



### Course Objective

The objective of this patented MIS program is to raise technical competency of technical employees from local manufacturing industry for product quality & productivity improvement through understanding of vital manufacturing variables. At the end of the MIS training, participants will realize the importance of technical details study & the introduction of science & engineering procedures to their existing practices for a profitable manufacturing operation.

### Session Overview

Sheet metal forming involves the transformation of a flat sheet of metal into a useful shape. Bending is the most common of all sheet metal forming processes in which a Box-shape, V-shape, U-shape, or channel shape is produced along a straight axis in ductile materials such as steel & aluminium metals. Typical products that are made using bending process are electronic & computer enclosures, card cages, rectangular ductwork, piping tubes and instrument chassis.

This course provides an in-depth study of bending process, bending analysis, study of sheet metal characteristics & properties for bendability, troubleshooting bending defects (springback, wrinkles, fracture, thinning, distortion and residual stress) and design guidelines to achieve quality bending results. Practical staff will gain valuable technical knowledge & experience from this 2-day informative technical short course and get to learn the logical reasoning for their daily doings while the advanced employees will study the practical engineering theory to assist their R&D for a scientific and systematic approach to improve products quality & production economy.

### Benefits

1. Understand important factors such as material, method, processing parameters and design on bending outcomes.
2. Gain manufacturing insight knowledge of sheet metal bending operation & its process control.
3. Study causes of bending defects & apply good practices to overcome it.
4. Learn good stamping design practices for continuous process and quality improvement.

### Course Contents

#### 1. Materials Properties & Conditions for Bendability

Bending materials; mechanical properties & metallurgical quality for successful bending; material conditions prior bending.

#### 2. Bending Introduction

Bending terminology; mechanics of bending, process variations, bending machines; V-bending; U-bending; wipe-bending; over-bending; double-die bending; air bending; bottoming; coining; bending forces.

#### 3. Bending Analysis

Bending stress; bending strain; bend allowance; bend deduction; developed flat length; maximum & minimum bend radius; location of neutral axis; tube bending guidelines.

#### 4. Bending Failures & Control

Spring back, wrinkles; thinning; splitting and distortion problems.

#### 5. Sheet Metal Stamping Design Guidelines

Hole size; hole spacing; clearance between hole & bend line; hole to part edge distance; bend relief; minimum flange width; bending direction etc.

## Course Instructor



William Lee - Malaysian, Materials Engineer with an honorable Bachelor Degree awarded by The Engineering Council of London (EC, UK). He has over 25 years working & teaching experience in manufacturing industry. William possesses strong fundamentals knowledge in technical science & has special talent to communicate and explain to others the principles involved in various engineering fields. His ability to present and link the various engineering disciplines with real industrial use has made many of his course participants to appreciate the significant of technical details study

for manufacturing improvement. Over the years, he has developed a series of patented Manufacturing Insights Skills (MIS) Training programs for various manufacturing industries. He is now a full time contract speaker for a few training organizers as well as professional associations in ASEAN & Australia. William will bring a wealth of teaching experience to this program along with his strong industrial background as a former engineering practitioner in tooling, materials, heat treatment, moulding & metal forming divisions. In addition, William is a versatile trilingual instructor who can instruct technical courses in English, Bahasa Malaysia or Mandarin (or a combination of the languages) to ensure full understanding of his presentation by his trainees from all levels.

## Target Participants

This course is recommended for the buyers, manufacturing engineer, engineering technician, design engineer, development engineer, senior project engineer, plant engineer, product manager, tool engineer, product designer, structural engineer and technical personnel from the sheet metal working industry only.

## Administrative Details

1. Should public training not be scheduled for this program we will consider opening an ad hoc public training class if you've minimum guaranteed participants to attend this program.
2. We can bring this program to your premises as in-house training event for your in-house employees only. Interested participating company may contact us for an in-house training proposal.
3. In-house training can be conducted on weekdays or weekends (including public holidays) to meet the scheduling needs of your targeted staff.
4. For in-house training, a list of participants complete with their full name & designation must be presented to training provider one week prior commencement of each program. The total no. of training manual is supplied to the actual no. of turned out attendees only.
5. Substitute is allowed to replace the earlier registered person if he / she is unable to attend the training program (both public and in-house training). Participating company must inform us the details of replacement person.
6. All programs are of SBL (Skim Bantuan Latihan) type. Eligible company (Human Resources Development Fund contributor) must apply through themselves for the rebate of any eligible expenses (including training fees) from Human Resources Development Council. Training provider bears no responsibility for the approval of training grants or any form of rebates between participating company and HRDC.



Organized by:

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