出國報告（出國類別： 出席國際會議）

參加紐約 2016 SIT 年度會議報告書

服務機關：台灣糖業股份有限公司
姓名職稱： 左希軍　砂糖事業部 執行長
黃民生　砂糖事業部 副執行長
賴明德　砂糖事業部 小港廠副廠長
黃進良　休閒遊憩事業部 執行長
蕭光宏　秘書處副處長
派赴國家：美國紐約
出國期間：民國 105 年 5 月 13 日至 5 月 20 日
報告日期：民國 105 年 6 月 21 日

摘要：

1. 參加於紐約舉行 2016 SIT 國際蔗糖協會的年會 (S. I. T. Technical Conference held in May 15－18 2016 in New York, NY, USA)。並以 ROC 臺灣、國旗、參加國際會議獲外交認同。同時也代表董事長由砂糖事業部左執行長領隊致詞；並取得 SIT 一席理事席位。

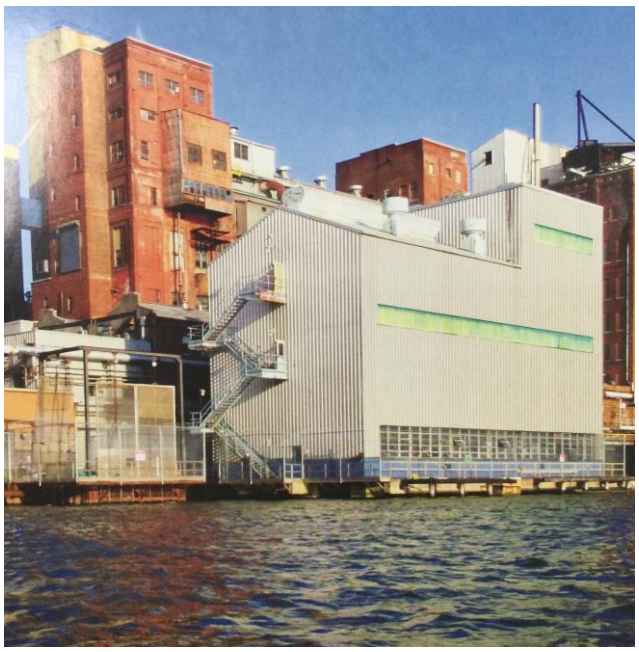
2. 取得糖業最新核心技術論文，並與國際技術交流，論文二十四篇，其中三篇有關再生爐、製程系統優化模式、建精煉糖廠規劃設計實例，可立即提升煉糖的技術。

3. 公司秘書處觀摩學習主辦國際會議流程及配偶行程，觀摩本屆 2016 SIT 年會，並準備 2017 年將在臺灣、臺南市舉行的年會，親身體驗及評估交流。

4. 休閒遊憩事業部觀摩安排各項會議與宴會，紐約國際凱悅酒店與台糖長榮酒店設計、服務比較；備妥明年入住台糖長榮酒店各項事宜。

5. 小港廠觀摩會議第三天的工廠參觀行程、路線、解說工作。觀摩紐約附近的 Yonkers 精煉糖廠製程，因其是百年老廠，多次併購更迭，現屬 ASR 集團，技術更新替換的軌跡；評估可供借鏡之相關煉糖的產品多樣化與高值化。

6. 洽紐約台北經濟文化辦事處，替台糖公司在 SIT 年會站台，本代表團隊為國家創造聲勢、並熱情的成功邀約各個會員國明年來臺灣參加年會。



New York Yonkers 精煉糖廠照片

在 1997 年 3 月到 4 月期間，正值小港精煉糖廠興建快完工準備試車時期；台糖公司曾派遣 10 位同仁到該廠實習，19 年後有兩位團員再臨舊地參觀，廠房及設備並沒什麼改變與進步，但感觸甚多，討論此現象，咸認為美國煉糖業競爭劇烈，該廠曾數度易主，目前為紐約區唯一還在經營的煉糖廠，他們追求的是短期內的獲利，不願做長期的投資，所以未再有積極進步，終將淪為隨風飄蕩、載乘載浮於低利傳統加工產業業；可為借鏡。

目　　錄

壹、緣由及目的：

1. 參加於紐約舉行 2016 SIT 國際蔗糖協會的年會 (S. I. T. Technical Conference to be held May 15–18 2016 in New York, NY, USA)。
2. 觀摩本屆 2016 SIT 年會，並準備 2017 年將在臺灣、臺南市舉行的年會，因為台糖公司是明年的主辦會員，故臺灣為主辦國。此行另一項任務為循往例下屆主辦國要組團邀請各會員國參加隔年的技術年會，故本團隊代表國家要創造聲勢、熱烈成功的邀約各個會員國明年來臺灣參加年會。
3. SIT 年會是砂糖事業部的核心技術範疇與國際技術交流機會，除聽取論文發表及技術交流等任務，並代表董事長由砂糖事業部領隊，爭取 SIT 一席理事席位，以促進國際經濟交流與落實外交。
4. 由公司秘書處觀摩學習主辦國際會議流程；休閒遊憩事業部觀摩安排各項會議與宴會，以及明年入住台糖長榮酒店各項事宜；小港廠觀摩會議第三天的工廠參觀行程、路線、解說工作。
5. 藉本屆參觀行程，觀摩紐約附近的 Yonkers 精煉糖廠製程，因其為百年老廠，多次併購更迭後現屬 ASR 集團，技術更新換代，相關煉糖的產品多樣化與高值化可供取經借鏡。

貳、人員名單及行程摘要

一、出國人員名單：

服務機關	職　稱	姓　名
砂糖事業部	執行長	左希軍
砂糖事業部	副執行長	黃民生
砂糖事業部 小港廠	副廠長	賴明德
休閒遊憩事業部	執行長	黃進良
公司秘書處	副處長	蕭光宏

二、 出國與會議行程

參加 2016 紐約 SIT 會議行程表

日期	地點	工作時程及內容	注意事項
105 05.13	桃園機場 → 紐約	啟程 1.長榮班機BR32 19:10第2航廈起飛，22:05抵達甘迺迪機場第1航廈 2.KKday旅行社接機前往Wolcott Hotel	1.上午從小港出發往高鐵左營站。 2.從左營搭高鐵，15:00 前抵達桃園。 3.從桃園高鐵站搭705巴士往機場，預定16:00前可抵達機場，劃機位寄行李、入關。

日期	地點	工作時程及內容	注意事項
105 05.14	紐約	適應時差 假日休息，認識城市行程	
105 05.15	紐約Grand Hyatt hotel	1.9:00~17:00報到註冊 2.15:30~17:30理事會議(請執行長參加) 3.18:30~20:00招待會	1. Wolcott Hotel與Grand Hyatt hotel之間的交通方便，走路或搭地鐵可達。 2.考慮搭乘次數不多，可購買 Metro Card(pay-per-ride)。
105 05.16	紐約Grand Hyatt hotel	1.8:00~17:00報到註冊、論文發表。 2.9:00~16:30配偶及賓客行程 3.12:10~12:20 SIT 大會、理事選舉、新任理事會議。 4.16:30與SIT 執行秘書 Edgar L.Aguirre會談。	請各SIT籌備小組相關人員預備資料及溝通議題。
105. 05.17	紐約Grand Hyatt hotel	1.8:00~17:00報到註冊、論文發表 2.9:00~16:00配偶及賓客行程 3.17:00~17:20董事長邀請致詞(請執行長代理)(含邀請影片播放) 4.19:00招待會 5.20:00宴會 6.22:00餘興節目	1.請執行長預備演講，隨行人員攜帶影片另以隨身碟備份，安排試播，台糖全體團員及紐約辦事處人員站台。 2.紐約辦事處人員將預先於 16:40 抵達會場。
105. 05.18	紐約	1.9:00第1班巴士出發前往參觀Yonkers Refinery 2.10:30 巴士從旅館出發前往午餐地點Castle Royal(僅限參加午餐者) 3.12:00午餐，15:00巴士回到旅館/機場。	1. 建議當天上午從Wolcott Hotel check out之後先把行李寄放在該 旅館，本日行程結束後再回來提取。 2. 午宴結束回到會場旅館/機場為15:00，當天下午有其他行程者，需再確認到達時間，以免延誤。 3. 搭乘次日(5/19)長榮班機最遲須於19:00 左右從曼哈頓市區出發往甘迺迪機場。
105. 05.19	紐約	回程 1.長榮班機BR31 01:25甘迺迪機場第1航廈起飛	
105. 05.20	→ 桃園機場	1. 5:15抵達桃園機場第2航廈	1.從機場搭705巴士往桃園高鐵站。 2.桃園高鐵站搭車回左營。

參、論文與簡報摘要

一、論文篇數

此次年會論文發表共有二十四篇與兩個論壇，論文皆有嚴謹審核後核給編號，也有其他原因而撤銷編號，以下為核可後的二十四篇文章，論文的摘要附於出國報告附件。

1. # - 1129„ Opportunities and challenges from the emerging bioeconomy for the sugarsector
   砂糖經濟區塊合併生物經濟的機會與挑戰
2. # - 1130„ Optimisation of White Sugar colour management through the utilisation of on-line colour cameras
   應用彩色攝影頭來做最佳化的白糖色澤管理
3. # - 1131„ NEW CONTROLS FOR BATCH AND CONTINUOUS CENTRIFUGALS
   新的控制方法用於批次及連續式的分蜜機
4. # - 1132„ NOVEL ADSORBENT FOR IMPROVED COLOR AND TURBIDITY REDUCTION WITH REDUCED PROCESS LOSSES
   NOVEL吸附塔用於製程來改進減少色澤與濁度並減少製程的損失
5. # - 1133„ HIGH PERFORMANCE ADSORBANTS (HPA) ECO-FRIENDLY TECHNOLOGY FOR COLOR REMOVAL IN SUGAR
   一種環保減能高效(HPA) 的吸附塔來減少砂糖的色澤製程
6. # - 1134„ THE USE OF COLOUR PRECIPITANTS IN A CARBONATATION REFINERY
   應用色澤沉澱法於精煉糖廠的碳酸飽和法製程
7. # - 1135„ Application in Sucrose Solutions – Towards a better Understanding
   更深入了解 澱粉轉化酵素應用於糖液上
8. # - 1136„ SOME THOUGHTS ON ASH IN SUGARS
   在煉糖中對灰分的一些想法
9. # - 1137„ THE CHALLENGE TO DESIGN A STATE OF THE ART GREENFIELD SUGAR REFINERY – AN AFRICAN EXPERIENCE
   一個非洲經驗 GREENFIELD精煉糖廠的最新型設計與挑戰
10. # - 1138„ OPTIMIZING FEEDING AND SCREENING EQUIPMENT WITH MEANS OF ANSYS SIMULATION AND 3D SOLID WORKS SOFTWARE
    應用分析與模擬 3D實體工作軟體於入料及篩分設備的最佳化設計
11. # - 1139„ IT-Security in Process Control Systems operating in Sugar production facilities „
    在煉糖設備的製程控制系統中的資訊安全作法
12. # - 1140„ Operational Improvements of Granular Activated Carbon Station through Continuous Improvement
    GAC活性碳再生爐的操作改進與持續改善
13. # - 1141„ Pulse Testing as a Useful Tool for Troubleshooting Industrial Operations Size Ion Exchange
    一項有用的工具－脈衝測試，用於糖業上樹酯交換操作的故障排除上
14. # - 1142„ Automatic Seeding System for Vacuum Pan Operation
    結晶罐的自動糖種等晶播種的做法
15 # - 1143„ On-line Monitoring of Crystallization Control Practices: Case Studies from Different Parts of the World
    線上監控助晶機操作實務—從世界各地區差異個案研究
16 # - 1144„ Optimised Sugar Refinery Model

煉糖工場模式的最佳化

17 # - 1145„ 50 years of progress in sugar technologies From 1 G to 5th Generation--- a Benchmark
50年來從第一代到第五代精煉糖廠製糖技術的進步‥‥標竿

18. # - 1147„ Operational Flexibility: Custom Food Grade Reactivation of Spent Granular Activated Carbon for the Cane Sugar Industry
操作彈性:對食品級GAC廢碳的再生做客製化，應用於甘蔗糖產業。

19. # - 1148 Development of a Sugar Refining Process Colour Prediction Model
開發精煉糖廠製程色澤的預測模式

20. # - 1149„ Water activity and the stability of specialty sugars
特殊糖的水活性與穩定性探討

21. # - 1150„ The use of High Performance Color Precipitants in the raw syrup and massecuite for Direct white sugar production.
應用在粗糖漿與糖膏的高效吸附粉來減少色澤以生產白糖

22. # - 1151„PRE-CARBONATATION WITH PURE CO2 IN A CANE SUGAR REFINERY
在甘蔗精煉糖廠製程以純氧用於預碳酸飽和法

23. # - 1152„ Feasibility Studies of Carbonated Mud for Cement Substitution in the Construction Industry
碳酸飽和法濾泥用以取代水泥應用於建築工業的可行性

24. # - 1153„Versatile filtration systems for many applications in the sugar mill
多功能過濾系統在製糖產業的應用

二、論壇方向：

本次年會有兩個論壇，一為糖業圈中新的發展與事物（what else of sugar），另一個論壇為談論在砂糖精煉製程中微生物的檢驗以及如何防範；此部分都是由各企業的研發長、聲望正隆的學者擔綱，邀請四到五位對談與提問。最有趣的是周博士提問中國大陸市場缺白糖，希望由臺灣代加工煉製（OEM）形式的看法？專家學者並沒有回答這個問題，因存在變數仍大、又是假設性的商業問題，故沒有進一步評論？！

論壇一：糖業圈中新的事物；包括世界各國新建立的精煉糖廠有哪些，在世界各國的 110 個精煉糖廠中，最近十五年在非洲及中東建立了十五六家精煉糖廠都是由歐洲與北美來設計監造，而傳統的糖廠已經漸漸由美日歐轉由中國、泰國等國家來承造。最新的發展是在非洲賴比瑞亞新建的精煉糖廠，由德國漢堡的一個顧問公司承包設計監造後試車商轉，這是一個成功的經驗模式，設備、配管等都是由德國來承造。以及英國 BS Sugar 在 wissinton 改建的兩個新式六級產業廠甜菜糖廠的例子，符合循環經濟、環保、以及綠能、完整六級產業模式，最終產品也多樣化如砂糖、酒精、肥料、電能與熱能、蕃茄與蔬菜，可惜公開資訊並不多，猜想並不賺錢，但是一個新的新創技術整合、新的營運模式。符合新趨勢與新潮流，值得省思與前瞻借鏡。

論壇二：砂糖精煉製程中微生物的檢驗以及如何防範；以往在精煉糖製程中，對微生物的重視不若現在因食安問題，更顯得日益重要；加上極端氣候下甘蔗原料的變異等等因素，精煉糖業者已經警覺開始要各會員注意防範以及現行有效使用的方法。

