



# 2014職業衛生研討會

## 論壇主題：如何強化安衛部門於企業經營之角色

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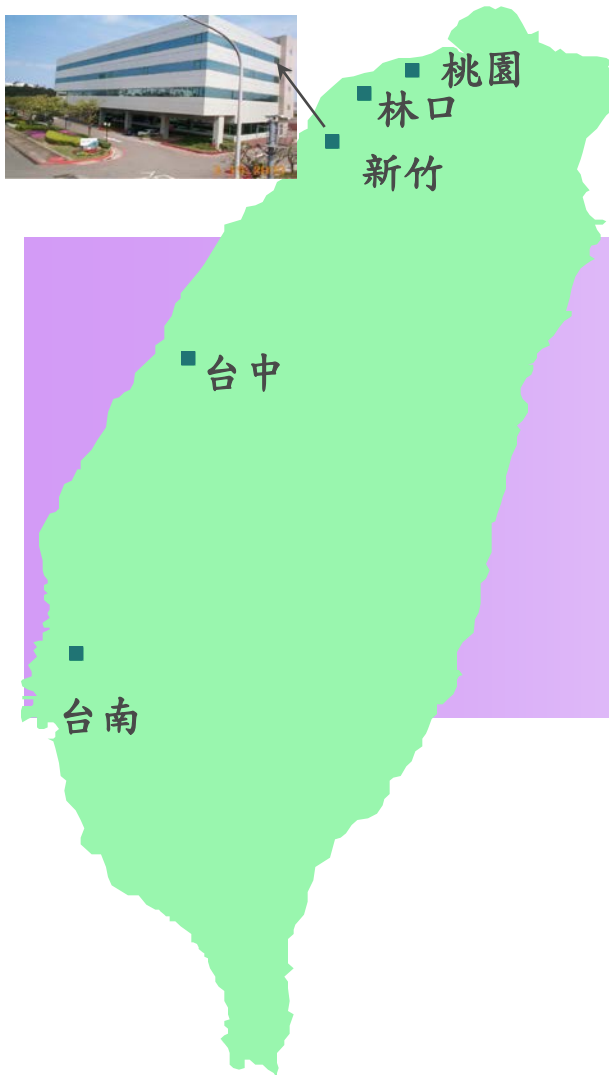


# 公司簡介 --

## 美商應用材料公司 (Applied Materials, AMAT)

- 成立時間 --1967年
- 公司總部 --美國加州矽谷Santa Clara市
- 產品 --半導體製程設備與服務、平面顯示器製程設備與服務、太陽能製程設備與服務、離子植入機(Varian)設備與服務、光罩製造與檢測設備與服務等
- 全球員工人數 --12,400
- 全球組織網 --在14國家設有超過70個行銷和/或服務據點  
--在北美、歐洲、以色列、新加坡、台灣及中國從事機台製造及組裝  
--在亞洲、北美、歐洲和以色列從事研發

# 公司簡介 – 台灣應用材料公司(AMT)



- 美商應用材料公司(Applied Materials Inc.)在台子公司，目前擁有員工約1,700人。
- 台灣實力最堅強的半導體製程設備技術團隊，包括近1,200人的製程、硬體、軟體及自動化等高科技專業人才。
- 1996年於新竹科學園區設立技術研發及製造中心。
- 2000年成立林口服務據點。
- 2000年啟用台南科學園區行政大樓。
- 2001年啟用南科潔淨製造中心。
- 2001年於桃園成立亞洲區半導體設備零組件物流中心。
- 2003年擴充技術訓練中心，引進第一套300mm訓練機台
- 2004年獲准進駐中部科學園區
- 2004年設立台南平面顯示器製造工廠
- 2005年中科辦公室開幕
- 2013年成立台南研發實驗室

# Overall Brief：如何強化安衛部門於企業經營之角色

- 公司永續經營必然擁有完善的安全衛生管理與制度，而**高階主管的支持**則是推動職業安全衛生重要的要素，也是持續改善的動力來源。
  - 由企業經營管理角度讓安全衛生管理成為營運的優勢
  - win-win的風險控制與管理整合

