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## Introduction to LS-OPT®

**Instructor: Imtiaz Gandikota**

**2 Day - \$400, Students \$200** w/student ID

Includes on-site continental breakfast, lunch, breaks, class notes, class dinner  
Includes 30-day demonstration license

**Prerequisite:** Knowledge in LS-DYNA is recommended

**Description:** This 2 day course provides an introduction to the use of the optimization code LS-OPT for design. It covers both theoretical concepts and practical aspects of design optimization. An emphasis is placed on interfacing with LS-DYNA. The course includes workshop sessions, in which the theoretical topics of the day are applied. The LS-OPT Version 6.0 graphical user interface is used to teach input preparation and post-processing.

Over the duration of the class, students work individually (sometimes in groups of 2) to solve the exercises. The exercises are simple, so that the run times are short, but contain enough complexity to give insight into the optimization process. Most of the problems are nonlinear dynamic and will be solved using LS-DYNA simulation.

### CONTENTS

#### *Day 1*

- Course outline
- Introduction to Design optimization using industrial examples
- LS-OPT features
- Optimization Theory:
  - Optimization fundamentals
  - Response Surface Methodology
  - Experimental Design
  - Metamodeling
  - Design model adequacy checking
  - Optimization strategies
  - Sensitivity analysis and variable screening
  - Optimization examples
- Running LS-OPT and using the post-processor

- Studying the different LS-OPT components using the GUI setup of a simple optimization example and running the example
- Post-processing using the viewer, e.g. simulation and approximation results, optimization history etc.
- Simple optimization with LS-DYNA stage
  - Setting up a simple optimization with LS-DYNA stage from start
  - resource allocation
  - sampling, metamodeling and stage options
  - LS-DYNA interface features, e.g. ASCII database, binary database, filtering, time history functions, injury criteria
  - composite functions
  - simple design optimization formulation
  - program execution
  - job monitoring
  - database and output
  - post-processing using the viewer
  - restarting the simple optimization with additional constraint

## *Day 2*

- Setting up and running a sequential optimization
- Discrete optimization
- Optimization with user defined stage/solver
- Importing analysis results table
- Direct Optimization
- Theory
  - Parameter Identification using curve matching
  - Multidisciplinary Optimization (MDO)
  - Mode tracking
- Setting up, running and post-processing material parameter identification examples
- Variable screening and MDO with reduced variables
- Shape optimization
- Job scheduling using queuing (optional)