三、 可借鏡與應用

本次參加第七十五屆2016 SIT紐約年會中，帶回的24篇論文都已經交下給砂糖實驗室、製糖組、小港廠分門別類成立小組，賦予任務給相關幹部、帶領年輕工程師來翻譯並學習，用到工作技術與設備的改進上來。也定期的要求各小組輪番上台報告，相信對砂糖事業部的管理、設計與技術能有一定的提升。

如果要挑出三篇最有助益的如下:

1. # - 1137„ THE CHALLENGE TO DESIGN A STATE OF THE ART GREENFIELD SUGAR REFINERY - AN AFRICAN EXPERIENCE
   一個非洲經驗 GREENFIELD精煉糖廠的最新型設計與挑戰

由德國漢堡附近，一家以前做潛水艇起家的公司*IPRO Industrieprojekt GmbH*來設計規劃在賴比瑞亞的大型精煉糖廠，產能每天2,400 t/d、每年最大750,000噸，用的都是德國精煉糖廠高級設備，如分蜜機、批次式結晶罐等、燃氣輪機、回收鍋爐等，配管、電腦程控等，一次就做好，整合面值能平衡等等，常常在想建廠規畫設計的模式，在國外容易成功，反觀國內難度確很高，看二十年前的小港、二十年後的臺中民營煉糖廠都是陷入自以為是的迷思中。

2. # - 1140„ Operational Improvements of Granular Activated Carbon Station through Continuous Improvement
   GAC活性碳再生爐的操作改進與持續改善

此篇論文就是本次地主參觀觀摩ASR，Yonkers的精煉糖廠所提出，本篇論文格式很像團結圈的模式，蒐集大量的數據以品管統計分析的手法逐步改善，參與本次會議的台糖人員都異口同聲，可資借鏡在小港的精煉糖廠。尤其今年小港廠又正在汰換舊的再生爐，對未來色澤控制、環境衛生與糖的回收率一定大有助益的。

3. # - 1144„ Optimised Sugar Refinery Model
   煉糖工場模式的最佳化

這是德國分蜜機大廠BMA根據二十五年來的數據,改善一家中東日煉3000噸的精煉糖廠,改善煮糖為連續煮糖模式VKT達到最佳化,砂糖的顏色色澤降低,大幅的提升品質,同時最重要的是將每噸糖的煉製耗油量由耗用廢汽0.83噸降到耗用廢汽0.67噸，什麼是煉糖的最佳模式呢？最主要是製程的清淨與結晶模式選擇與設備加上動力系統的選擇模式，沒有投資改善設備，徒要靠努力來進步是小小幅度的慢進，大幅度改善能源效率與環保，首先是要做好最佳化模式的選擇，其次資本支出投資改良才能立竿見影看到成果！故也推薦此篇來突破同仁的慣性思維！

肆、觀摩籌備行程與參觀工廠

一、觀摩籌備會議行程 :

(一)為 2017 年糖業專技人員協會(Sugar Industry Technologists Inc.)在臺舉辦年會作準備:

(1)SIT 簡介:

糖業專技人員協會(Sugar Industry Technologists Inc.)，簡稱 SIT，為一國際性組織，1941 年成立於美國佛州，主要透過每年的技術會議與會員分享製糖的科學和技術，增進會員間之交流及鼓勵原創性研究，並與其他工程，技術和科學學會進行合作交流，台灣糖業股份有限公司為 SIT 正式會員。

(2)2017 年 SIT 年會在臺灣:

SIT 年會舉辦地點每年不同，多選擇在會員國或會員公司所在地區辦理。2017 年 SIT 年會將在臺灣臺南舉辦，並選擇在本公司休閒遊憩事業部所屬台糖長榮酒店舉行，經該協會派員來臺洽商，2017 年 SIT 年會議程規劃如下:

日期	開始時間	結束時間	功能	擺設	預定人數
05/07/17	9:00AM	5:00PM	報到區	報到型	
	9:00AM	9:30PM	展示空間		
	2:30PM	5:30PM	會議	U 型	40
	6:30PM	8:00PM	歡迎晚會	接待型	50
	6:30PM	8:00PM	娛樂節目		
05/08/17	8:00AM	5:00PM	報到區	報到型	
	9:00AM	12:15PM	會議	聽講型	120
	10:30AM	11:00AM	咖啡時間		70
	08:00AM	09:30PM	展示空間		
	12:15PM	2:00PM	午餐	十人圓桌	70
	2:00PM	5:00PM	會議	聽講型	120
05/09/17	8:00AM	5:00PM	報到區	報到型	
	8:00AM	04:30PM	展示空間		
	9:00AM	5:00PM	會議	聽講型	120
	10:30AM	11:00AM	咖啡時間		70
	7:00PM	8:00PM	告別晚會	接待型	90
	7:00PM	8:00PM	娛樂節目		
	8:00PM	10:00PM	晚餐	十人圓桌	90
	10:00PM	0:00AM	DJ 夜場		

台糖長榮酒店將依各議程活動性質，參加人數及主辦單位需求安排適合之會議、論文展示及晚會空間，提供餐飲及咖啡茶點，以及與會人員於會展及住宿期間等館內相關服務。因此本公司休閒遊憩事業部特別派員參與 SIT 今年在美國紐約 Grand Hyatt Hotel 舉辦的 2016 年會，以實地瞭解年會舉辦之流程及需求，以期為 2017 年 SIT 在臺年會提供完善之服務。

（二）、為本公司休閒遊憩事業部拓展會展業務作準備：

臺南市政府爭取多年的大臺南會展中心，預定落腳高鐵臺南站特定區，計畫可行性評估已獲經濟部核定，將報行政院核准。如果一切順利，位於高鐵臺南站特定區的大臺南會展中心，可望於 2020 年開發完成。

經濟部國貿局曾進行臺灣會展產業的綜合評估，發現北、中、南均有興建一座會展中心的需求，其中南部產業聚落數量 31 個，為各區之冠，臺南市產業聚落 14 個，又為各直轄市之冠，最適合發展會展中心，加上臺南市府積極爭取，所以經濟部國貿局決定出資興建，並朝會展、表演、體育競賽及各類活動等多功能展館規劃，預估總經費約 18 億元。

大臺南會展中心開發目標，主要是吸引全球買家，行銷在地產業，提升廠商知名度及城市形象，增加國際能見度。並利用舉辦國際型展覽、會議與在地觀光資源結合，行銷文化首都臺南府城，預期將大大促進未來臺南市會展及觀光產業之發展。

會展產業主要以會議（Meeting）、獎勵旅遊（Incentive）、大型會議（Conference）及展覽（Exhibition）內容為主，簡稱 MICE。目前會展產業已列為我國未來發展旅遊產業的重要政策之一，目標客群為國際各產業或企業負責籌辦或編列活動預算之人員，以及國際性學會或社團等。

要吸引這些團體在臺舉辦活動，則需要靠各區域會展資訊及產品服務供應商的整體包裝行銷，才能爭取到訂單。這些機構及供應商，包含各國各市的會議展覽中心、觀光局、飯店業、會議公司及旅遊業者等。

本公司休閒遊憩事業部在臺南地區，計有台糖長榮酒店及尖山埤江南渡假村具有提供會展服務之軟硬體設施，目前已有辦理國內 MICE 的經驗，惟較少有接辦國際性 MICE 的經驗。尤其是台糖長榮酒店相對於臺南市其他國際觀光飯店距離未來的大臺南會展中心最近，為掌握及爭取未來臺南市的會展商機，除將持續關切臺南市會展產業發展動態外，並希望能藉由本次參加 SIT 年會，觀摩國際知名連鎖飯店承辦會展之相關作業及服務流程，瞭解相關軟硬體規劃及品質標準，除可供本公司休憩事業部相關營業據點參考與學習外，亦可作為本公司未來開發會展型酒店之參考。

二、活動行程&內容重點

2016 年 SIT 年會在美國紐約舉行，也是 SIT 的第 75 屆年會，會展活動從 5 月 15

日至 18 日，在紐約君悅飯店(Grand Hyatt hotel)舉行。

Grand Hyatt hotel 為 Hyatt Hotels Corporation 國際連鎖飯店旗下之飯店品牌。飯店品牌定位為全球主要城市及渡假點全服務的大型高級飯店。Grand Hyatt hotel New York 前身為 Commodore Hotel，初建於 1919 年，幾經改建於 1980 年以 Grand Hyatt hotel 之名重新開幕，是具有近百年歷史的四星級飯店，近期分別於 1996 年及 2011 年進行大裝修，惟飯店門廳至大宴會廳區域仍保留舊有的新現代主義列柱設計及灰泥塗面裝修以見證飯店及時代的光榮歷史。

位於商務活動熱絡的曼哈頓中城區，且緊鄰大中央火車站 (Grand Central Terminal)交通便利，地理位置卓越，共有客房 1,300 間及 60,000 平方英尺(約 1,690 坪)宴會場地，住宿客人可輕鬆步行到紐約公園大道(Park Avenue)、 第五大道(Fifth Avenue)、中央公園(Central Park)、時代廣場(Times Square)、洛克菲勒中心 (Rockefeller Center)、百老匯(Broadway theaters), 世界知名的餐飲及購物區，非常適合舉辦會展活動。並被 CVENT 票選為 2016 年美國前 100 最佳會議型飯店。

SIT 年會除開放會員報名參加外，另還提供會員親友行程以服務攜伴之會員。本次年會正式議程如下:

2016 年 5 月 15 日 星期日

時間	活動	地點
9:00 am - 5:00 pm	會員報到	Mezzanine, Mezzanine Level
3:30 pm - 5:30 pm	SIT 理事會議	Imperial-Morosco Room, Conference Level
6:30 pm - 8:00 pm	SIT 見面接待會	Gallery on Lex, Lobby Level

2016 年 5 月 16 日 星期一

時間	活動	地點
9:00 am - 5:00 pm	會議報到	Foyer Manhattan Ballroom, Lobby Level
9:00 am 出發 4:30 pm 返回	會員親友行程集合	Hotel Lobby
8:30 am - 12:20 pm	第一階段技術會議	Manhattan Ballroom, Lobby Level
12:30 pm	S.I.T.聯誼午餐	Museum Space, Lobby Level
2:00pm - 4:00pm	第二階段技術會議	Manhattan Ballroom, Lobby Level

2016 年 5 月 17 日 星期二

時間	活動	地點
9:00 am - 5:00 pm	會議報到	Foyer Manhattan Ballroom, Lobby Level
9:00 am 出發 4:00 pm 返回	會員親友行程集合	Hotel Lobby
8:30 am - 11:30 pm	第三階段技術會議	Manhattan Ballroom, Lobby Level
12:00 pm	午餐	自理
2:00pm - 3:50pm	第四階段技術會議	Manhattan Ballroom, Lobby Level
5:00pm	2017 年會在地國會員代表邀請 Invitation to Tainan, Taiwan	
5:20pm	SIT 會長閉會演說	
7:00 pm	晚宴接待會	Empire State Ballroom II
8:00 pm	(頒獎)晚宴	Empire State Ballroom III
10:00 pm	餘興活動	

2016 年 5 月 18 日 星期三

時間	活動	地點
9:00 am	首班巴士前往 Yonkers 煉糖廠	Hotel Lobby 1
10:30 am	巴士前往受邀午餐	Hotel Lobby
12:00 pm	受邀午餐	Castle Royale
3:00 pm	返回飯店或前往機場	hotel/airport

本次參加 SIT 年會，係以會展與會人員(消費者)及飯店經營管理者之角度，親身體驗來觀察會展型飯店相關設施及服務流程:

(一)、大廳(Lobby)

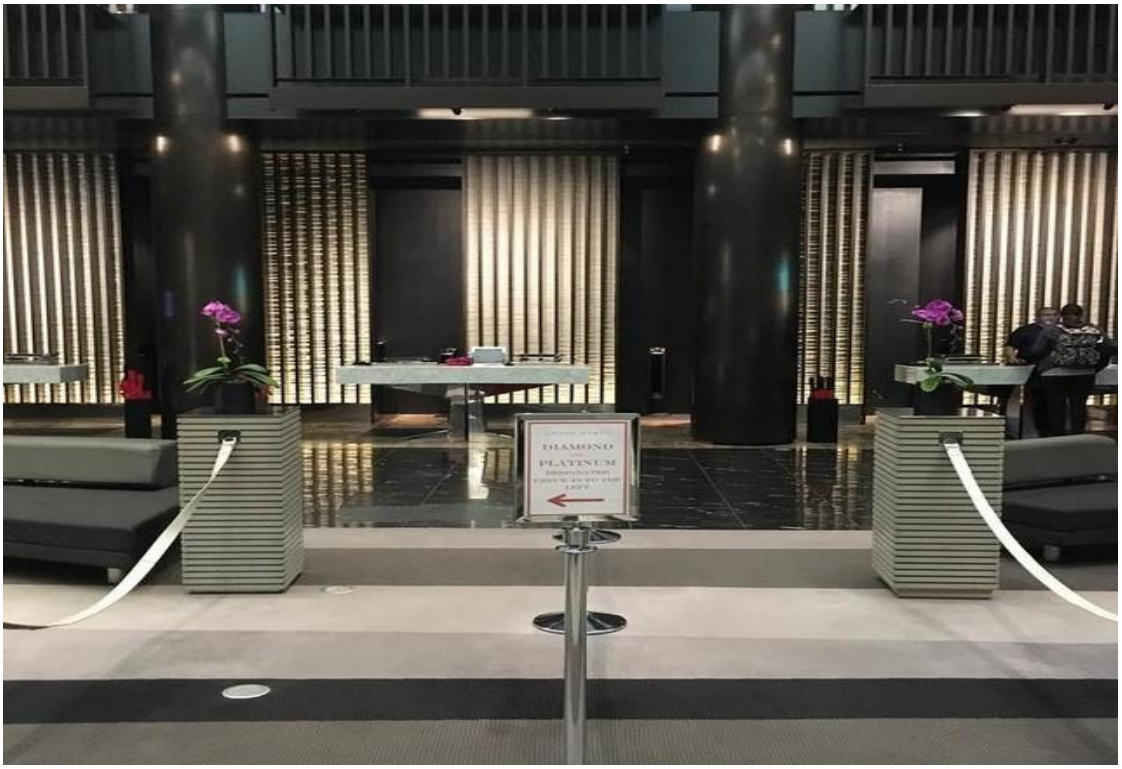
(1)設計

一進大廳就可感受到具有紐約特色的現代及摩登設計，白色巨型人頭雕塑、水瀑造景及金黃光投射於水幕的飯店招牌，加上挑高及開闊的空間設計，宛如置身於博物館，讓客人感受到這城市特有的魅力。