# What elements will be impact Safe ?

- 本質區分

- 心理層面：意志、態度（輕率或不經心）、精神情緒（緊張、興奮、敏感、平靜、穩定）、個性（急燥、膽小、貪心、粗心）等
- 身理層面：包括健康、體格、反應、智能等
- 物理層面：包括設備、原料、能量（電、光、熱、冷、溫度、壓力、輻射、流速）等

- 一般區分

- 人員：甄選、訓練、調配、教導、演練、激勵、管理等
- 設備：工程技術、檢驗(檢查)、採購規範、維護保養等
- 物質：管制、管理、採購規範、標示等

# What responsibilities for top management (included EHS head)?

- Protect safe for all workers at the plant/ or fab
- Keep safe conditions and environment all the time
- Comply with local regulations and EHS Acts.

# What valuable on the safety management policies or programs ?

- A systematic way to quantitatively represent risk.
- Top management might learn to think in a broader domain-situation of risk, ratio of dollar damage to dollar expended to reduce source of risk, better quality and more productivity, etc.,
- With the basis or framework for rational decision making by identifying a more complete array of risks, the top management will be able to address risk/ safety management in a broader domain and to recognize the actual involvement

Above is an essential feature of the success of any safety management policies or programs.

# What kinds of risk analysis techniques?

- Qualitative technique:
  - Dow Index
  - Mond Index
  - PHA (Preliminary Hazard Analysis)
    - What-if
    - Checklist
  - HAZOP (Hazardous and Operability), etc.,
- Quantitative technique:
  - FMEA (Failure Mode and Effects Analysis)
  - FTA (Fault Tree Analysis)
  - ETA (Event Tree Analysis), etc.,



# What categories of hazard ?

- Hazard Severity:

- Defined to provide a qualitative measure of the worst credible mishap resulting from personnel error, mechanical failure, or other malfunction.

<i>Severity Group</i>	<i>People (See Note A1-2.)</i>	<i>Equipment/Facility (See Note A1-3.)</i>	<i>Property</i>
1 – Catastrophic	One or more fatalities.	System or facility loss.	Chemical release with lasting environmental or public health impact.
2 – Severe	Disabling injury/illness.	Major subsystem loss or facility damage.	Chemical release with temporary environmental or public health impact.
3 – Moderate	Medical treatment or restricted work activity (OSHA recordable).	Minor subsystem loss or facility damage.	Chemical release triggering external reporting requirements.
4 – Minor	First aid only.	Non-serious equipment or facility damage.	Chemical release requiring only routine cleanup without reporting.

- Hazard Probability (or Likelihood)

- Defined to provide quantitative measure of the likelihood of hazard.

<i>Likelihood Group</i>	<i>Expected Frequency (% of Units- Year) (See Note 1.)</i>
A – Frequent	More than 1%
B – Likely	More than 0.2% but not more than 1%
C – Possible	More than 0.04%, but not more than 0.2%
D – Rare	More than 0.02%, but not more than 0.04%
E – Unlikely	Not more than 0.02%


Definition of table comes from SEMI S10 (Safety Guideline for Risk Assessment and Risk Evaluation Process)

# What is Risk Assessment Code (RAC) ?

- Identified hazards will be categorized by hazard severity and hazard probability and given a corresponding risk assessment code (RAC).
- The purpose of prioritizing the hazards for corrective actions.

RISK RANKING MATRIX		LIKELIHOOD				
		FREQUENT A	LIKELY B	POSSIBLE C	RARE D	UNLIKELY E
S E V E R E I T Y	CATASTROPHIC 1					
	SEVERE 2					
	MODERATE 3					
	MINOR 4					

# SEMI S10 Risk Assessment (Standard)

 SEMI S10 Risk Assessment Matrix			Likelihood					
			Frequent	Likely	Possible	Rare	Unlikely	Not Reasonably Foreseeable
			A	B	C	D	E	F
Severity	Catastrophic	1	Very High	Very High	High	Medium	Low	Very Low
	Severe	2	Very High	High	Medium	Low	Low	Very Low
	Moderate	3	High	Medium	Low	Low	Very Low	Very Low
	Minor	4	Low	Low	Low	Very Low	Very Low	Very Low
Likelihood Definitions			$f > 1\%$	$0.2\% < f \leq 1\%$	$0.04\% < f \leq 0.2\%$	$0.02\% < f \leq 0.04\%$	$0.002\% < f \leq 0.02\%$	$f \leq 0.002\%$
Expected or Observed Frequency ( $f\%$ per Year)								
Applied Materials Corporate Product EHS © 2007								

