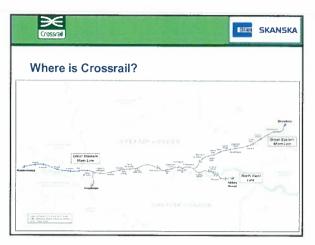
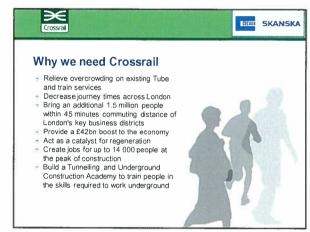
附件3.1-01: Paddinton crossrail summary 24 feb 14 by PM Ben Hardy







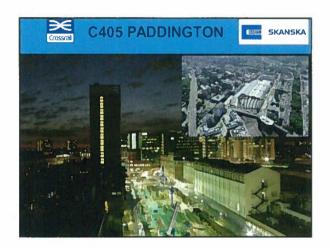










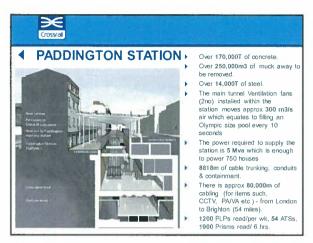


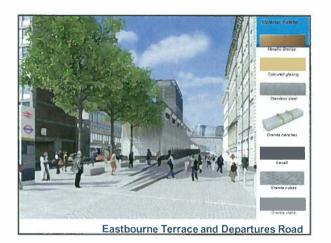




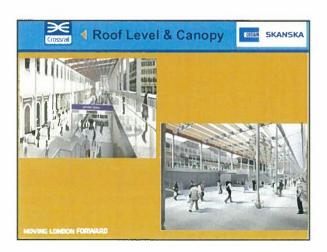




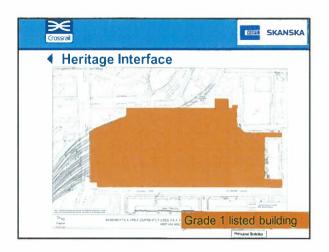




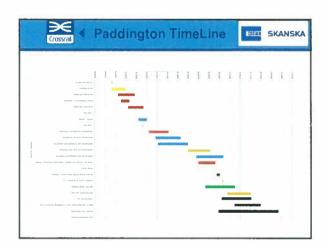






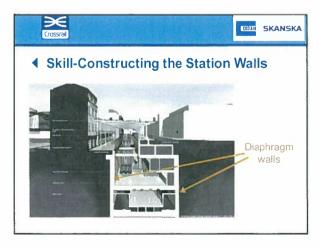






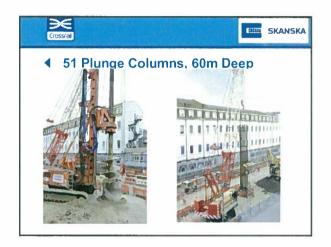












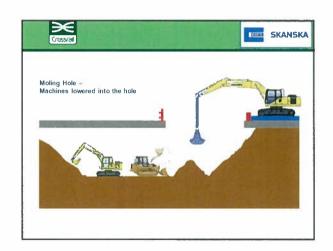




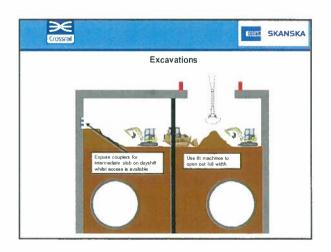










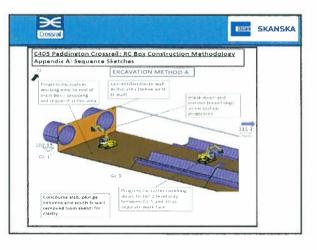




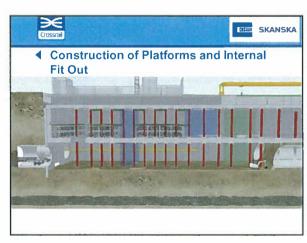








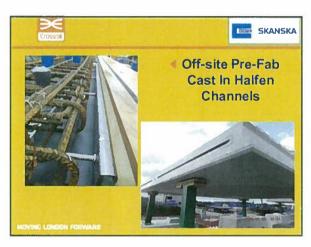






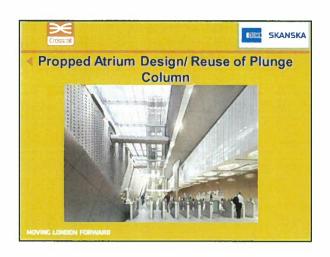
















# 附件3.1-02: 張武訓與華人工程師Andy Liao針對Crossrail工程管理BIM討論書信

#### 20140307am0930 from wschang

Dear Andy 謝謝您,幫助很大。 張武訓 敬上 0921123340



----Original Message-----

From: Andy Liao [mailto:wyaliao

Sent: Thursday, March 06, 2014 1:29 AM

To: wschang

Subject: RE: Visit to Paddington Crossrail Station

Hi Mr Chang,

Thank you for the kind words. I am fortunate and honored to be part of the major railway project delivery.