(2)功能分區

更重要的是透過高低差、穿透型隔柵、造型桌椅、裝置藝術品、不同材質顏色的地板材質及燈光，區隔各功能空間。使各空間的使用者不被相互的干擾，並

能有效率及充分發揮空間功能，例如:出入口處的門廳區(STREET LOBBY)，以高低差、樓梯及電扶梯與入住大廳(LOBBY)作空間區隔，將人流進出頻繁門廳區與等候入、退房(Check in-out)的大廳區作適當的區隔與聯通。大廳區又利用上述設計手法，將等候會面區、大櫃(Front Desk)、酒吧區及電梯區，作很有效率的區隔與聯通。



(3)指標設施

為讓住客及訪客能很快熟悉館內外的相對方位、場地與設備設施，於不同進出入口，皆以相對應的街道名稱標示。並設立方向指示牌(含館內外重要地標)及E-Concierge(電子禮賓)，可依客人需求提供館內設備設施、餐廳營業資訊、活動場地資訊、館外旅遊觀光、天氣及交通等相關資訊。另為縮短住客於入退房尖峰期間的等候時間，引進如國際機場的電子櫃檯(Automated kiosks)，讓住客能自行辦理入住或退房手續。

(4)相關服務

無線上網部分，則如國外多數飯店，飯店會提供一組密碼讓住客可在大廳免費上

網。兩個臨街出入口皆提供叫車及行李服務，另服務中心的禮賓人員(Concierge)，能依住客興趣給予紐約著名百老匯歌舞劇之建議，並提供熱門票卷的代購及旅遊相關服務。

(二)、客房(Guest Rooms)

(1)房型及設計

客房及走道採現代設計，走道採光明亮。客房依設備、空間大小、景觀及附加服務，主要分為:standard(標準房)、Accessible(身障房)、Grand Club(會員房)、Deluxe(豪華房)、Suite(套房)及 View(景觀房)，再依所配置床位數量及尺寸來設定房型，例如：One King Bed 或 Two Double Beds，相當清楚明瞭。Accessible(身障房)則分為 Shower(淋浴)及 Tub(浴缸)。

值得一提的發現是，Accessible(身障房)的規劃相較國內一般飯店用心，除了一般法規要求的進出入口及動線加寬、坡度限制、浴室扶把及消防求救拉環外，並降低門把、窺視孔及相關設備開關面板的高度，以及提供無線式電話、電視字幕機(Closed Caption)以利行動不便及聽障者使用。

而 Grand Club(會員房)，在一般飯店亦不常見，主要提供住宿者額外的設施使用權及餐飲服務，例如:可使用飯店俱樂部內設施、早餐、下午茶及酒吧服務，以及可以使用頂樓的開放空間。特別的是該房型並非僅提供給會員訂房，亦開放一般住客訂房，對於一些會在飯店逗留時間較長的住客，特別是商務客，可提供更佳及更多如家自在的服務。

(2)客房服務

除一般星級飯店的客房服務外，特別發現在 Room service 部分，該飯店作了一些創新：In-Room dining 除了傳統式的房內點餐，由飯店烹飪團隊製作後，再由服務人員以餐車推送餐點至房內，住客用完餐後再由服務人員至客房收餐。該飯店另於大廳角落創新設立了一間 24 小時咖啡館(Market)，全年無休地提供最具當地特色、可及時享用的食物及飲料，提供房客可自行選擇及拿了就走的餐點服務。其優點是縮短了房客等候時間，且價格也比傳統的 Room service，經濟實惠許多。

配合此設施，該飯店也縮短了傳統客房送餐的服務時間，每日下午 2 點至下午 5 點不提供房內點送餐服務，可大大減少人力成本及提升客戶滿意度。同時因該飯店位於紐約中央火車站及交通要衝，具有 24 小時的人流，亦可藉此拓展飯店外賣市場，可見此項創新的設施服務，具有多項的戰略考量，值得參考。

(二)、宴會服務(Meetings and Events)

如同一般飯店的宴會部門，標榜多樣彈性的空間規劃、高端的影音設備、電腦網路連線設施、客製的餐飲服務、提供協力廠商資訊與協助連繫，及專業的現場服務人員(Expert on-site staff)。該飯店藉交通地利之優勢，除規劃配有 24 小時的商務中心(Business Center)的會展樓層(Conference Level)13,000 平方英尺(約 364 坪)外、另規劃可活動隔間的各式會議及宴會廳 6 廳，合計約 60,000 平方英尺(約 1,690 坪)，提供各大小規模的會展及婚宴服務，並有專人依預算提供專業的規劃建議。(參附件一:樓層平面圖)

(1)會員報到、理事會及接待會

依 SIT 網路公佈之本次年會議程表，原規劃會員報到處在飯店夾層區，可能是怕

會員不熟習環境，另在飯店側門入口處設立接待台，並有人員及指標引道至夾層區，這時可充分感受到 Lobby 挑高設計並於周邊規劃夾層，其穿透性利於對初到飯店者進行指引，非常適合作為報到及展示空間。

SIT 理事會議則在會議層的小型會議室(Imperial-Morosco Room)召開，廳房外設有電子佈告欄，清楚標示使用單位及時段。理事會約為 20 人的小型會議，桌椅擺設方式採議事型(Board Meeting)以利意見交流。另為響應環保及避免會議中被打擾，每人桌上皆設置玻璃水杯及水瓶，特別值得注意的是：玻璃水杯及水瓶無論在造型、美觀及大小上皆經過設計，利於未使用時倒蓋的穩固性及取用時的握取安全，同時搭配具前衛時代感的簡潔條紋設計，使原本嚴肅及單調的會議室增添了該城市的藝術氛圍。

（圖 A）

（圖 B）

首日晚上的接待會(Reception)在大廳層的 Gallery on Lex 舉行。值得一提的是，此廳房為該飯店最新改裝的社交宴會空間，有別一般傳統的宴會廳，Gallery on Lex 採獨特的家居型設計，搭配舒適家具及規劃一個別具特色的”廚房”區，廚房中島(kitchen island)擺設自行取用之食物與飲料。本廳房共有三區，中央區為開放空間及玻璃隔間的交誼區，並與左、右兩區聯通，我想這是為何本廳房以藝廊(Gallery)稱呼。而這樣的空間規劃，讓中央藝廊區提供了一個可供發想的多樣型擺設空間。因此本廳房極適合作為人際交誼(networking)、腦力激盪(brainstorming)、雞尾酒接待會(cocktail receptions)及小型發表會(intimate presentations)的場地。

（圖 C）

基於年會首日接待會的目的，是希望會員能在輕鬆的環境及氣氛中相互認識與交談、所以中央交誼區不設桌椅，以利會員取用飲料後，可以自由移動、趨近寒暄及相互認識。左右兩區則設置簡易小立桌或桌椅，以供會員間作進一步及較長時間之交談。另大會並安排了電吉他藝人演奏，以音樂營造自在輕鬆的氛圍。

餐點部分則採 Finger Food 的型式，以小份量方便會員取用及進食，且為避免會員因取餐而中斷交誼的進行，飯店配置服務人員端著餐點及紙巾，不時穿梭於會員間

提供會員選取餐點。比較特別的是，服務人員的服裝不同於一般飯店多以白色為主色的制服，而是以襯衫領帶搭配深色西裝型風衣夾克，予人輕鬆又不失莊重的感覺，並融入紐約都會的現代風情。這應該是配合本廳房家居型的設計，以擺脫一般餐廳制服予人過重的商業氣息。

（圖 D）

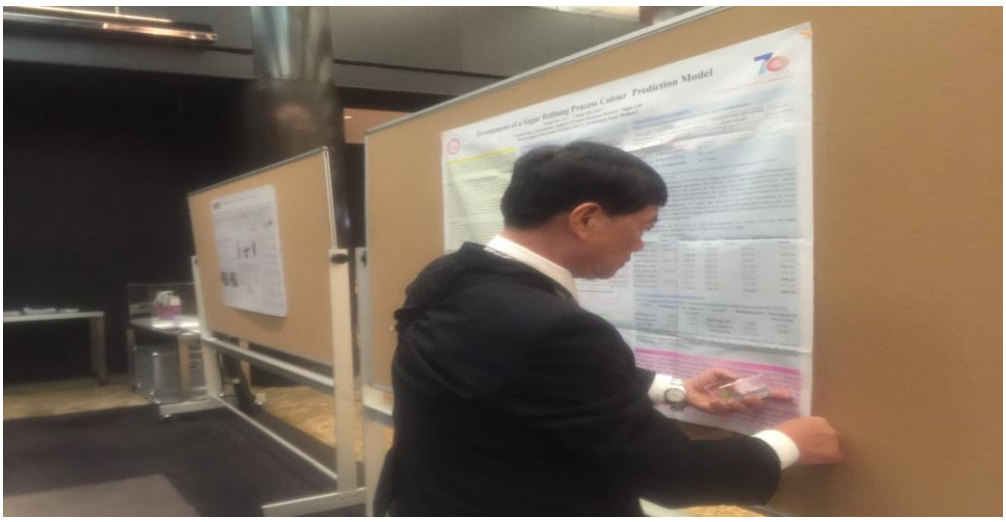
(2)正式會議、聯誼午餐及會員親友行程

年會正式會議安排在 Lobby 層的 Manhattan Ballroom 舉行，該宴會廳標榜 24 英尺(約 7.3 公尺)挑高玻璃牆，因位於轉角區，可收 42nd Street and Lexington Avenue 的大都會街景，配有全遮光拉簾及窗簾，垂降式投影幕及影音設備，若以劇場型(theater-style)排列座位，可容納近 400 人。

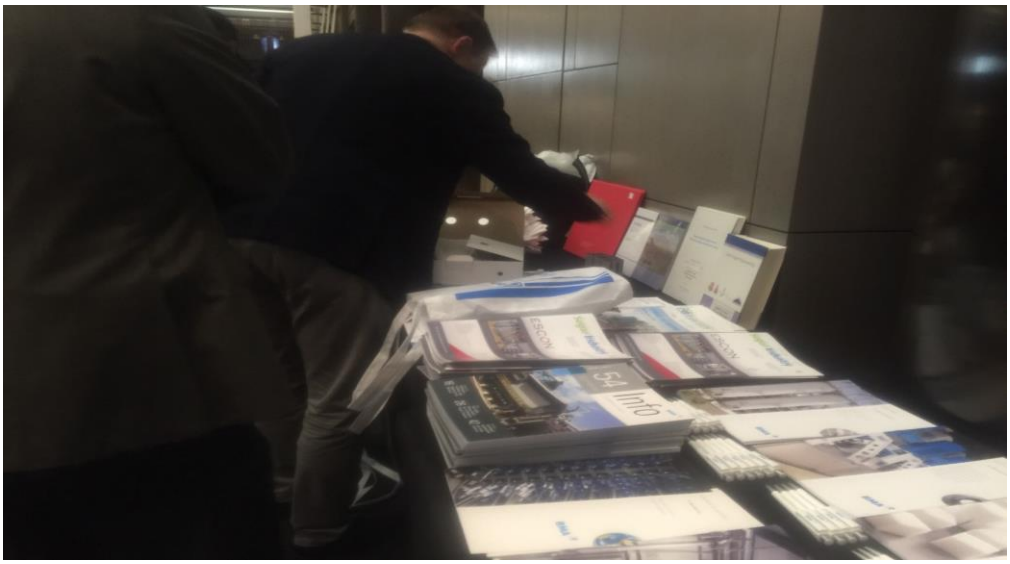
（圖 E）

值得一提的是，宴會廳前規劃了一個 3,000 平方英尺(近 84 坪)的門廳空間 Foyer Manhattan Ballroom，提供作為宴會前的準備(pre-function)空間，本次年會會議報到處即設於此區，並作為大會 Post 專題報告展示區及廠商資料展示區。報到台並同時辦理相關行程活動安排的事前統計登記，例如:特殊用餐要求(Special Meal Request)、每日的親友行程(Guest Tour)、煉糖廠參訪午餐行程(Refinery Tour Lunch Only)、煉糖廠參訪後不用午餐及逕赴機場行程(Refinery Tour No Lunch Only/Airports)等十類別行程統計，報到台後方並備十個空紙箱，以利歸類並提供給飯店及廠商作後續服務之安排準備。親友行程每日出發及返回時間及集合地點，也清楚地列在議程中。

（圖 F）

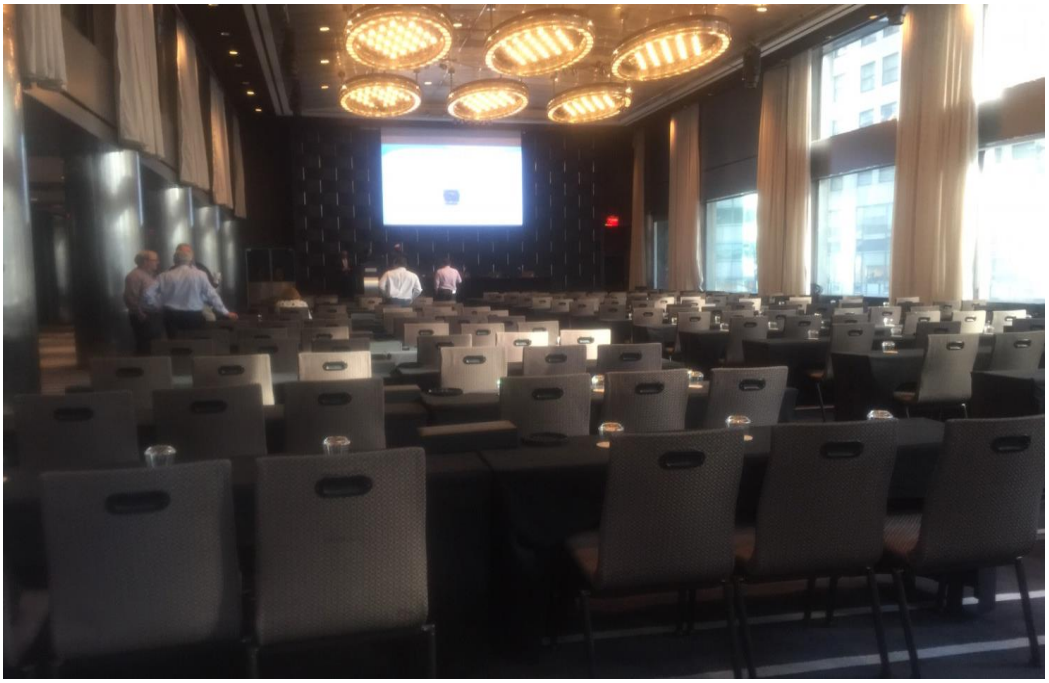


（圖 G）



（圖 H）

本次正式會議採劇場型(theater-style)排列座位，後排座位具有高低差，以避免視線阻擋。配合舞台垂降螢幕的簡報投影，舞台區側面窗作局部拉簾遮光，以避免光害。兩側落地玻璃窗則採開起狀態，以取得自然採光及產生開闊的視覺空間感。採自助式茶水服務，提供每位與會者玻璃水杯，於會場外設茶水台，以酒精加熱保溫的不鏽鋼水桶提供熱水、咖啡、不含咖啡因(decaffeinated)咖啡等飲料。值得一提的是，不含咖啡因(decaffeinated)咖啡獨立成一選項，應該是順應越趨普遍的消費者對無咖啡因的需求，而不另提供鮮奶或奶精？，節省取用時間及避免人數眾多自行操作可能造成環境髒污?。



