

## MANUFACTURING INSIGHTS SKILLS TRAINING

### **Semiconductor Assembly Engineering Training Series**

**(SE04) Session Topic:** Hardening and Surface Coatings for Semiconductor Tooling  
**SBL TRAINING PROGRAM**

#### **Course Objective**

The objective of this patented MIS program is to raise technical competency of technical employees from semiconductor 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.

#### **Course Overview:**

In considering ways of improving semiconductor precision tooling performance or at least to fabricate a reliable tooling, proper hardening & surface coating play an important role to lay down a good foundation and to bring out the desirable characteristics & properties of tooling material. The economic risk factor from this heat treatment process is high as poor quality hardening is a main source of tool failures during tool making and subsequent production running (including future coating plan). While machining may produce the *shape* or external *finishes* to tools, dies & moulds, heat-treating gives the fabricated products the final touch of quality that makes them usable & reliable to do the job they are intended to do.

In addition, the applications & characteristics of various thin-film coatings such as TiN, TiCN, TiAlN, CrN and DLC layers to improve tooling performance are not fully understood. This program will teach course participants one of the very important industry missing-link study on how to achieve and ensure good quality hardening and to make full use of thin film coating. It is design to make participants familiar with the process principles, control of variables, common failures and solutions to overcome it as well as various testing and inspection techniques to examine the results.

#### **Benefits:**

1. Study important metallurgical principle of heat treatment.
2. Examine heat-treating problems for tooling and its preventive measures.
3. Explore different types of thin film coatings & their characteristics.
4. Learn how to measure and evaluate hardening & surface treatment results.

#### **Course Contents:**

##### **1. Metallurgical Principle of Heat Treatment**

The WHAT, WHEN & HOW of Tooling Heat Treatment, Hardening Mechanism, Phase Diagram, TTT-Diagram.

##### **2. Hardening Process and Common Problems**

Heat Treating stresses & damages, Quenching control, Material factor, Dimensional growth & shrinkage, Improved austenitizing, Hardness control, Metallurgical damage on hardened surface, Tempering embrittlement.

##### **3. Hard Surface Coatings Techniques**

PVD & CVD Coating Techniques & Variations; Vacuum Coating; Plasma Assisted Coating; Thermal Evaporation; Arc Discharge; Sputtering Deposition Techniques; Coating Limitation & Improvement.

##### **4. Hard Surface Coatings Quality**

Properties & Characteristics of Coating Materials; Selection of Coating Materials; Common Problems; Bond Strength; Substrate Conditions; Temperature Sequence; CTE Mismatching; Dimension Control; Coatings Case Studies.



### **Your Workshop Leader**

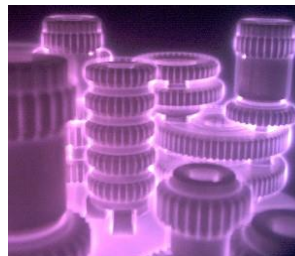
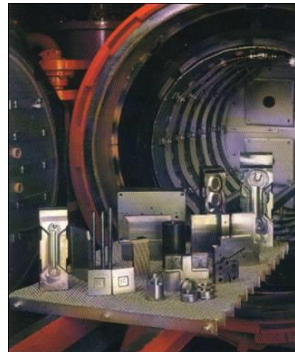
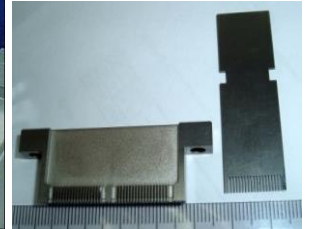
**Mr. William Lee**

Dip. Tech (TARC), B.Eng (Hons) EC, UK

Fulltime Technical Training Instructor

PSMB Certified Industry Trainer

HR Ministry Appointed Trainer



## Course Instructor



William Lee - Malaysian, Materials Engineer with an honorable Bachelor Degree awarded by The Engineering Council of London (EC, UK). He has over 28 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.

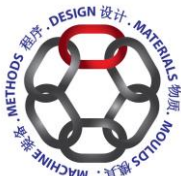
Over the years, he has developed a series of patented Manufacturing Insights Skills (MIS) Training programs for various manufacturing industries. He is now a full time contract speaker for a few training organizers as well as professional associations in ASEAN & Australia. William will bring a wealth 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 semiconductor tooling & production engineers, tool makers, heat treaters, designers and maintenance staff. Anyone who are serious about inconsistency of fabricated tools due to heat treating factor and how to enhance tooling performance with the use of hard surface coatings technology are also encourage to attend.

## 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:

### **METALLOY CONSULTANT SERVICES PLT**

(Registered Training Provider under Ministry of Finance: 357-02128315)

(Registered Training Provider under PSMB: LLP0003449-LGN)

**Tel: 03-80751529 Fax: Go Green; Avoid Fax**

**Email: [training@metalloy.com.my](mailto:training@metalloy.com.my) Website: [www.metalloy.com.my](http://www.metalloy.com.my)**

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