With regards to your question about application of BIM at Crossrail, Mr Andrew Wolstenholme (Crossrail CEO) is aware that Crossrail is a major opportunity to lead the change in the construction and railway industry. The UK government also mandating the use of BIM for all public project by 2016. Therefore BIM is being rolled

out to all the Crossrail Contracts. Unfortunately I am not able to advise on the level of BIM application at other Crossrail Contracts.

For Paddington, I was advised by our BIM manager that 80% of the BIM application will be relating to railway operation and maintenance and 20% of the BIM application will be relating to the construction phase of the project. The information collected during the construction phase will provide a progressive assurance to all the asset of the station, including civil/building/mechanical/electrical assets which we will handover to Crossrail Operation and Maintenance Team once they are tested and commissioned at end of the project. These information are crucial and will be centrally stored which allows the Operator and Maintainer to identify the item via digital/physical asset tagging (eg via a QR code), and bring up all information (document, manual, drawings, specification etc) relating to that asset. This especially allows the Maintainer to pinpoint the information required, correct replacement/repair needed, correct parts obtained, or to ensure that regular maintenance of assets is undertaken.

As for BIM application at the construction phase, for a programme/health/safety point, you have already seen a BIM video been used at Paddington site as part of the weekly project update, informing the site supervisors and operatives about the activities and for them to be aware of the safety risks they face onsite. However, the main usage of the BIM model at Paddington is for early clash detection of services. This is used regularly in multidisciplinary interface meeting between civil/mechanical/electrical/plumbing for cable/pipe routing during design phase, where designers come together in front of the Paddington station BIM model to discuss and resolve clashes. (using SMART board such as this one - http://smarttech.com/Solutions/Business+Solutions/Products/8000+series+interactive+flat+panels) We also identified several potential clashes of the temporary props installation required for excavation. This prevented additional cost for the project if we had not detect these clashes in the BIM model.

In addition, the model receives regular update from the deisgn and construction team. It can be used as an as-built condition of the station for programme purposes. It is also used by the Quantity Surveyor to quantify and estimate the cost for specific package of works.

Unfortuantely I am not expert in BIM application, but I do appreciate its use, as in many aspects, it helped with a smooth project design and delivery. I hope the above information obtained from our Innovation team and BIM manager had given you

some ideas to be able to improve the Operation and Maintenance aspects of Taiwan High Speed Rail and can be implemented in the future projects.

Attached link is an example of the BIM video, as this is the intellectural property for our contractor, please exercise caution when using this information. Please let me know if the link below does not work.

BIM Weekly Video 280217 mp4.mp4

<https://uk1.aconex.co.uk/GuestFileDownload?\_action=downloadFile&fileId=28956 1448&value=0BmM7IuVlkxo3tiONeMpRmizDb2zu23B21iCLTmWGzxBJzMmtRCbgTkie X3dcw5Z/oClick here to download BIM Weekly Video 280217 mp4.mp4> <https://uk1.aconex.co.uk/GuestFileDownload?\_action=downloadFile&fileId=28956 1448&value=0BmM7IuVlkxo3tiONeMpRmizDb2zu23B21iCLTmWGzxBJzMmtRCbgTkie X3dcw5Z/oClick here to download BIM Weekly Video 280217 mp4.mp4> Kind Regards

Andy Liao

From: wschang@hsr.gov.tw

To: wyaliao

Subject: Re: Visit to Paddington Crossrail Station

Date: Mon, 3 Mar 2014 17:19:28 +0000

#### Andy 您好:

謝謝您來信,也佩服您在英國所參與的重大工程,尤其是 BIM 的應用。我同時是中華民國營建管理協會技術研究發展委員會主任委員,積極推動 BIM 中。若有貴工程實務的相關資料,方便的話請 mail 給我,以提升台灣在營建技巧,謝謝。

張武訓敬上

海德公園留影

image.jpeg<https://cid:3A07971E-9FE9-4616-82D0-0DA78C7FE06F>

從我的 iPhone 傳送

"Andy Liao" <wyaliao 於 2014/3/3 下午 11:51 寫道:

Dear all.

It was a pleasure meeting all of you last Monday at Paddington. I was delighted to meet many of the countrymen who are also working in and interested in the civil and railway industry.

I hope that you had an enjoyable time at Paddington site and that all your questions were answered. Although it was a short visit, I hope you found the visit to be informative and can bring some of the ideas from here back to Taiwan. Please let me know if you require any further information with regards to the project or the UK railway industry in general. I will do my utmost to provide the info to the best of my ability.

Hopefully you all had a fulfilling week in the UK and that your trip back to Taiwan was a confortable one. Please do keep in touch and do let me know if you need further information.