（圖 I）

（圖 J）

中午大會在 Lobby 層的 Museum Space 提供簡易的自助式聯誼午餐，以打餐台方式提供沙拉、麵包、冷盤、4 道酒精保溫熱食、飲料及甜點。因本區原屬公共開放空間，非屬正式用餐區，並沒有另外擺設餐用桌椅，所以桌椅高度稍嫌低矮。也可能因設定為聯誼式午餐，會員亦可採站立式用餐及交談。本部分於明年在臺舉辦時，可向主辦單位調查會員反映及接受度，可作適當的安排及調整。惟值得一提的是，大會於挑高天花板處懸掛各與會會員國國旗，確實增添了年會的國際感。該飯店提供這種規格化服務及善用天花板的空間巧思，值得參考。

（圖 K）

（圖 L）

（圖 M）

(3)閉會演說與頒獎晚宴

最後一天會議同樣安排在 Lobby 層的 Manhattan Ballroom 舉行，在會長發表閉會演說前，會邀請明年年會地主國(臺灣)會員代表，上台邀請各國會員參加。本公司由砂糖事業部左執行長代表董事長，上台邀請與會各國代表明年至臺南參加 SIT 年會，並播放臺灣、臺南及本公司的綜合介紹短片。本公司並特別邀請我國駐紐約辦事處人員上台壯聲勢，獲熱烈迴響，成功達成國民外交的使命。本部分對未來年會的舉辦地主國會員非常重要，因此明年本公司台糖長榮酒店作業時，應特別注意相關影音設備的正常運作及影音品質，以協助未來年會地主國會員，順利圓滿地完成邀請會員與會的使命。

（圖 N）

正式晚宴安排在宴會廳層(Ballroom Level)的帝國宴會廳 3 號廳房(Empire State Ballroom III)舉行，餐前接待會則在毗鄰的帝國宴會廳 2 號廳房(Empire State Ballroom II)舉行。

帝國宴會廳號稱是紐約市最大的飯店型宴會廳，共 19,000 平方英尺(約 532 坪)，為該飯店近期投入 120 萬元美金(約臺幣 3600 萬元)完成改裝的新場館，採用溫暖的色調、挑高天花板及舞池地板設計，可供多功能使用，最多可容納 1,500 人舉辦大型會議或舉辦 2,000 人的雞尾酒會。透過活動隔板的設計，可彈性區隔至 5 個廳房，且因具連通性，可滿足客人多樣性的需求，例如：使用 3 個廳房舉行會議，其餘空間打通作為會後用餐區。又如本次年會晚宴接待會及晚宴分別於 2 號廳及 3 號廳舉行。

（圖 O）

晚宴餐前接待會，採開闊的舞池型空間擺設，舞池週邊擺設輕便的小桌椅，並設酒水吧提供各式飲料及酒水，以提供會員無障礙的自由移動及交誼空間。本區的功能也如預期成為晚宴後餘興活動的舞池場地，也彰顯本宴會廳多功能設計的實用性。

（圖 P）

頒獎晚宴部分採十人圓桌及位上方式進行，因今年適逢 SIT 的 75 周年慶，大會對晚宴服裝建議(dress code)為打黑領結，男性著燕尾服/西裝，女性著長禮服。一般西式晚宴或舞會場所，多設有 dress code。若大會有通知飯店，一般飯店都會準備一些(例如:黑領結)以備參宴者不時之需，因本次晚宴 dress code 採建議型而非強制型，所以飯店並無提供租借服務，不過會建議本公司台糖長榮酒店於明年接辦時，可先洽 SIT 主辦人員以了解本部分的需求，以提供更貼心的服務。

晚宴場地透過各類不同設計造型、不同顏色及不同角度的投射，再配以桌面小燭台的擺設，營造出溫馨浪漫的氣氛。同時利用舞台變化的燈光及專業 DJ 的配樂效果，吸引會員攜伴於舞台前的舞池翩翩起舞。

（圖 Q）

餐桌上除每個座位皆擺設咖啡杯組、鮮奶、糖包盅、餐前麵包、奶油塊、酒水杯、餐具及口布外，另每人並有一份印上 SIT 及晚宴贊助會員公司 Logo 的類似菜單摺頁，其內容包括:晚宴菜單(含前菜、主餐、麵包及奶油、水果裝飾的起司蛋糕、飲料-咖啡、不含咖啡因咖啡及綜合花草茶)、頒獎流程(含致詞者、各獎項之頒獎者與受獎公司或人員名單）以及新舊任會長的遞槌儀式（PASSING of the GAVEL)、得獎人介紹及 SIT 年度組織人員名單。重要主桌並擺有入座人員姓名桌牌。有關桌面擺設及餐飲類型，部分涉及到國際用餐習慣及贊助會員的巧思，本部分建議未來可事前與大會主辦人員溝通，以期能兼顧到大部分國際性會員的用餐習慣及提供在地國的創意巧思。

（圖 R）

（圖 S）

（圖 T）

（圖 U）

三、心得與建議事項

就本事業部而言，參加本次 SIT 年會主要是觀摩國際知名連鎖飯店承辦會展之相關作業及服務流程，瞭解相關軟硬體品質標準，以作為現有營業據點及未來開發會展型酒店之參考，因此特別於 5 月 17 日下午抽空拜會交通部觀光局駐紐约辦事處張维庭主任、除介紹本公司休閒遊憩事業部業務外，並聽取張主任之建議。張主任對於台糖公司大面積之土地開發深感興趣，建議可與有經驗的國際大型開發商合作以共同拓展國際觀光及會展業務，並希望能介紹當地有興趣的廠商或集團來臺考察。對於張主任的積極與熱心協助參與本次年會，與會人員代表公司向張主任表達真切感謝之意。

本次與會觀摩心得與建議，除於活動行程及內容重點說明外，特別感受到 Grand Hyatt hotel New York 透過 2011 大改裝的機會，不但在空間動線及裝修設計進行改造外，更導入許多創新的設施及服務以提升會展型飯店的服務效率及客戶滿意度，深具學習與參考價值，以下分幾個大項分享:

（1）客制化的會議團體訂房服務

該飯店為 10 間以上訂房需求的會議團體，提供客制化專屬的網路訂房專區，會員可透過該飯店給予該團體的專屬連結進入該專區，並依個別會員需求進行網路訂房及電子付款。

對客戶而言，該會議團體會員可透過該團體官網作連接，讓會員進入飯店專屬網站，以該團體協商的專案優惠價訂房，該網頁可以加入該會議團體的 Logo，使會員能充分感受到飯店給予的尊榮感。該網頁更可提供該團體會議用餐場地、所在城市資訊及飯店相關服務等資訊，讓主辦單位在辦理會員網路報名的流程上更加順暢及有效率。

對飯店而言，傳統使用傳真及 email 訂房，會因為各地時差、手寫字跡辨識差異、大量 email 造成的漏失，以及轉寫鍵入訂房系統造成的失誤，不但作業流程繁複耗時，且極易發生失誤。本部分非常值得學習，以提升營運效率及客戶滿意度。

（2）房型命名簡單易懂

會展型飯店通常房間數眾多，簡單易懂的房型說明可以避免誤解及減少交易時間。一般國際化飯店，其客床多採國際標準尺寸及名稱，如:Single、double、Queen 及 King 等，各類房型主要以床型，配以床數及面積說明，即可讓住客瞭解房型概況。目前因台糖長榮酒店的客床尺寸非屬國際標準尺寸，通常以大中小床或標註長寬尺寸說明，較易生誤解及耗時。未來若有國際會展型飯店的開發案，客床部分建議可納入國際通用尺寸，以減少溝通障礙。

（3）E化設備的引入

如電子櫃台(Automated kiosks)能讓住客能自行辦理入住或退房手續，飯店並提供免費語音住房登記服務(1-800-CHECK-IN)。對住客而言，可快速，甚至在到達飯店前即可完成Check-In。電子櫃台還能自動製作房卡及收卡，對於經過長途旅行到達飯店的住客，可輕鬆快速地入住客房休息是非常令人開心的一件事。

對會展型的飯店而言，除可避免尖峰及大量住客同時湧入時，大排長龍等候Check-In所造成的客戶抱怨外。同時可以減少時段性人力不足的狀況及降低人力成本。

（4）跨業合作

如本報告內容摘要所述，地方要發展會展產業，吸引潛在國際團體在臺舉辦活動，則需靠觀光產業上、中、下游商品及服務的整體包裝與行銷，才能爭取到訂單。這些機構及供應商，包含各國各市的會議展覽中心、觀光局、飯店業、會議公司及旅遊業者等。例如本次年會的會員親友旅遊行程，則需靠飯店以外的旅行業者來提供服務。

先前提到該飯店服務中心的禮賓人員，能依住客興趣，給予紐約著名百老匯歌舞劇之建議，並提供熱門票券的代購及旅遊相關服務。因這樣的服務在一般飯店至為少見，再進一步探詢及瞭解中，發覺Grand Hyatt hotel New York在跨業的合作上，除提供協力廠商資訊與協助連繫外，更引入創新的營運模式：該服務中心的禮賓團隊是委由當地一家綜合票券及旅遊業公司(Continental Guest Services)派員至飯店服務。這樣的跨界合作，除可提供住客更專業的旅遊諮詢及商品訂購服務外，也可降低飯店相關人事成本，亦可供本公司各據點參考、評估與學習。

二、觀摩配偶行程

出席第 75 屆 SIT 年會有關 Spousal/Guest Program 報告

（一）、時間：2016 年 5 月 16-17 日

（二）、地點：紐約曼哈頓區

（三）、行程內容：

2017 年本公司將主辦 SIT 第 76 屆年會，此行目的旨在見習主辦國（美國）如何安排今（2016）年與會者的配偶或眷屬，一些知性與在地文化、景觀的遊覽。

根據大會網站揭露的內容，第一天（5 月 16 日）主要遊覽紐約市曼哈頓的下城區與中城區。實際情形是一部大巴士在飯店外頭接應（圖 1），原預定上午 9 點發車，但人員一直無法到齊而延宕半小時之久，待人員全數到齊後開始往下城區前進，首站來到第五大道的麥迪遜花園，此處可同時遠眺到帝國大廈（Empire State Building）與熨斗大廈（Flatiron Building）的建築外觀（圖 2），接著前往華盛頓廣場，此處為紐約大學校區一部份（圖 3），觀賞特殊建築外觀，再接著往下城區的華爾街，看看紐約的證券交易中心，以及馳名中外的華爾街金牛，接近中午時分來到紐約世貿大樓與 911 的紀念館參觀，直至下午一點才開往洛克菲勒中心的餐廳用餐（圖 4）。

整個上午可說是純外觀的欣賞，既沒有進入館內或大廈內，也沒有所到之處有接待人員解說，就只是車內由一位導遊全程導覽與說明，比起去年到日本的第一天安排奈良參觀還附贈伴手禮，可說是很精簡而且不太花錢，主辦單位省很大。

中午就在洛克斐勒中心的地下室用餐，全數只有一套餐點--牛排（前菜有沙拉與麵包，後面有咖啡與蛋糕），私下了解這一套餐約 39 美元，但團體入座價格可能另議。

用完餐後即上到 67 樓的觀景台，鳥瞰紐約市（圖 5），門票單張 30 美元，團體價格也可能另議，之後全車打道回府，結束第一天的行程。

第二天（5 月 17 日）也是上午九點自飯店出發，車子先往林肯中心參觀（圖 6），依舊是欣賞外觀不能入內，然後就是一連串的坐車遊覽，中央公園、哥倫比亞大學、哈林區、第五大道等，又是一個不用花錢，全仰仗車內導遊全程解說，連走路都不用的「視覺行程」。

接近中午來到雀兒喜碼頭搭船，在船上用餐並遊哈德遜河，兩天以來的亮點行程，大概只有這一項，推估此費用每人可能在百元（美金）之內，船內有鋼琴演奏，並近距離觀看自由女神像與布魯克林大橋、麥迪遜大橋。餐點一樣是沙拉、麵包、蛋糕、咖啡，主餐可選擇雞或魚，不過遊客興致全在遊船的景點，餐飲的美味反倒是其次了（圖 7、8）。

約莫兩點半離開船，車道雀兒喜市場以及高架花園（圖 9），不過都是匆匆一見，並未深入參觀，三點半就回到飯店。

（四）、結論與建議：

1.參與同仁仍須具備可溝通的外語能力。

2.可以看出紐約的物價非常高，光餐飲即占了大部分的預算，所以整個兩天的遊覽行程其實乏善可陳，除了搭船遊河這一項。

3.這一次紐約的行程還有疏漏，例如沒有任何書面資料或旅遊冊子給遊客，只發了一本由紐約市公發的小冊子給客人，比起去年大阪年會可說是簡陋又不貼心，或許可以解釋行程幾乎都是外部參觀，所以也不必備什麼書面資料了。

4.坦白說，這兩天的行程並不出色，紐約只不過是全球著名城市、太多電影或影集拍攝於此，才讓此城市聞名於世，自助旅遊都比這一趟還來的細緻，有走馬看花之嫌，對於 SIT 理事主席夫婦前年來臺，嫌棄我們安排的臺南的景點，可能是對東西方文化的看法有差異所致，正如此次紐約的行程，真的沒什麼亮點。

5.因此建議明年我們的安排：第一天上午高雄佛陀紀念館，下午尋找美濃客家莊，有製作紙傘、可觀光之地，中午餐廳也得尋覓衛生、裝潢等條件好一點的。第二天上午故宮南院，中午尖山埤用餐加遊湖，下午奇美博物館，讓東西方的文物欣賞交會於同一天。

6.車輛安排一台大巴士即可，參加人數在 40 人以內，車內最好附廁所，這些貴婦女士們都有使用的習慣。

（圖 1）在飯店外頭接應大巴士

（圖 2）帝國大廈（Empire State Building）與熨斗大廈（Flatiron Building）的建築外觀

（圖 3）華盛頓廣場，此處為紐約大學校區一部份

（圖 4）洛克菲勒中心的餐廳用餐

（圖 5）用完餐後即上到 67 樓的觀景台，鳥瞰紐約市

（圖 6）參觀林肯中心

（圖 7）遊船的景點與餐飲

（圖 8）遊船的美味餐飲

（圖 9）雀兒喜市場以及高架花園

三、參觀工廠行程

一、揚克斯精煉糖廠(Yonkers Refinery)簡介

該廠創建於 1901 年，目前屬於 ASR(American Sugar Refining) 集團旗下的 Domino Suagr，所在地揚克斯是美國紐約州威斯特徹斯特縣的一座城市，位於哈德遜河的東岸。人口約 20 萬，是該州第四大城市。

