented is a methodology for modeling hot stamping. The Numisheet 2008 benchmark problem BM03 was selected as the model problem to be solved.

Hot Forming Process - fringes of temperature