This is my personal email address. My Crossrail email address is as followed:

Andy Liao | Field Engineer – Paddington Station Crossrail | Paddington House, Gate 4, Kingdom Street, Paddington Central, London, W2 6BD

0207 4795228 | andyliac

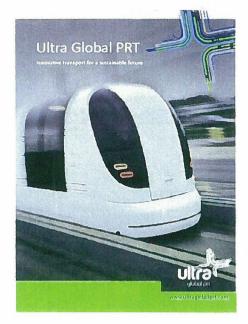
www.crossrail.co.uk <a href="http://www.crossrail.co.uk/">http://www.crossrail.co.uk/>

MOVING LONDON FORWARD

Kind Regards

Andy Liao

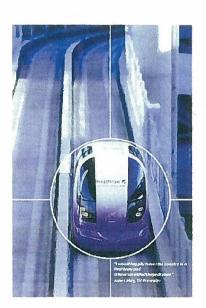
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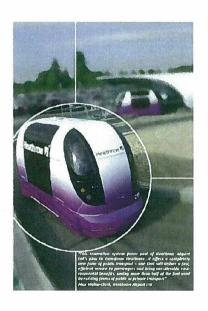














#### Cardiff, UK



#### Amritser, India

















#### The components of an Ultra system are

tou don't mat for vehicles – vehicles was for you. No transfer, no routes to memorize.



#### High value, low cost, Integrated solutions

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Outstanding service at Heathrow
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#### What do our passengers think?

Landed and used the very cool Heathrow pod - they releven better to use— putries saller and greener that the huses to from the car pain.

Heathrow and trive. One of He's unemerted pleasure.



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System	Availability
HEATHOU POUR	#845 (2015-2018)
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conducted leground (LUC)	15 8× (3310/2011)
Estiva in Light Rentifold	97414 (2017/2011)
Transink.	98 di+ (2010/2011)
Overpowd	94 Pv (2010/2011)

Average warting time for a vehicle to arrive is only 10 to seconds, with 60° of pastergest having no wait at all





#### Easy to install — no disruption to airport operations

















Winners of multiple awards in 2012

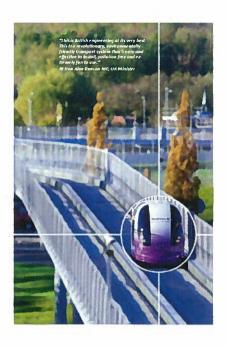
















#### Excellence in Engineering & Operations

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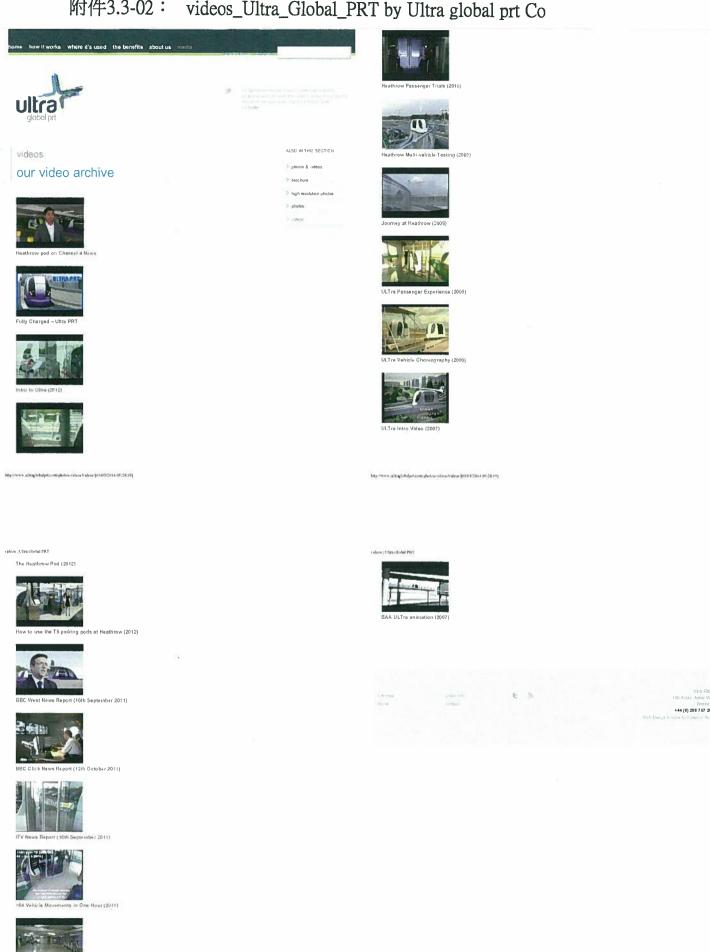
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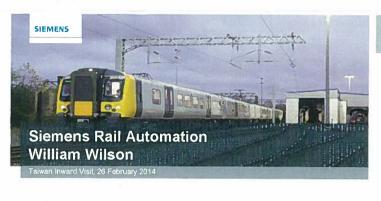