該廠曾於 2000 年初期停閉，後因喬治亞州 1 座精煉糖廠爆炸，才再度恢復經營。主要產品有細砂、二砂、液糖及各式小包裝糖。

二、接待安排

在工廠前擺了幾張長桌，放置個人防護具及衛生用品，包括：安全帽、護目鏡、耳塞、髮罩及安全背心。另有準備 ASR 集團自己生產的幾樣產品和一頂鴨舌帽作為伴手禮。

三、參觀人員分組

約每 10 人為一組，每一組都配一個引導員，當天有 3 台巴士，參觀總人數大概 120 人。

四、參觀點的安排

原料糖卸貨與洗糖設備(Raw Sugar Unloading and Wash Station)、清淨設備與粒狀活性碳(Clarifiers and GAC)、液態與太空包儲運(Liquid and Bulk Shipping) 、Power House(動力工場)、Granular Sugar(砂糖)、Liquid Sugar(液糖)、Evaporation and Polishing(蒸發與精濾)、Brown Sugar Packaging(二砂包裝)、Packaging(包裝)、Ware House(倉庫) 等 10 個點，每個據點現場有張貼簡介海報，並有專人解說。

五、參訪心得

(一)缺點

1. 參觀前沒有工廠簡介：沒有適當的接待場所，在工廠前領用個人防護具後直接引導進入工廠，有如逛迷宮。
2. 工廠老舊：環境有經過整理，仍看得出破舊之景象，水溝仍有酸臭味。
3. 參觀點太多：多達 10 個據點，參觀路徑複雜，各據點的解說人員照本宣科念解說稿，訪客不容易聚焦，參觀時間拉長。
4. 對訪客動態掌控不良：參觀結束後有 2 位訪客走失，耽誤大家後續之行程。
5. 時程掌控制不佳：因參觀時間過長、遊客走失、午餐安排等因素，整體行程一再延誤，差點讓部分訪客趕不上飛機。

(二)優點

1. 注重工安及衛生：進入廠區前先發放相關用具並要求配戴，工廠內適當地點均有標示應配戴之防護具。
2. 注重營業秘密保護：在場區禁止拍照及攝影，如有違規馬上會被制止。
3. 注重製程操作持續改善：在 5 月 17 日的論文發表會，有分享以工作圈手法改善 GAC 脫色塔操作的經驗，其成效為省水、節能、減少糖份損失。
4. 倉儲及包裝區場地寬敞：可供發展多樣化之包裝及充裕之市場供需調節彈性。
5. 對待訪客親切禮貌並贈送伴手禮：加深訪客的美好印象，提升企業形象。

(三)、參觀之整體觀感

在 1997 年小港精煉糖廠興建時期，台糖曾派遣 10 位同仁到該廠實習，19 年後舊地重遊，廠房及設備並沒麼改變與進步，與日本友人 Urabe 先生討論此現象，認為：美國煉糖業競爭劇烈，該廠曾數度易主為目前紐約區唯一還在經營的煉糖廠，他們追求的是短期內的獲利，不願做長期的投資。相較於本公司砂糖事業部近年來所提出的投資案如：已進行中的 GAC 再生爐更新、二砂分蜜機更新、鍋爐改燒天然氣；計畫中的 4000 噸儲水槽、砂糖倉庫興建等案。台糖的經營更具前瞻性與永續性。

(四)建議與結論

1. 強化接待事宜：所有訪客(包括不參觀工廠者)先在 3F 中山堂集合，觀賞小港廠簡介影片及進入工廠應注意事項，發放個人安全防護具及解說耳機，參觀人員分組，不參觀工廠者另安排娛樂節目。
2. 簡化參觀景點：參觀點規劃為原料糖倉庫、煉糖大樓 3F 主控室、成品倉庫參觀室、實驗室、汽電共生場、製油工場包裝室等 6 個點。各據點懸掛解說海報，並設置英文自動解說系統，可經由耳機收聽。
3. 加強引導人員配置：每組參觀人數約 15 人，配置 2 個引導員，預防訪客走失，並協助安全事項防止意外發生。
4. 午餐安排：安排離工廠近的餐廳，以自助餐方式即可，因部分訪客需趕飛機航班，時間控制宜精準。
5. 致贈伴手禮：考量具有特色的台糖產品及繡上台糖 logo 的帽子。

伍、獲致成果與效益：

一、成果：

（一）、參加本屆 SIT 紐約 2016 會員大會，由左執行長希軍代理王副總國禧的理事職位到紐約參加 SIT 2016 年會，聽取了 SIT 2015 年度會務報告，並被選為 SIT 2016 理事；在論文與論壇發表會議後段，再次上台代表董事長致詞，放影片、掛國旗、同時邀請所有會員國 2017 到 ROC 臺灣臺南參加會員大會；會議期間與 25 個會員國家交流，成功的維護 ROC 臺灣地位與國旗，完成學術、外交與經濟交流，成績斐然，相當難得的成功完成任務。

（二）、從頭到尾聽取 2016 紐約 SIT、本屆所有論文與簡報發表，參與討論交流，取得所有發表論文，同時也與主辦理事主席談判要求給予全部簡報資料，獲得應允同意給台糖公司，總計共有論文一千一百篇左右，此待遇未曾有之。

（三）、本次參加大會有 25 會員國代表團，共 186 人，中華民國 ROC 臺灣代表團共 5 人參加，為史上出席第三多人的一次；但邀請參加 SIT 2017 年會致詞時，因攜有專業與高畫質影片播放，讓所有會員大為讚賞外，上台人數共 9 人更是表現空前的誠意，其間有紐約台北經濟文化辦事處動員前來七人，包含有兩位主任來一齊為台糖公司 TSC 站台，加上影片的震撼效果，以行銷規劃來顛覆 SIT 的 25 個會員國對臺灣的看法，大獲成功。

（四）、經交涉理事主席 Edgar Aqquire 後，獲理事主席應允可在 SIT 網路看歷屆論文，同意給密碼給台糖公司使用，以助提升技術及學術能力。

（五）、特別因台糖公司為 2017 舉辦的地主國，又遠道派 5 人與會，超過中國代表團人數；有別於本屆參加代表團人員會費，打八折優惠給台糖公司人員，同時願協助台糖公司與民營益聯精煉糖廠競爭，特別照顧老會員。

（六）、因 ROC 代表團的表現讓人印象深刻，連 SIT 理事主席都要找台糖公司做新的合作模式。協商同意給 ROC、臺灣、台糖公司更大的權力空間，各項優惠：如國旗名稱，網路行銷等，允許臺灣影片予 Sugar Journal 雜誌社採用，有助行銷臺灣觀光並提升國家的地位，也助台糖公司提升研發與製造技術。

（七）、藉由陳董事長的影響力與台糖公司品牌、資源力量；趁著出席年會之方便，將紐約台北經濟文化辦事處人員，整個拉進來為台糖公司 TSC 站台當支柱，同時台糖公司參加 SIT 也為他們創造宣傳績效的實績，引外商與台糖投資合作，也答應促銷台糖公司糖品、農產品與服務。

（八）、勇敢去改變、去執行、去爭取是本次參加 SIT 會員大會的特色，有突破才有機會贏得更多的機會！帶到紐約的禮盒設計相當成功！SIT影片內容也贏得SIT會員的人心！可見行前規劃的策略成功地達成任務！

二、效益：

（一）、有形效益：

1.論文資料庫的使用，一千一百多篇，可以分門別類來使用，重新培養設計人才!

2.找尋合作對象如日本三井製糖、美國 ASR、英國 BS 等大廠做市場的競合。

3.從行銷面來看；讓中國市場看到糖業中的台糖公司品牌，與臺灣市場的第一品牌，以參加國際會議當做品牌行銷的直接費用，此次是相當成功的例子。

（二）、無形效益：

1.建立海峽兩岸在傳統糖廠、精煉糖及二次加工糖的生產技術及創新研發上，台糖公司就是領導的品牌，此部分在 1930 年代台糖公司就頗負盛名，只是因經濟循環與經濟開發而隨著農業而沒落，所以參加國際性年會來喚起生產技術的信心與自尊，這部份認為最為重要。而且是出口轉內銷的模式。

2.對臺灣內部的煉糖業競爭，面臨的是民營精煉糖廠的建廠試車與生產競爭，但現實的是精煉糖的生產技術大部分都由先進美日歐國家所掌控，當然，台糖品牌要先從國際上的品牌站住臺灣市場地位，由國際會議的場合行銷台糖品牌，真是本輕利大的成功，也給國外砂糖業要與民營煉糖廠合作的業者，施以競爭壓力，國外的廠商會勸說民營煉糖廠業者，”有台糖的品牌與技術在臺灣市場，進入此市場的門檻與風險太大！何不找台糖合作？”

陸、結論與建議：

一、 結論：

（一）、此次會議與歷年發表論文都偏重在技術方面的改良論文，新設備儀器等介紹，世界各地新的建廠實績三大類，原本希望有更多生物科技類來投稿發表，但為何還是缺席呢？個人認為在最近二十年來與糖有關的高價值產品與技術都往醫藥方面或是生物科技論壇協會來發表，這表示此協會在產業發展過渡中，已經沒落；又加上製糖、煉糖產業從成長到成熟後開始衰退，加上北美併購激烈，大者恆大如 ASR、Lantic 等，會員數減少，所以氣弱了，大部分精英也轉業了。

（二）、但此次論壇兩個議題;一為與糖相關新名詞與科技討論。一為製程微生物 microbes 的控制與方法。其實此問題是呼應食品安全與衛生。以往糖的精煉製程是相當的穩定與安全，但是現在潮流與法規面，對環保、基改原料、污染、衛生更需要重視。再以論壇的整個趨勢推估，未來種甘蔗採收甘蔗都靠機器人，製糖工廠也由機器人或自動化來取代人工，透過大數據與物聯網提高甘蔗產量，並利用再生綠能進行綠色生產，台糖公司與 SIT 各會員國在工業 4.0 世代是不可能缺席的，建立在地特色的生態圈與經濟圈，突出自己的特色、厚植競爭力，否則將被取代或淘汰。

（三）、有關生質能源、酒精類的發表在本年技術缺席，與國際油價大跌及頁岩油開發等競爭力比，成為全球產業發展處於弱勢有關，故本屆在此著墨的並不多。

（四）、SIT 每年都是在技術討論層級，反而在產業營運面、行銷與策略面甚少提及，從而反映出形而上的商業面變遷太快，無法評述；另一方面給第三國家忙於技術跟隨，而不著重在規劃管理面上，這就是為何建精煉糖廠都是北美與日歐主導建廠，第三世界或開發中國家生產原料糖，中東與產油國家熱衷建精煉糖廠的原因。

（五）、精煉糖廠經營效率的良窳，至關當初建廠的規劃與一次性的投資是否足夠；如果先天不良，規劃不當，後續再投入更多的錢都是效果有限，變成先天不良，如小港廠目前的困境，如廠地址選擇不當，邏輯配送、先進先出等都成問題。

（六）、製程後段的倉儲與包裝，在先進國家的精煉糖廠根本不是問題，但在小港卻是最大痛處：倉庫儲存空間不足，僅僅只有 6000 噸，而衛福部的食品安全衛生管理法要求的先進先出下，產生捉襟見肘的窘境，以年度大量移運三萬噸費用約七、八千萬，或採每月停溶 1 次，每次損耗成本八百萬到一千萬之方式增加倉儲空間，經此次參觀 Yonkers 精煉糖廠後，他山之石可以攻錯，倉庫就是平面堆疊四層，周轉空間達一萬五千噸，寬敞的車道，六台堆高機同時作業，雖然是百年老廠，在各方面比小港差，但倉儲容量卻比台糖的小港廠好，實在令人扼腕不已！

（七）、從國際會議上拿回國內煉糖技術市場的主導權，周重吉博士曾經為 Sugar handbook 編輯自居，又是益聯民營精煉糖廠興建的總顧問，居中操控兩岸精煉糖技術資源，實則是地主美國的會員代表，切斷與 SIT 的居中牽線，台糖公司直接洽 SIT 合作，另一方面也可牽制民營精煉糖廠的工程進度，重現台糖員工對煉糖技術的自信心。

（八）、現代化精煉糖廠的包裝設備要自動化與多樣化，全世界都是如此；可惜的是小港廠廠房受限又疏於投資，所以無法擴大生產線與多樣化，當然無法更新換代來做完整的自動化與競爭力的提升，生產平台的改善與效率提升，市場行銷的產品規劃等，這是我們該對未來經營做策略性的思考。

二、建議：

（一）、在西方國家建廠或籌備國際會議的思考策略上，當然認為台糖公司 TSC 為國家支持應該會大氣些，故 2017 SIT 在臺灣舉辦，就希望做好規劃與投資來好好的辦一辦，結合觀光旅遊及行銷臺灣，這不但是很有意義且也可行銷臺灣順便提升精煉糖廠的技術，並讓年青員工看到的是臺灣糖業的復興與精緻化一面。

（二）、明年 2017 SIT 國際年會在臺灣臺南，依照慣例請副總統級以上貴賓來做開幕，同時第一篇論文由董事長來發表台糖的六級產業，相信對 ROC 臺灣與台糖公司的國際地位提升，一定有很大的助益！

（三）、將 SIT 歷年來的論文分門別類，交由台糖公司各相關部門研究參考，應可以大大的提升公司在製糖與煉糖的核心競爭力。

（四）、在 1998 年的 3 月當初是在小港精煉糖廠的建廠期間，有十人參與受訓，算算已經是十九年前的過往，此行黃副執行長民生與賴副廠長明德真巧此次參觀工廠就是位在哈德遜河(Hudson River)的Yonkers 精煉糖廠，當初是屬BS(British Sugar)所有，中間歷經關廠、被收購併入 ASR 所有，如果以現在小港精煉糖廠的眼光來看現在的 Yonkers 廠，當然老舊與效率不如臺灣的小港精煉糖廠，清潔、清理更無法與小港廠比擬，且當初是以生產一半液糖，一半結晶糖；但現在改變為 1/3 生產液糖，另外 5%生產 Brown sugar，其他生產白糖結晶糖約 61%。但是 Brown sugar 價格是一般白糖結晶糖的 2.5 倍，如此應驗台糖公司應往生產黑糖等二次加工糖的方向來改變！