	Personnel	Physical Damage	Environmental & Real Property Contamination		
1	Fatality	System or facilities loss	Chemical release with lasting environmental or public health impact		
2	Disabling Injury/ Illness	Major subsystem loss $\geq$ \$100K (USD) or facilities damage $\geq$ \$5M (USD)	Chemical release with temporary environmental or public health impact		
3	Injury – medical treatment or restricted work activity (OSHA recordable)	Minor subsystem loss $\geq$ \$20K (USD) or facilities damage $\geq$ \$250K (USD)	Chemical release triggering external reporting requirements		
4	Injury (only first aid) or exposure at AMAT OEL	Non-serious equipment or facilities damage	Chemical release requiring only routine clean-up without external reporting		
<b>( for all hazards above [SEMI S10] ) Severity ( for fire/smoke below [SEMI S14] )</b>					
	<b>Minimum times</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
	Equip. Loss of Use	One year	One month	One week	One day
	Facility Loss of Use	One week	One day	One shift	Any

# Analysis for RAC- Example

➤ Severity: **3** (Moderate)

	<i>Personnel</i>	<i>Physical Damage</i>	<i>Environmental &amp; Real Property Contamination</i>		
<b>1</b>	Fatality	System or facilities loss	Chemical release with lasting environmental or public health impact		
<b>2</b>	Disabling Injury/ Illness	Major subsystem loss $\geq$ \$100K (USD) or facilities damage $\geq$ \$250K (USD)	Chemical release with temporary environmental or public health impact		
<b>3</b>	Injury – medical treatment or restricted work activity (OSHA recordable)	Minor subsystem loss $\geq$ \$20K (USD) or facilities damage $\geq$ \$250K (USD)	Chemical release triggering external reporting requirements		
<b>4</b>	Injury (only first aid) or exposure at AMAT OEL	Non-serious equipment or facilities damage	Chemical release requiring only routine clean-up without external reporting		
<b>( for all hazards above [SEMI S10] ) Severity ( for fire/smoke below [SEMI S14] )</b>					
<b>Minimum times</b>		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<i>Equip. Loss of Use</i>		One year	One month	One week	One day
<i>Facility Loss of Use</i>		One week	One day	One shift	Any

➤ Probability (or Likelihood): **C**

- Cases: 3 times
- Installed Base: 359 units
- Average operation periods: 4 years

$3 \text{ times} / (359 \text{ units} \times 4 \text{ years of operation}) \times 100\% = 0.2 \%$

➤ Overall Safety Ranking: **3C (Low)**

APPLIED MATERIALS SEM S10 Risk Assessment Matrix		Likelihood					
		Frequent	Likely	Possible	Rare	Unlikely	Not Reasonably Foreseeable
		A	B	C	D	E	F
Severity	Catastrophic	1 Very High	Very High	High	Medium	Low	Very Low
	Severe	2 Very High	High	Medium	Low	Low	Very Low
	Moderate	3 High	Medium	Low	Low	Very Low	Very Low
	Minor	4 Low	Low	Low	Very Low	Very Low	Very Low
Likelihood Definitions		$f > 1\%$	$0.2\% < f \leq 1\%$	$0.04\% < f \leq 0.2\%$	$0.02\% < f \leq 0.04\%$	$0.002\% < f \leq 0.02\%$	$f \leq 0.002\%$
Expected or Assessed Frequency (f% per Year)							
Applied Materials Corporate Product EHS © 2007							

# Conclusion

- Developing effectively the total safety management system (or risk management system) at your plants or fab.
- Introduces a systematic way to quantitatively represent risk.
- The top management might learn to think in a broader domain-situation of risk, ratio of dollar damage to dollar expanded to reduce source of risk, better quality and more productivity, etc.,
- With the basis or framework for rational decision making by identifying a more complete array of risks, the top management will be able to address risk/ safety management in a broader domain and to recognize the actual involvement.



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