Head Office: +44(4) 1454 414700 Enquiries: +44(4) 2087 577/54 Et info@ultracet,com Wiswasultracet,com

# 附件3.3-02: videos\_Ultra\_Global\_PRT by Ultra global prt Co



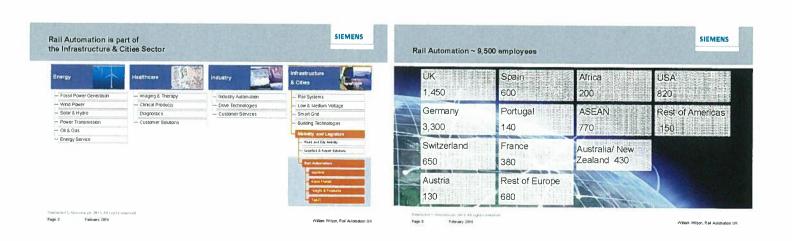
# 附件3.4-01: Siemens Rail Automation by William Wilson











Rail Automation: what we do...

SIEMENS





"We help keep railways running safely and efficiently."

#### Taiwan's Tao Yuan (TTY) Airport Line

- 51km long Tao Yuan (TTY) Airport Line,
- connecting Taipei's airport to the city.

  Assisting Marubeni in provision of signalling and train control.
- train control.

  New build railway.

  23 stations on the line; 7 underground equipped with platform screen doors.

  Trackguard WESTRACE interlockings.

  DTG-R automatic train control, trackside and train-
- carried equipment to support high density mixed express and local traffic.

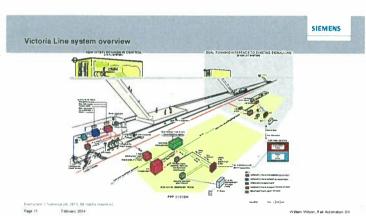
  Control centre with automatic route setting and
- automatic train regulation.

  Trackside components including point machines.
  Interface with platform screen doors.



SIEMENS







William Willson, Rail Automation UK

#### Victoria Line Signalling Upgrade

£10 billion, nine-year upgrade programme of the Victoria Line.
Peak services increased from 28 to 33 trains per

hour.

- hour.

  Overlay delivery strategy allowed old and new trains to run during the upgrade works. Includes RailCom system integrating line management, operational comms and signalling systems.
- systems.
  Line remained operational during the day throughout the project.
  Victoria Line is the busiest line of the London Underground network, carrying over 183 million passengers each year.

William Wilson Rail Automation Uk

SIEMENS

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#### Thameslink

- Resignalling of the Thameslink line and London Bridge area.
- One of the most complex signalling schemes in
- The transformation of London Bridge station, and
- The transformation of London Bridge station, and associated railway work, is now fully underway and is scheduled to be completed in 2018. It will enable the frequency of trains to increase from 16 to 24 per hour, providing a much needed capacity boost for increasing numbers of



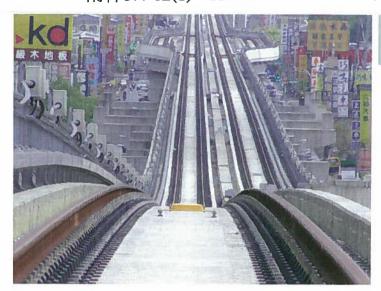
SIEMENS

#### Crossrall signalling, control and communications

- Europe's largest construction project.
  The route will pass through 37 stations and run 118km between Maidenhead, Heathrow. Shenfield and Abbey Wood.
  Will operate a 24 TPH service between Paddington and Liverpool Street.
  CBTC signalling and interlocking for the central area of the Crossrail network.
  Station management systems, including customer information, public address and CCTV.
  Rail and station SCADA systems includingtraction power, tunnel lighting and drainage, station equipment.
  Radio systems.
  Interfaces with railways at each end.



# 附件3.4-02(1) SRA RICH 1030306到BOHSR 簡報



BOHSR Off Site Testing Brief 060314 – Off Site Data Testing – Why?

SIEMENS

Off site testing is preferable because:

- It allows the Train and SER data for the interlocking to be safely tested without the risk.
- It can commence in advance of site testing.
- it will greatly reduce the amount of on site testing.

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BOHSR Off Site Testing Brief 060314 – Off Site Data Testing – Why?

SIEMENS

There are some definite advantages to offsite testing:

- There are no site access restrictions
- With scripting testing can be 24 hours a day
- Can be performed in an office environment anywhere in the world.
- Error conditions can be injected to perform negative testing easily.

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siemens.com/answers

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Video Introduction

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BOHSR Off Site Testing Brief 060314 – Data Development - Offsite

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Train and SER/Wayside Data are developed in a simple cycle:

- The data is designed against the results of client supplied information and site survey information by the engineering application data team.
- This data is then passed to systems test for offsite testing where it is:
  - \*Set to Work (powered up and basic check) 準備工作(開機和簡單檢查)
  - Principles Tested to ensure the interlocking performs in

accordance with the engineering specification 測試的原則 - 確保聯動的表現符合工程規範

#### BOHSR Off Site Testing Brief 060314 - Data Development - Offsite 資料發展 - 場外

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BOHSR Off Site Testing Brief 060314 - Wayside SER **Data Testing** 

沿線號誌機房(SER)資料測試

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When the Set to Work and Principles testing is complete any issues are raised on test logs.