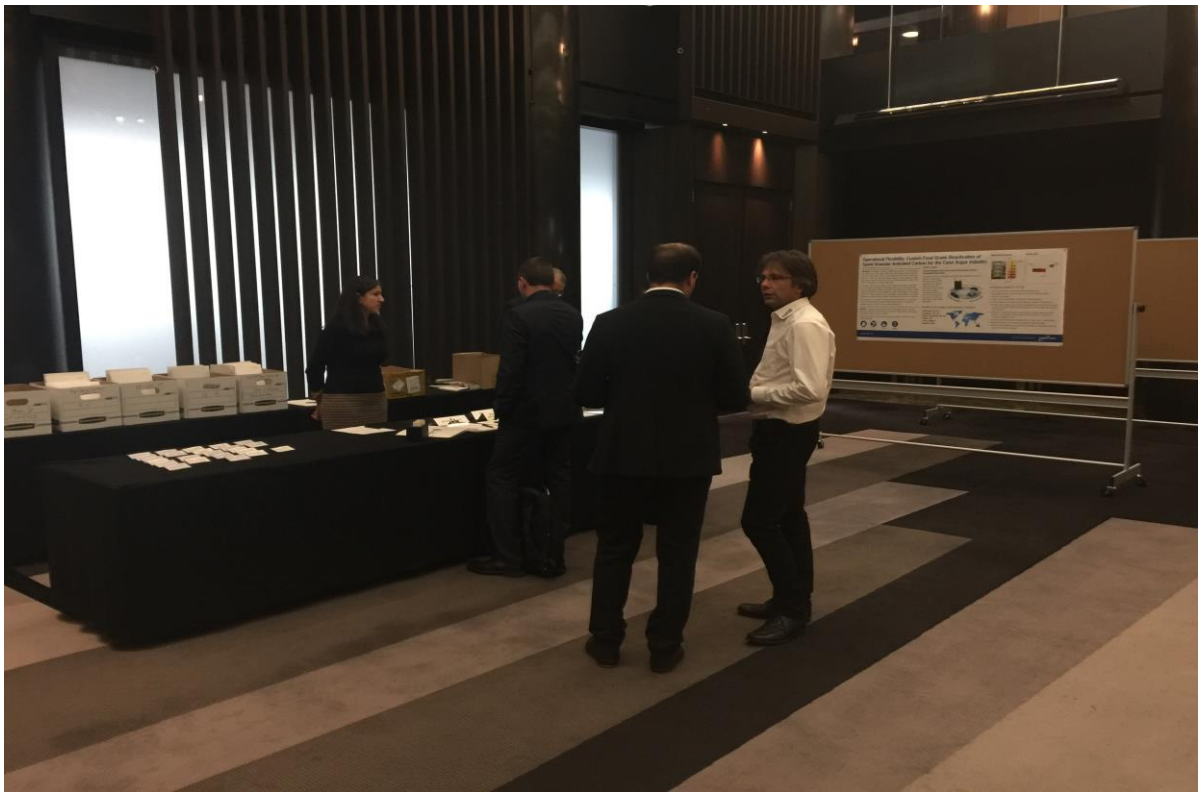
（圖 10）5/15 下午理事會會場告示牌

（圖 11）5/15 下午理事會會場

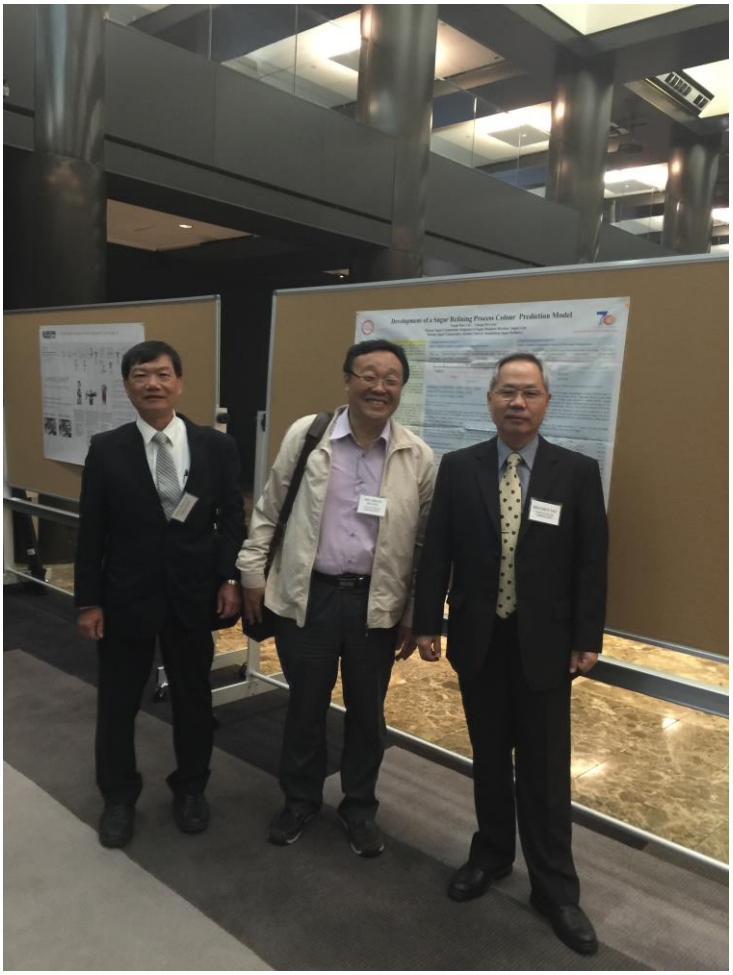
（圖 12）5/16 SIT 2016 開會的紐約凱悅飯店

（圖 13）5/15 SIT 2016 開會第一天報到處

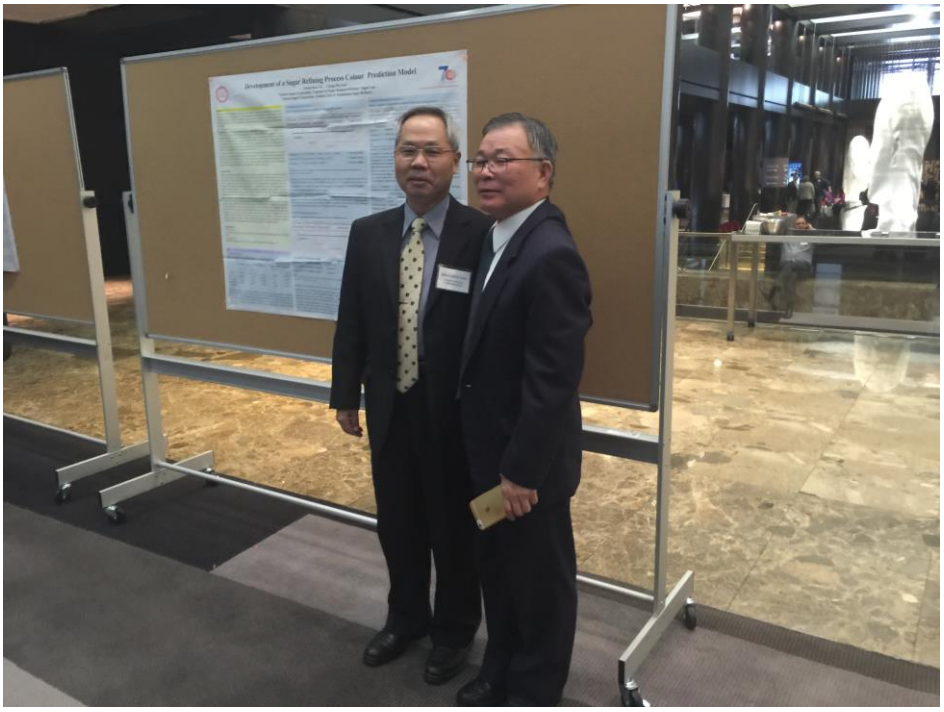
（圖 14）5/15 SIT 2016 開會第一天報到處



（圖 15）5/16 SIT 2016 開會第二天早上報到處



（圖 16）5/16 SIT 2016 開會第二天早上報到合影

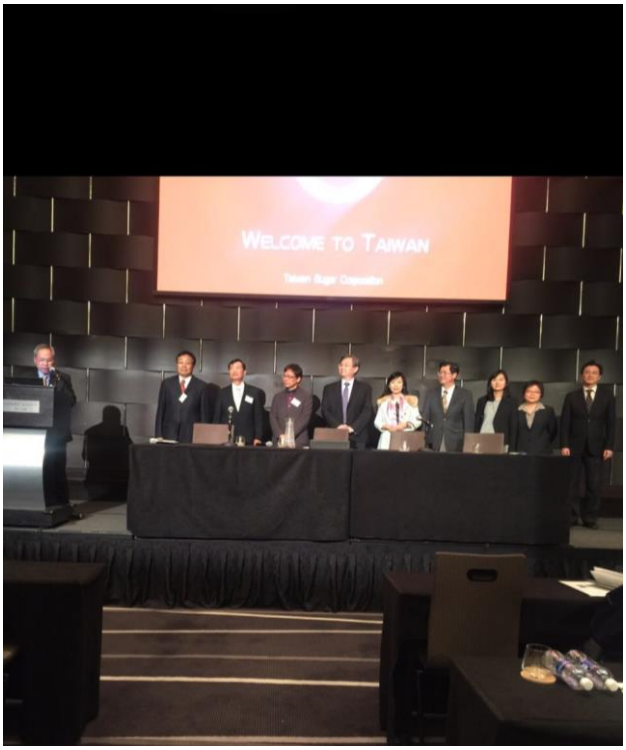


（圖 17）5/16 SIT 2016 開會第二天早上報到合影

（圖 18）5/16 SIT 2016 會議論文發表 1

（圖 19）5/16-5/17 SIT 2016 會議論文發表 2

（圖 20）5/17 SIT 2016 會議台糖公司代表致辭邀約 2017 臺灣年會 1



（圖 21）5/17 SIT 2016 會議台糖公司代表團上台邀約 2017 臺灣年會 1

（圖 22）5/17 SIT 2016 會議台糖公司代表團上台邀約 2017 臺灣年會 2

（圖 23）5/17 SIT 2016 會議論壇 1

（圖 24）5/17 SIT 2016 會議論文發表結束

（圖 25）5/17 SIT 2016 會議晚宴開始

（圖 26）5/17 SIT 2016 會議晚宴

（圖 27）5/18 SIT 2016 參觀 YONKERS 精煉糖廠 1

（圖 28）5/18 SIT 2016 參觀 YONKERS 精煉糖廠 2

（圖 29）5/18 SIT 2016 參觀 YONKERS 精煉糖廠廠區出口

（圖 30）5/18 SIT 2016 參觀 YONKERS 精煉糖廠後的餐廳聚餐 1

（圖 31）5/18 SIT 2016 參觀 YONKERS 精煉糖廠後的餐廳聚餐 2

（圖 32）5/18 SIT 2016 參觀 YONKERS 精煉糖廠後的餐廳聚餐 3

（圖 33）5/18 SIT 2016 參觀 YONKERS 精煉糖廠後的餐廳聚餐 4

柒、論文附錄:

1. # - 1129„ Opportunities and challenges from the emerging bioeconomy for the sugarsector

砂糖經濟區塊合併生物經濟的機會與挑戰

Arvind Chudasama,
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Email: arvind.chudasama@informa.com

Abstract
Advances in industrial biotechnology has made sugar a superb feedstock to produce variety of platform chemicals via the engineered microbe route. This has been led by the development of metabolic engineering toolbox comprising omics technologies, computational systems biology, protein engineering and synthetic biology. The toolbox facilitates engineering of metabolic pathway in microbes to produce a desired molecule. This technology has facilitated many biotech start-ups whereby, in most cases, bioengineered microbes produce a variety of platform chemicals from sugar starch feedstocks. The recent breakthrough in gene editing technology, CRISPR, is widely recognised as a marked progress in genetic engineering. Fine opportunity exists for sugar producers to diversify their revenue streams through exploiting new technologies surfacing in the sector. The industry needs to look at licensing technologies developed by biotech start-ups (the French Cristal Union is currently just doing that through partnering with Global Bioenergies) and develop in-house expertise in this emerging sector. This presentation provides an overview of the dynamics of the biobased products sector that is beginning to mature and which will drive a company's competitiveness.

2. # - 1130„ Optimisation of White Sugar colour management through the utilisation of on-line colour cameras

應用彩色攝影頭來做最佳化的白糖色澤管理

Craig Parker, Robert Howe, Brian Black, Carlton Haynes and Catherine Bouché
British Sugar plc and ITECA SOCADEI

Abstract
Ensuring a factory can produce white sugar that meets the solution colour demands of its customers' is a key focus for any sugar factory operation. Managing the process to minimise the financial impact of those demands is always challenging and the default position tends to be to over wash the sugar, thus allowing for variations within the process as a consequence of reacting to laboratory generated data.
The paper describes the development of an online ITECA colour camera system over a two year period at British Sugar's Wissington factory. The development resulted in a significant reduction in process variability around white sugar solution colour that enabled the solution colour set point to be increased, whilst still guaranteeing the final product remained within specification. This

led to a financial saving in energy through a reduction in white centrifuge wash water volumes, as well as a reduction in the volume of recycle of sugar back to the white pans from the white centrifuge station.

The paper describes the various developments of the installation to overcome technical obstacles relating to the system location, as well as development of the camera system itself. It also describes how the camera installation enabled the factory team to identify issues with individual plant items.

3. # - 1131„ NEW CONTROLS FOR BATCH AND CONTINUOUS CENTRIFUGALS

新的控制方法用於批次及連續式的分蜜機

By B.C. NIELSEN *Neltec Denmark A/S* bcn@neltec.dk

KEYWORDS: Sugar losses, refinery automation, wash water control, centrifugal safety.

Abstract

The performance of both batch and continuous centrifugals change over time, sometimes within minutes. Batch centrifugals depend on massecuite viscosity, extent of filling of the basket, massecuite CV, amount of spraying with (syrup and) water, nozzle clogging, pinhole blocking, discharger adjustment, and many other factors. Continuous centrifugals depend on massecuite viscosity, addition of water, heating with steam, water spraying, wear on screen, etc. Measurements inside and outside the centrifugals can help monitor and control the variations, and warn the operator about required intervention. A new set of measuring devices and controls has been developed and applied in sugar factories. This paper will describe function and first experiences.

5. # - 1132„ NOVEL ADSORBENT FOR IMPROVED COLOR AND TURBIDITY REDUCTION WITH REDUCED PROCESS LOSSES

NOVEL吸附塔用於製程來改進減少色澤與濁度並減少製程的損失

Idalberto Delgado, Graver Technologies, Glasgow, DE USA

Jerry Lengen, Graver Technologies, Glasgow, DE USA

Introduction Production of high quality fine liquor as feed to the sugar refinery crystallization system is critical to ensure high quality refined sugar. Adsorbents are an essential component of this purification process, regenerable or disposable, the latter requiring significantly less capital investment. Extended full scale refinery trials were conducted at four different refineries, all previously using non-regenerable, carbon-based adsorbents (PAC's), utilizing a newly formulated non-regenerable adsorbent created to optimize hydraulic pressure and maximum decolorization, as a unique means of achieving more efficient adsorption processes. The initial trials were designed to compare adsorbent

and filter aid consumption, duration of filtration cycle, sugar losses, wash water consumption and filter cleaning times required to achieve fine liquor color, pH, and turbidity in the same specification range as in current practice. On average, adsorbent use (based on refined sugar output) was reduced by 30%; filter aid use by 50%; and product turbidity by 25%. Due to the enhanced filtration characteristics of the adsorbent, the average filtration cycle times were more than doubled; maximizing adsorbent "press effect". Filter wash water, and related sweetwater losses, were reduced on average, by 50%. In addition, pH drop decreased by an average of 0.2 to 0.3 units versus current practice. Based on these results, additional trials were run to investigate the use of Ecosorb S-492 in other processing schemes to further improve the refining operation, including, 1.) eliminating clarification (phosphatation); and 2.) treating a portion of the run-off (currently sent back to the mill) through addition to the clarified liquor.