完成準備工作和原理測試後,在測試紀錄上提出問題

The data and logs are returned to the engineering application data team. The issues are resolved and then then the data is

將資料和測試紀錄交由工程應用資料組,解決問題後,再重新測試資料 The amount of retesting required is dependent on the severity of the issues raised.

重新測試的次數因問題嚴重性而定

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WESTRACE, MCT, SAW and DMC data is tested using 2 test tools 以兩種測試工具(平台)測試WESTRACE,MCT(維修控制 (rigs) 終端機),SAW(站務員工作站),DMC(多元監視控制器)資料

- (GSIM) 地理模擬器
- TSS (Training Simulator System) Rig TSS(訓練模擬系統)平台

7 IRSE licensed principle testers based in the Chippenham, York and Portugal testing the data

七名IRSE的原理測試員在奇彭哈姆、約克、葡萄牙測試資料

Page 10

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BOHSR Off Site Testing Brief 060314 - Data **Development - Onsite** 

SIEMENS

資料發展 - 現場

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Page 7

On site data testing is executed in 4 phases: 現場資料測試分成四階段執行:

Phase 1 - Set to Work

第一階段 - 準備工作

Phase 2 – Functional 第二階段 - 功能測試

Phase 3 – Mainline Commissioning (Principles) 第三階段 - 主練試運轉 (原理測試) Phase 4 – Train Testing 第四階段 - 列車測試

For each of these phases off site data is released to site for testina

場外測試的資料會被用來做每階段的現場測試

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**BOHSR Off Site Testing Brief 060314 - Test Tools** (Rigs) 測試工具(平台)

**SIEMENS** 

#### GDSIM (Geographical Data Simulator) test rig

The GSDIM test rig based on the ATO and ATP software 以ATO(自動列車駕駛)和ATP(自動列車保護)為基礎的GDSIM測試平台 Lest the logic of the data (not in real time)

測試資料的邏輯性(非即時的) Scenario based scripts enables 24/7 testing 以情境腳本可進行一周七天每天24小時不間斷的測試

GSIM test rig

PC Based test rig 在個人電腦上的測試平台

- Tests the WESTRACE ladder logic 測試WESTRACE的階梯形邏輯
- Interfaces to real MCT, SAW and DMC to enable

MCT/DMC/SAW data

介面連接到實體的MCT(維修控制終端機),SAW(站務員工作 站),DMC(多元監視控制器),以啓動MCT/DMC/SAW的資料

BOHSR Off Site Testing Brief 060314 - Train Data

列車資料測試

Train data is tested using 2 different test tools (rigs) 用兩種不同的工具(平台)測試列車資料

GDSIM

地理資料模擬器

System Test Facility 系統測試設施

Team of 6 testers testing the train data based in Chippenham

and London

在倫敦和奇彭哈姆有六名測試員測試列車資料

**BOHSR Off Site Testing Brief 060314 - Test Tools** (Rigs) 測試工具(平台)

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TSS (Training Simulator System) TSS(訓練模型器系統)

PC based test rig Used for functional software and data testing of the ATS systems

個人電腦測試平台,用來跑ATS(自動列車監視)的資料測試和功能軟體

#### **BOHSR Off Site Testing Brief 060314 - Test Tools** (Rigs) 測試工具(平台)

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**BOHSR Off Site Testing Brief 060314 - Test Tools** (Rigs) 測試工具(平台)

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#### Taiwan System Test Facility (STF)

- Uses TTY Project Hardware 使用桃捷專案的硬體
  - 列車(ATO(自動列車駕駛)、ATP(自動列車保護)、CIB(CMS Interface Box,控制監控系統介面盒)、DDU(司機員顯示器)、無線電)
  - SER(號誌機房)/沿線(MCT(維修控制終端機),SAW(站務員工作 站),DMC(多元監視控制器)、ATP-BP(自動列車保護-區間處理 器)、ERG、無線電) LSC(現地區域電腦) 和ATS
- Used for functional software and System Integration testing 供功能軟體和系統整合測試使用

整合测试系统。(CASITS) "大平台"

- Consisting of 包括:
- 3 x SERs (Each with MCT. SAW and DMC) 3間號誌機房(每間有MCT、SAW和DMC)
   使用真實聯動資料、以GSIM模擬1段LSC(現地區域電腦)區域和 LSC控制下的聯動
- \* ATS (OWS, OVW, CSP 和 TDS)
- · 2組ATP-BP

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**BOHSR Off Site Testing Brief 060314 - Test Tools** (Rigs) 測試工具(平台)

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BOHSR Off Site Testing Brief 060314 - Off Site Data

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ATS Data ATS(自動列車監控)資料

PC Based test rig including 3 x PC 三台個人電腦作為測試平台

Tests ATS System Geographical Data 測試ATS的地理資料

#### ATS System Testing ATS(自動列車監控)側試

- 以模擬器測試目標硬體
- Tests whole system configuration 測試整體系統的組態
- 8 x Engineers in the ATS Team ATS網中有8名工程師

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Issued to Site

使用在現場的場外資料

When data is required at site it is issued across the Siemens Secure Network.

在現場需要資料時,由西門子的安全網絡發佈

It is issued with a the following paperwork:

- Document Transmittal Form (DTF) 發佈以下文件:
- Design Check Certificate (DCC)
- 從DTF傳來的文件
- \*Updated configuration statement. \_ 更新後的組態説明
  - 設計檢查認證(DCC)

The data is then down loaded in the site office and taken to the relevant SER and uploaded for testing.

在現場辦公室下載這些資料,在相關的號誌機房上傳這些資料,進行測試

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**BOHSR Off Site Testing Brief 060314 - Test Tools** (Rigs) 測試工具(平台)

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Control Centre and Signalling Equipment Room Integration Test System - (CASITS) "The Big Rig" 控制中心與號誌機局 整合測試系統 (CASITS) "大平台"

Provides a larger geographical area than the Taiwan

System Test Facility (STF) 比台灣系統測試設施(STF)提供更大的地理區域

- Enables testing across all trackside subsystems 可以測試所有的軌旁子系統
- Can be reconfigured to represent any location on the

可以更改設定, 測試軌道上任何地點

BOHSR Off Site Testing Brief 060314 - Off Site Data **Testing Status** 

場外資料 測試現況

All station sites from A21 to A2, SER and Wayside have now been tested offsite and are in the later stages of development. A21到A2站、號誌機房、沿線的車站現場,都已做場外測試,並在發展階段後期

Both 4 and 5 car line wide data has been issued and is being dynamically tested on site.

4車和5車路線上的資料都已發佈,並已在現場做動態測試

ATS Data A16 to A11 is delivered from off site test to site. A16到A11站的ATS資料已從場外測試轉移到現場

#### BOHSR Off Site Testing Brief 060314 - Off Site Data Testing Status 場外資料 測試現況

SIEMENS

Off site data is issued to site when the site is ready for testing. 現場準備好時,將場外資料傳到現場做測試

SRA have recently converted the Victoria Line Control Centre and Signalling Equipment Room Integration Test System – (CASITS) to be used on TTY and this will further reduce the duration of Mainline Commissioning testing on site.

SRA最近修改了維多利亞線的控制中心和號誌機房整合測試系統的 CASITS,用在桃捷上,這將可進一步縮減主線試運轉現場測試的時間

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Author / Department

BOHSR Off Site Testing Brief 060314 - Off Site Data Testing Status

SIEMENS

#### Thank You

Author / Department



# 附件3.4-02(2) SRA RICH 1030306到BOHSR 簡報簡報影片 audio 口白

西門子簡報

這裡是西門子在奇彭哈姆的測試中心,測試台灣桃園機場捷運。

當然,在如此複雜的專案中,現場測試還是非常重要的,有些錯誤只能在現場軌道測試中發現。

但,場外模擬測試還是有很多好處,例如,可以在 24 小時不間斷地做測試、測試中加入故障、有開發人員在旁待機。所以,為了台灣的專案,本公司重資打造測試平台。在大平台上做最終整合之前,產品和資料在不同的平台上得到驗證。大平台(Big Rig)是控制中心和號誌機房整合測試系統(CASITS)的簡稱。以下為各平台的展示: (略)

原理測試的需求之一是在現場做測試。

現場測試有許多問題,各機房(中控室、站長室、軌旁、鄰近的聯鎖)的地理位置不同。為了支援現場測試,我們需要很多人力在各點監控。此外,還有軌道進場衝突問題需要和其他的廠商協調、調度列車、等等。所以,現場測試時,需要一人在中控室、一人在號誌機房、還需要另外的人員在遠端向測試人員報告、控制、連絡、指出問題、等等。在這大平台上,我們把各原理測試的工作流程整合起來,如 DMC、MCT、SAW、LSC、DTG、WESTRACE 測試資料。它們全都在大平台連接在一起。

這提供了整個系統從頭到尾的剖面分析,嘗試盡量模擬現場測試的最終設置。 事先模擬的好處是,

- 1. 我們可以先看到系統各部分連接正常,如果有問題,在真正的現場測試之前,可以先在英國除錯;2. 測試所需的人力,本來需要四、五人,包括測試員和協調員;而模擬時只需要兩人,主測試員和助理測試員;
- 3. 節省因進場問題而浪費的時間。

之前評估現場測試,本公司確認了 30%的現場測試可在英國用大平台模擬測試。 大平台會進行資料驗證過程,此驗證是之後能在英國現場測試的關鍵。 大平台完成驗證後會有審查,然後認證測試結果,以保證可以用大平台測試代 替部分現場測試。