5. # - 1133„ HIGH PERFORMANCE ADSORBANTS (HPA) ECO-FRIENDLY TECHNOLOGY FOR COLOR REMOVAL IN SUGAR

一種環保減能高效(HPA) 的吸附塔來減少砂糖的色澤製程

E.M.Sarir, B.R.Pabon, C.A: Donado
Carbo Solutions International

Keywords: Sustainability, color removal, adsorption, Carbo Solutions International, high performance adsorbents

Abstract

Concerns have often been raised regarding producing sugar sustainably. Pressure for responsible production has come largely from major industrial users as well as importers of sugar.

HPA (High Performance Adsorbents) technology developed by Carbo Solutions International has shown to be superior to GAC and IEX technologies in tests in terms of effectiveness in color removal, being cost competitive and being less pollutant and environmentally friendly

HPAs are similar to PAC (Powdered Activated Carbon) but have higher surface area with special designed pore structure facilitating filterability and color removal.

6. # - 1134„ THE USE OF COLOUR PRECIPITANTS IN A CARBONATATION REFINERY

應用色澤沉澱法於精煉糖廠的碳酸飽和法製程

José Manuel Chorão1*, Julien Arnold2, David Hunkeler2
1 RAR – Refinarias de Açúcar Reunidas, Porto, Portugal
2 AQUA+TECH Specialties SA, Geneva, Switzerland

Abstract

Cationic polymers, with a quaternary ammonium functionality, were evaluated for their effectiveness in decolourisation. Both laboratory and full-scale plant evaluations were carried out to identify the most suitable addition point. It was found that adding the polymer into saturator B at 60 ppm (24 ppm based on active content) was the most cost effective and the lowest dosage reported in the literature. The chemistry of the polymer (polyamine and polyDADMAC) as well as the molecular weight were varied. The quaternary ammonium chemistry was selected to be similar to that used in the ion exchange resin. Though decolourisation was slightly improved, the main benefit of applying cationic polymers before the physical decolourisation equipment is that the life of the resin is prolonged. Economic calculation shows that the application of the polymer is an investment paid off in a reduced frequency of ion exchange resin changes, and savings in regenerants, water and steam.

Keywords: Coagulant, Decolourisation, Flocculant, Polymer, Polyelectrolyte, Sugar

* Corresponding Author: *jmchorao@gmail.com*

7. # - 1135„ **Application in Sucrose Solutions – Towards a better Understanding 更深入了解 澱粉轉化酵素應用於糖液上**

Abraham, K. b, a; Hagen, S. a; Schlumbach, K. a; A. Rohde, A.b, Flöter, E. a
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bSternenzym, Ahrensburg, Germany

TAhbisst rwaocrtk: is concerned with the decomposition of dextran by dextranase action (Sugazym DXL, SternEnzym). Detailed analysis of dextran and potential decomposition products is key to this work. Different analytical methods (Haze, Roberts' Copper Method, Chromatography) were used and new insights into the enzymatic degradation of dextrans could be derived from their combination. The Haze method rather non-specifically detects larger dextrans. This is practical because the larger dextrans are known to predominantly cause processing problems. However, what degradation products appear and how they influence the manufacturing processes is not understood in great detail. The work performed hence actually tries to elucidate this subject matter. Combination of industrially relevant enzyme and dextran levels yielded decomposition products in the range of 40 kDa to trisaccharides. At higher enzyme levels decomposition to smaller saccharides appeared. The crystallization experiments performed indicated that the presence of dextran has a significant influence (crystallization rate, particle size distribution, crystal morphology). In detail it is found that dextran led to a slightly increased crystallization rate and a wider particle size distribution. Light microscopy images illustrate morphological changes induced by the presence of dextran (distinctly elongated,

slightly elongated and agglomerated crystals). The precise effect of different dextran fractions on the crystallization is still not fully mapped and certainly needs further investigation. Nevertheless, a negative effect on the crystallization and the crystal characteristics could be detected, while an enzyme treatment reduces or rather eliminates these negative effects taken appropriate enzyme dosages and exposure times are used.

Keywords: Dextran, Dextranase, Decomposition products, Crystallization

8. # - 1136„ **SOME THOUGHTS ON ASH IN SUGARS**

在煉糖中對灰分的一些想法

Stephen J. Clarke, Meshugger LLC

ABSTRACT

The ash content of sugars is a standard quality parameter that is often inadequately understood. Components of ash can impact the quality of sugar, especially taste, and perhaps more important, the refining and other processing qualities of the sugar and its application as an ingredient. One problem is that the measurement of ash lumps all the different constituents of ash into a single number obtained by each of the standard analytical procedures. For raw sugars the ash content is a variable in the determination of price; for finished sugars the ash content is usually a not-to-exceed value. The pros and cons of the laboratory methods will be discussed, emphasizing the limited value of the data obtained. Not all components of ash have the same impact on process. More data on the cations in ashare available; some, especially calcium, have significant process impact, for example, the formation of scale in evaporators and vacuum pans. Such scale becomes a problem when the corresponding anion, especially sulfate or aconitate, are present in the juice extracted from the cane. Available data on anion levels are much sparser then for cations. The solubility of calcium sulfate in sucrose syrups is much lower than in low brix clarified juice; data will be presented showing that the major component of ash in some raw sugars is due to the presence of fine calcium sulfate particles being included in the sugar crystal, especially for raw sugar. Softening using ion-exchange resins is a possible remedy; conventionally replacement of divalent (calcium) ions with monovalent (sodium) ions. This replacement has negligible impact on the ash measurement for sugars that do not contain fine particulates of insoluble salts. The relative impact on the measured conductivity value of the different cations

has been estimated from the published specific conductances for the different cations. A similar assessment for the anions is difficult due to the lack of data on their concentrations. The following question arises – Does removal of calcium by softening, but retaining the problem anions (sulfate, aconitate,etc.) make sense if the next stage of the process (refining) involves the use of calciumhydroxide?

9. # - 1137„ THE CHALLENGE TO DESIGN A STATE OF THE ART GREENFIELD SUGAR REFINERY - AN AFRICAN EXPERIENCE

一個非洲經驗 GREENFIELD精煉糖廠的最新型設計與挑戰

by *Thomas Stark and Robert Emeis*

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1. Introduction

Numerous requirements are the challenge designing a State of the Art sugar refinery. Local

conditions have to be considered, starting from the landscape features, the size of the available plot of land and its infrastructure as well as the availability, quality and price of water and energy carriers. For most process steps, various technologies are available. It is necessary to make an "ideal" choice, one that harmonizes best with the location and the project parameters. Decisions such as whether to install a steam or gas turbine, the installation of a single or multi effect evaporation unit or the best juice purification concept have to be made as well as thoughts given to a possible sugar conditioning and the storage system, etc. This paper, with reference to a green-field refinery in Lagos Nigeria designed in detail by IPRO, describes the essential decision making steps concerning the definition of process technology and energy concept of the plant. The main technologies as well as the layout will be explained, considering future extensions. Qualified value added design and the application of modern tools, is a prerequisite for success and minimizes the demand of time and cost for the construction phase quite considerably.

7. # - 1138„ OPTIMIZING FEEDING AND SCREENING EQUIPMENT WITH MEANS OF ANSYS SIMULATION AND 3D SOLID WORKS SOFTWARE

應用分析與模擬 3D實體工作軟體於入料及篩分設備的最佳化設計

**Dipl.-Ing. Dietmar Koch, M.Sc. Rajesh Arulnesan and Dr.-Ing. Axel Wellendorf*

RHEWUM GmbH

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ABSTRACT

In times of increasing energy cost and global demand for improved machine technology, the optimization of industrial sugar processes in terms of efficiency and production cost is an important factor when choosing industrial equipment suppliers. Of course this applies for screening machines, feeders and distributers as well!

Besides of the ability of a screening machine for being adjustable to changing requirements during the production process itself, it becomes more and more important to choose the correct screening machine type, peripheral equipment for arising screening tasks and to optimize the overall design of the screening machine starting at a very early stage.

The different types of screening machines bring many advantages and disadvantages with them. The selection of the correct type of screening machine can improve the flow rate, energy, efficiency, yield, quality, output, availability and decrease the maintenance costs and structural steel work. The machine optimization has to be a consecutive process in which at any time results of simulation and "real-life measurement" are compared and the findings are implemented in machine development and design. As an example, it is possible to reduce machine weight and reinforce the steel structure of a screening machine at the same time, which enables the manufacturer to use smaller drives for the screen. This paper will present the methods ANSYS and 3D Solid Works used at RHEWUM GmbH for this way of optimizing machine design and construction and examples for results gained from this continuous improvement process.

Figure 1 - ANSYS Example of design improvement of screening machine traverse

KEYWORDS

Screen, Feeders, Screening Technology, Design, Optimization, 3D Solid Works, FEM, ANSYS

8. # - 1139„ IT-Security in Process Control Systems operating in Sugar production facilities „

在煉糖設備的製程控制系統中的資訊安全作法

There is no advanced sugar production facility operating anywhere globally today which does not have any process control equipment in operation. Several factories even operate systems which are tightly connected to corporate IT-structures or have open access to outside systems. IT Security is a, so far in many cases neglected, "side-issue". This paper describes the basic threats, and the prevention strategies. The aim is to introduce strategies on how to protect production in itself as well as production know how. Even in this old-fashioned and sometimes conservative thinking sugar industry production know how in regard of by-products or efficient plant operation is becoming a target for know-how theft. It is time to act before the damage is

done.

12. # - 1140„ Operational Improvements of Granular Activated Carbon Station through Continuous Improvement

GAC活性碳再生爐的操作改進與持續改善

Jesse Williams American Sugar Refining Yonkers, NY

ABSTRACT

The Domino Sugar Refinery in Yonkers, NY uses granular activated carbon (GAC) as its primary decolorization unit operation. The station runs at nearly maximum engineered capacity while the refinery is operational. Process variations in GAC column sweetening-off have caused problems with column scheduling and water consumption. Consequently, a focus group was formed to reduce the amount, and variation of time spent and water used. The group identified that the sweetening off step of the GAC column cycle was the area of focus needed. The group consisted of seven individuals ranging from 0-10 years of direct experience with the GAC station. They met once a week to determine the necessary steps needed to ensure the sustainability of the station, and to ensure that column transition was as smooth as possible with minimal down time. In regards to sweetening off, the group achieved a 52% reduction in water used, 21% reduction in energy, 21% reduction of sucrose loss, and 37% reduction in total time. In addition, their efforts resulted in the reduction of sucrose loss and down time. Numerous ideas brought forth by the focus group were implemented with success. The Yonkers Continuous Improvement program, being very new at the time, was able to benefit from the experience and repetition that the group meetings provided. Recommendations for group make-up, frequency of meetings, and the meeting structure were also determined.

13. # - 1141„ Pulse Testing as a Useful Tool for Troubleshooting Industrial Operations Size Ion Exchange

一項有用的工具－脈衝測試，用於糖業上樹酯交換操作的故障排除上

Scott Brandon1, Vadim Kochergin1, Trent Holcomb2, Stan Case2

1- Amalgamated Research LLC, Twin Falls, ID, USA 2- The Amalgamated Sugar Company LLC, Nampa and Twin Falls , ID, USA

Abstract

Resin based systems for decolorization, ion exchange, or large scale chromatographic separation are utilized throughout the sugar industry. In the sugar refining industry, companies started switching from bone char to resin technologies for syrup decolorization. These large resin based system require very efficient fluid distribution across the entire resin bed in order to achieve the desired performance and minimize the waste streams. Many operational problem are caused by poor hydrodynamics in the resin vessels. Poor initial liquid distribution, resin clumping, and channeling are among the problems reducing system efficiency. Early detection of these problems becomes essential in maintaining high productivity of large resin systems.

Tracer testing has been successful for analyzing residence time distribution of liquid in various sugar industry unit operations: vacuum pans, clarifiers, crystallizers, reaction vessels. A method was developed and tested that introduces a short pulse of concentrated food grade dye into an ion exchange vessel and measures the dispersion of the dye as it passes through the resin beds. Resulting response curves with very high narrow peak, sharp peak top, and a short trailing edge can serve an example of good fluid distribution. Several example of method application for the commercial scale chromatographic and ion exchange systems will be discussed. The response curves influenced by a broken fluid distributor and resin fouled with precipitate will be shown. Use of on line color analyzer for rapid evaluation of response curves will be described.

14. # - 1142„ **Automatic Seeding System for Vacuum Pan Operation**
結晶罐的自動糖種等晶播種的做法

Presented by Greg Martin ASR Group, Chalmette Refinery New Orleans, LA

Abstract

As vacuum pans become more and more automated, a natural progression to reducing the variability of operation is to automate the seeding of the pan. This paper discusses how this opportunity was addressed at the Chalmette Refinery. Practical experience has shown that variability introduced through manual seeding leads to variation in the quality of finished product white sugar. By automating the process to the point where the only operator intervention is adding a prescribed number of 50# bags of sugar to the system, this variability is greatly reduced or eliminated and a more stable, consistent product is the result. The system is designed to seed all pans, based on super saturation, at the proper time, with the proper amount of seed fondant. This paper describes the design of the system, how it functions in reality, and some of the design modifications that were required after the system was put into service to make it operate more effectively.

In addition, the planned future improvements to the system and their anticipated results will bediscussed.

15 # - 1143„ **On-line Monitoring of Crystallization Control Practices: Case Studies from Different Parts of the World**
線上監控助晶機操作實務—從世界各地區差異個案研究

Lajos Rozsa* Ph.D; Jakab Rozsa*; Seppo Kilpinen**, Eero Mielonen**, Marja Kivenheimo**

ZUTORA Ltd.*, Hungary; K-PATENTS Oy**, Finland

Contact: LajosRozsa@mail.datanet.hu; Seppo.Kilpinen@kpatents.com

Abstract

Monitoring sugar crystallization in industrial sugar crystallizers is an

important topic of the technical literature of the industry.
The aim is to help to specify the most important parameters and their effect on crystallization in order to improve crystallization control methods and practice.
The introduction of electronic instruments around the middle of the last century measuring *conductivity, density* and *consistency*, followed later on by *radio frequency (RF)* and *microwave transmitters* and *in-line process refractometers* opened up new possibilities in the on-line monitoring and control of sugar crystallization. However, these new instruments did not change considerably the accustomed practice of control that was and remained *manual* for a long time. It is even more surprising to learn that with the appearance of the modern digital control systems (PLC, DCS) later on, even today quite often one or the other only slightly different *manual control practice* is programmed and frozen in digital memory.
It is common knowledge in the industry that (besides product data like color, MA, CV, crystal photography) the *really important parameters of sugar crystallization needed in real time are:*

supersaturation,
massecuite solids content,
massecuite crystal content and
mother liquor purity.