CCO、ACO控制中心和號誌機房整合測試系統(CASITS),另稱大平台,可以整合控制中心、地域控制、號誌機房的產品程式碼和資料。

平台可以模擬 5 個 LSC 區,我們開發出聯動系統測試用的工具 GSIM,提供 LSC 區內的聯鎖功能。

平台可以同時測試大量的車站區域資料、號誌機房、工作站、維修控制站、控制終端機,多元化監控設備。測試中,平台使用了 DMC、PLC 輸入,以測試號誌機房警報、PSD 顯示。

平台也提供和 ATP-BP 的聯鎖功能,用了許多久經考驗的工具,監控 ATP-BP 和聯鎖、無線電通訊之間的聯動。

## 附件3.4-02(3) 高鐵局1030306召開「機場捷運號誌系統廠商境內及境外自 主查驗」會議紀錄

交通部高速鐵路工程局 函

機構地址: 22041新光率数据框模表大进2後7號9排水 對 人 7 量文號 電 以: 08-2870H20分級8117 電子對性 1saith, landert, gov te

受文者:副局長室

於文目期:甲基底國103年3月18日 使文章就:高級投資統二年第1030602904號 規制:普號符 安年及都高強計五額密期服 普通 附件:如東西

主旨:柏洪太易103年3月6日召開之「機堪修運駛就系施虧百戶 內及境外自主查驗」會議紀錄乙份、如附件、請查照、

五本:中央に短期間投行者係公司前國義國家問籍後後後電監道工程為、日南東京監 所投份有限公司交通者意合公司、共済而行于收接自動化者限公司台灣分公司 本局的得限定、総二征司宣、第三位、改述工程與 酬本:

代理局長 朝 湘 麟

21日41万

#### 臺灣桃園國際機場聯外接選系統建設計畫 機電系統統包工程(MEOI 標)

德琳接通號誌系統廠前規內及境外自主黨職會議紀統

- · 查議時間 : 103 年 3 月 5 日(星期四)下午 3 時型
- 紀錄: 貧火鎮
- 四、出斥單位辰人黃、详會議簽到五

五 讨 论

- (一)本北乡镇陆南英裔西門平城縣自動北省很公司台灣分 今司制: Fich Mirtehead: 故「楊彈捷運數出處施 所以為是於自立蓋報」之執行方式復行獎權、獨報內 完計與相信:
- (二)與分各單位於簡較過程後,分就其內容提出問題及該面 門子公司進行澄清。
- - (一)辦西門子公司提供率日前報之電子槽予業主及監建工 程度(已於103/03/97提供,詳如附件1)。
  - (三)請允託公司將本日面符子公司將全申所請或之影片。就 其中之口請說明提供中文副譯書面資料,並提近于家主 及監逸工程處。
  - (三)請接工處於收到上述資料後、轉送于本屬相關單值。
  - (三)所樣一處。但於正定目刊說。 特殊下午如何期刊就 (四)所樣工度於501 監通工程處,到對未募集國門子爵縣 (四字中京屬(可)下京(世)與100年5(世)東國市學者以 (由)作於明整理、並得同本科會構成經過減少與高(學知 )對作2),吳賴城商於文前(監閱),提出著權。
- 七、版 會 下午5時10分

交通部高速鐵路工程局 出席會議簽名單

89k84	查可機関國際轉編聯外被選系改建設計畫 國際点機地 工程(擬图)-機構建建設的表征兩線機內及设计者主直加學派			
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103/03/06 機場捷運號站系統廠商境內及境外自主查驗會議 西門子公司領敦明事項

」. 磷钇明 OFF-SITE 从 ON-SITE 之自主電驗八方配置?

- 2. 磷过明 DFF-STTE 及 DF-STTE 各有那些自立查驗項目?
- 3. 鳞状明黄 (N-SYIE 白色性触栓生筒糖液缺合作:如何與 (NP-SYIE 協调反政
- 尤特提明上述缺失協調、改長所靠時間?略均第口反如何等性?
- 5. 構說明載員目於,OFF-SITE 自三量驗證據為例(已完成膨脹站之卷驗)?
- 5. 雜稅期或差月第一以下SITE自主重稅追資為何(己完成都被站上查驗)?[500 何時可以開始重裝。
- 7. 有朝 UPP-SITE 及 DI-SITE 特別述之自立查檢工作。LSCI。USD2、LSC3、LSC4 及 LSC5 應同分進行:證券法同步进行、请提明原因(人力、絕界及危税)。
- 8. 转说明 (PF-S)TC 魚 (P-S)TC 之 自主我知道度,其许与方式或选举与何?当清 提到数据及实生所入管理。
- 9. 情快期 5F-SIE 主 OH-SIE 所附近之畫輪,美容尼酒電面門子公司[Interlocking tentional and Validation Testing Specification」交往中所有之臺輪項目?技術表面另有某地自立重整件字之項?
- 10. ESI\$/IGSF儘管報益辦法規查,竟逐軍取刊實際規模投資之於應?免逐洋邊廣 提場。100~該?
- 11. GSTM/GSTM/推模器、连言高频器三分频率化(加入比层层)之边理》 12. DBF-STTE 與 [BI-STTE 版獨立作業, 外价求德同時販勤數值區議辦公門
- 13 DM SITE 附近回馈减坚需多大计模完成?