This set of *online data*, if available provides a reliable picture on crystallization control practice. These are the data which can be used not only to diagnose the pitfalls of the actual practice, but for the advanced control of crystallization as well. However, except massecuite solids content, none of these parameters can be monitored online with the instruments listed above. This is the main reason of the long delay in using the parameters that really count for the advanced control of crystallization.
There are different methods to monitor the major crystallization parameters:
Academic: it usually relies on mass and energy balance calculations combined with modeling crystal growth and size distribution.
Laboratory: relies mostly on small-scale crystallization experiments and studies using the instruments listed above.
These two methods quite often use arbitrary simplifications and neglect important process parameters.
Control engineering approach: develop, if needed and use the instruments able to provide without simplifying assumptions all of the important on-line data of the industrial crystallizers in operation on the pan floor. 2 In this paper case studies from different parts of the world are presented using the above set of monitored data on the important parameters. The technique is based on

the use of the SeedMaster Instruments (including the recently introduced SeedMaster 3 with new features) able to monitor *in real time all of the important parameters of industrial crystallizers in operation* [1], [2], [3]. *The acquired data are not based on assumptions and simplifications:* they provide a true picture of the process from the beginning till the end of a batch strike, as it happens. This technique has proved its worth in hundreds of strikes during the last few years. A large data archive helps to track control practice all over a campaign, if needed. Monitored data provide an excellent opportunity for the technologists to diagnose control problems related to the details of crystallization: syrup concentration, seeding, feed and boiling control etc. This will be demonstrated case by case using data from batch pans used in different countries.

It is only natural that the same set of data is available via digital communication for the local control system (PLC, DCS) to implement advanced control of the process of crystallization. Naturally enough, it should be based on the most important parameter of crystallization: supersaturation. One version of a control set-up and some of the experience gained with its use in quite a few mills is also presented.)

16 # - 1144„ **Optimized Sugar Refinery Model**

煉糖工場模式的最佳化

By Dr Mohsen Makina, BMA MENA Industries SARL and Steffen Kaufmann, BMA AG

Contents:

1. Technical implementation of an optimized sugar refinery model

1. 1 Fundamental details and targets

- ✓ Concept studies or basic engineering for the development of the ditftrent steps in the entire main sugar refinery process
- ✓ Detailed engineering for implementation of the concepts
- ✓ Planning and supply of equipment for optimizing the evaporator station
- ✓ Planning and supply of equipment for optimizing crystallization
- ✓ Development of energy-efficient concepts for new plants or for enhancing the efficiency of existing sugar refineries ; measures include integrating
- ✓ continuous crystallization and thermo-compression systems
- ✓ Development of concepts for reduced water consumption
- ✓ Optimization of sugar drying plants ; also for operation in demanding climatic
- ✓ conditions (high temperatures, high air moisture)

- ✓ Determination of technological plant terminal points (design parameters for Power station, water treatment, etc.)
- ✓ Supply of centrifugal machines

1. 2 Technical concept

- ✓ Optimum capital and operating costs
- ✓ Low energy consumption
- ✓ Low water consumption
- ✓ optimum sugar output
- ✓ Optimum reduction of color during liquor clarification, liquor decolorization, and crystallization
- ✓ Lowest possible increase of color during evaporation and crystallization
- ✓ Extensive use of locally available chemicals
- ✓ Optimum sugar refinery automation for high process reliability and low staffing levels
- ✓ High degree of process flexibility to counteract color variations in the raw cane sugar

2. Implementation in the Etihad project

2. 1 Basic data / selected concept

- ✓ Refined sugar output : 3, 000 tld
- ✓ Raw cane sugar quality : max. color-2, 000 IU
- ✓ polarization-min. 98. 7 %
- ✓ Refined sugar quality max. color-45 IU
- ✓ Steam consumption : 0. 83 t exhaust steam per ton of produced sugar

2, 2 Results

- ✓ Sugar quality : 23 IU
- ✓ Steam consumption : 0. 67 t of exhaust steam per ton of refined sugar

17 # - 1145„ 50 years of progress in sugar technologies From 1 G to 5th Generation---a Benchmark

50年來從第一代到第五代精煉糖廠製糖技術的進步‥‥標竿

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	Steam on melt Ton/ton	Sucrose Yield %	Electricity Usage kW/ton sugar
Pre 1970	> 1.7	< 97%	>125
1970 -1980's (1G with good processing practices)	< 1.4	97 to 97.5%	100 to125
1980 -1990's (2G with VHP raw sugar)	<0.8	97.5 to 98%	75
1990-2000's (3G with low head vacuum pans, etc.)	<0.5	98 – 98.5%	50
2000-2010's (4G with thermal recompression)	<0.3	>99%	85
Future (5 G) 4 G plus no molasses produced	<0.3	>99.5%	80

18. # - 1147„ Operational Flexibility: Custom Food Grade Reactivation of Spent Granular Activated Carbon for the Cane Sugar Industry

操作彈性:對食品級GAC廢碳的再生做客製化，應用於甘蔗糖產業。

ABSTRACT: Activated carbon is a widely used solution for decolorization and purification of cane sugar. Many cane sugar refining plants reactivate their own spent carbon on-site in multi hearth furnaces or kilns. In the past few years, there has become available regional off site food grade carbon reactivation services, called Custom Food Grade Reactivation centers, that offer a continuing or 'as needed' alternative.

A specific customer and location, can have their spent carbon reactivated in a food grade reactivation furnace/kiln, with their spent and reactivated carbons segregated, custom reactivated, and returned to the site as 100% reactivated carbon or with the addition of virgin carbon make-up. The whole process from field services/carbon technicians, transportation, reactivation, screening and carbon return, follows food grade protocols and is traceable.

This option can be used for total plant carbon reactivation or as an option to aid during site furnace maintenance shutdowns/repairs or should an imbalance occur in spent vs react carbon inventories.

19. # - 1148 Development of a Sugar Refining Process Colour Prediction Model
開發精煉糖廠製程色澤的預測模式

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INTRODUCTION:

The Kaohsiung Sugar Refinery has the provision to measure "colour" on a daily basis at five checkpoints: a) for raw sugar, b) at the dissolving tank outlet (dissolved syrup), c) at the pressure filter outlet (filtered syrup), d) at the activated carbon decolorization tower outlet (evaporation tank inlet syrup) and e) at the three-way evaporator outlet (fine syrup). The purpose of these checkpoints is to monitor the correct functionalization of sugar refining process. At present, the three-way evaporation tank outlet is set as a control point (with the colourof fine syrup at 400 IU or less), with other points only adopting control charts (including center lines and lower and upper regulatory boundaries). In the present study, statistical software has been utilized in order to calculate the correlations among the colours measured at each checkpoint, using data from 2012 to 2014 and to monitor each of the processes in order to reduce the effective capacity of colours for assessing whether or not a forecasting system could be established. For example, based on the colour of raw sugar only, a prediction system would be able to estimate the value and changes in the colour at other stages of the refining process. The purpose of such a prediction system relates to process control, given a lack of references for improvement, through establishing better standard operating procedures for sugar refinement, thereby reducing energy consumption and enhancing the quality of the finished sugar.

20. # - 1149„ Water activity and the stability of specialty sugars
特殊糖的水活性與穩定性探討

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Abstract

Specialty sugars are a number of consumable brown sugars having different names like brilliant yellow sugar, dark yellow sugar, demerara-style sugar, Muscovado sugar, evaporated cane sugar, tubinado sugar, etc… Organic sugar is also one of the recently introduced sugar specialties, but raw sugar destined to the refineries, is not directly sold to consumers and cannot be considered as a sugar specialty. All these sugars have in common, the presence of a more or less important layer of molasses at their surfaces, which is responsible for their color and flavor. They are generally commercialized as dry granulated crystals, presenting some stickiness and difficult flow ability. They can be prepared

either by crystallization in highly colored syrup or by blending molasses with white sugar crystals.

The stability of specialty sugars during handling, storage and transport depends on their equilibrium relative humidity (ERH or water activity) when they are exposed to humid air. The water vapor sorption isotherms were established for brown sugar and compared to that of white sugar. The impact of factors like grain size distribution, the amount of reducing sugars and other impurities, on the hygroscopicity, the aptitude to drying and the flowability of brown sugar was evaluated.

The results show that the fine crystals are the first cause of lumping for brown as well as white sugar. Brown sugar tends to show more frequently soft lumping, while white sugar can develop hard caking in the same conditions. Although slightly sticky, brown sugar maintains a certain flowability. The hygroscopic impurities at the surface of soft sugar play a role of anti-crystallizing agent for sucrose, while the re-crystallization of amorphous particles in white crystalline sugar play the role of cement in the caking phenomenon. The drying and maturation of brown sugar should take into account these differences and not be conducted similarly to that of white sugar.

21. # - 1150„ **The use of High Performance Color Precipitants in the raw syrup and maseccuitesfor Direct white sugar production.**

應用在粗糖漿與糖膏的高效吸附粉來減少色澤以生產白糖

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Abstract

High Performance adsorbents (HPA) were developd as an alternative in the production of direct white sugar (<150IU) without using additional operations as remelting or refining. This new technology offers great advantages, improved sugar quality, increased sucrose recovery and energy balance. Such product has been used in raw syrup and maseccuites of a sugar mill in Colombia.

22. # - 1151„**PRE-CARBONATATION WITH PURE CO2 IN A CANE SUGAR REFINERY**

在甘蔗精煉糖廠製程以純氧用於預碳酸飽和法

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Abstract

Cane sugar refineries sought to take advantage of the competitive price of

natural gas, leading to its consumption in the boilers. This has raised a serious problem for the carbonatation process, dependent on carbon dioxide in flue gases. The lower CO2 content in flue gases from boilers burning natural gas demanded a search for a solution to this problem. We describe the steps taken to implement a system able to supplement the needed carbon dioxide for carbonatation, based on the injection of pure CO2 in limed liquor. A test installation was first operated, using CO2 flows corresponding to 18% to 51% of stoichiometric. Pure CO2 was injected in limed liquor before the first saturators. Given the excellent results obtained, a definitive installation was put in routine operation, with a pure CO2 consumption corresponding to 30% of stoichiometric. This pre-carbonatation proved to be a simple, easy to operate and economical solution.

23. # - 1152„ **Feasibility Studies of Carbonated Mud for Cement Substitution in the Construction Industry**

碳酸飽和法濾泥用以取代水泥應用於建築工業的可行性

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Abstract

The food industry in Saudi Arabia has grown quickly during the last decades. Carbonated mud (CM) is a byproduct observed from white sugar industry from its raw sugar material. It is greenish color and lightweight behavior which allows for utilization as a aggregated like materials, while in downy powder used as a filler in the concrete. CM specimens obtained after sugar clarification to adjust the mother liquor at alkaline pH to rid get off non-sugar compounds such as betaine and phenolic substances, and investigated to evaluate the physical, chemical and structuralize properties. CM were incorporated as a partial replacement material for agglomerates and their engineering characteristics were ascertained. The percent used 5,10,15,20,25 and 30% to determine the optimal conditions by channeling the new CM in the construction industry, an efficient CM waste management system can be stimulated; thus, innovating a cleaner environment. This research is also expected to offer cost effective guides and directions for upcoming new research area on the incorporation of CM in another industries

24. # - 1153„**Versatile filtration systems for many applications in the sugar mill**

多功能過濾系統在製糖產業的應用

Automatic backwash filtration

Status „filtration“ Status „backwash“

1. Wash Water Filtration

To remove dirt and undesired solid from the sugar beets, they are sprinkled

with water. To prevent the spray nozzles from clogging this wash water circuit has to be filtered. Lenzing CanFil protects the spray nozzles and also furthermore circuit water lifetime could be extended. This results in a reliable and robust system at lowest possible cost.

2. Water Filtration

For process water needs mostly surface water is used. This has to be a simple filtration with nearly no manual operation and high availability. Therefore the Lenzing CanFil fits perfect to those requirements. The reject is simply returned into the river, lake or drain. The filtration fineness varies between 100 and 300μm and manual labor is reduced to a minimum.

3. Thin juice polishing

The major load of particles precipitated in the carbonation step is removed by cake building filters with huge filter areas and a comparably big footprint. This can be realized for example with a CakeFil solution at a high degree of automation, which minimizes the maintenance efforts as well as the running cost compared to pressure leaf filters.

For polishing of the prefiltered thin juice solution the Lenzing OptiFilR shows its advantages by having a small plant footprint and no losses of valuable product as the reject can be recirculated upstream the main filtration stage. Additionally it is a reliable filter system able to handle varying solid contents in the beginning of cake formation at the main filtration. Reject volumes can be recirculated upstream the main filtration stage.

4. Condensate Filtration

To protect the steam turbine in the boiler house from wear through abrasive particles a very fine filtration down to 5μm is required. Very often this is done with disposable filter cartridges. Besides the advantage of low investment operators are facing problems as those kind of systems are causing high operating costs and require intensive manual labour. In this application the Lenzing OptiFilR provides a reliable barrier for particles without manual intervention and lowest operating expenses. Furthermore the high temperature restistance (standard 120°C on request up 200°C) is required for this application.

5. Cooling water Filtration

For heat recovery from evaporation systems very often plate heat exchangers are used, with the disadvantage of small distances between the plates and therefore the propensity to clog. This results in high manual effort for cleaning and costs for spare seals. This can be overcome by prefiltration with the Lenzing CanFil, thereby multiplying the idle time of the heat exchanger package.

6. Thick juice Filtration

The thick juice out of the evaporators is mixed with return flows of the crystallization, thereby creating socalled Standard Liquor. Prior to crystallization, the remaining solids have to be removed from this mixture (sugar content approx. 70%).The solids are mainly burned sugar and ion exchange resins and have to be removed to lowest solid contents. The Lenzing OptiFilR is operated with a 10μm filter material and doesn't need to be opened during campaign. Due to the space saving design and the simple installation (only 1 automatic valve) significant cost advantages in operation as well as investment are achieved.

7. Molasses Filtration

To maximize the yield in the sugar production process also the rest sugar out of the D-centrifuge, contained in the so-called molasses, is utilized. Therefore the solids have to be removed prior to the downstream chromatography process step. With the Lenzing OptiFilR this works in some cases even without filter aid resulting

in huge operation cost savings compared to previously used candle or plate type precoat filters. In cases with highest quality demands the OptiFilR is operated as a polishing filter downstream a precoat filter like for example the Lenzing CakeFil. Patented regeneration system Minimum losses and highest backwash efficiency

Filter fineness down to 1 μm