## 附件3.5-01: Mott MacDonalt presentation

#### What is Mott MacDonald?



Mott MacDonald welcomes In-bound Delegation from Taiwan



One of the world's largest management, engineering and development consultancies







#### Mott MacDonald Presentation Team

Dick Dumolo - Technical Director (Railways)

Gareth Mainwaring - Business Development Director (Metros and Civil)

Karl King - Head of Train Control Systems



#### Multinational





Multisector

#### **Presentation Content**

- Introduction to Mott MacDonald
- Introduction to Railways
- Light Rail Credentials
- Mott MacDonald contribution to Cross Rail
- Train Control Systems
- Open Discussion





It's the sheer diversity of our work that makes us unique



#### What we do

## Our independent and proud heritage in Railways

We use our worldwide resources and experience to: Plan, design, procure and deliver projects of any type on any scale





Our independence through being owned by our staff means that we bring totally impartial expertise to our clients totally unfettered by national, industrial or shareholder pressures. Many competitors' advice is subject to these

pressures We believe in the deep core values of PRIDE



Progress Respect Integrity Drive Excellence



Scope

# Mott MacDonald

## Principal offices



# Working in over 120 countries worldwide

- Over 2,500 out of Mott MacDonald's 14,700 staff are working in rail
- We comprehensively cover: High Speed Rail

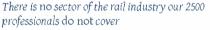


Heavy Rail Freight

Metros

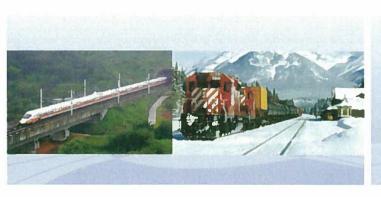
Light Rail

Monorail





#### Railways Capability



#### BART - USA

- BMRC INDIA
- CALTRANS USA
- DfT UK
- DMRC INDIA
- DOT ABU DHABI
- KMRT TAIWAN
- LTA SINGAPORE
- LUL UK MOR - CHINA

#### MOR - INDIA

- MOT EGYPT
- MRT THAILAND
- MTR HONG KONG
- NAKHEEL DUBAI
- NR UK
- PKP POLAND
- SOUND TRANSIT USA
- THRSC-TAIWAN
- TRANSNET SOUTH AFRICA



Clients Globally





#### Full Life Service

## Global comprehensive service

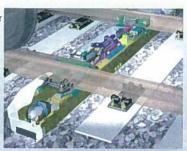


Supporting clients throughout the railway's whole life cycle



International work emphasises our top-end and front end skills

- PPP/PFI Technical Advisors
- Due Diligence
- Business case
- Institutional Development
- Resource accounting/asset management
- Procurement advice
- Revenue forecasting



Our practical doing of railway work globally ensures our front end skills are for real



#### Comprehensive system capabilities in Railways



There is no aspect of the railway's physical systems our 2500 professionals do not cover



#### Global comprehensive service

Railway Systems - 500 staff Advanced simulation
Asset management
Commissioning & service readiness
Communications and control systems
Commercial, finance & franchising
Electrification Electronic signage
Systems engineering & assurance
Electromagnetic compatibility
Fire & evacuation
Freight scheduling & passenger timetabling

Signalling Traction power Tunnel ventilation & aerodynamics Railway Infrastructure — 2,000 staff
Airport Interfaces and remote baggage
Building services
Environmental impacts
Fuels, energy & power
Organisation development & training
Planning & economics
Project finance

Project and programme management
Public Private Partnership (arranging)
Railway bridges and structures
Railway bridges and structures
Railway tunnels
Social & sustainability analysis
Stations, terminals & depots

Human factors & ergonomics independent checking & certification Mechanical & electrical Operations & maintenance

maintenance
Passenger flow modelling
Permanent Way
Rolling stock & whole life maintenance
Safety & reliability



TOTAL CAPABILITY from 2,500 railway professionals



## Global Expertise



World class expertise plus local specialists and capacity on-tap



## Summary

- A hugely capable, global company with a proud heritage in all types and aspects of railways
- High calibre, up to date, international staff independently providing impartial and authoritative advice
- We cover the hard engineering skills as well as the softer implementation and operational people skills
- We work with partners and clients in a uniquely close and integrated way so that the team result is distinctive



#### **Light Rapid Transit Credentials**











#### Judges Comments: 2013

Award Winning Team

"Mott MacDonald have the magic touch in the light rail business and as one of their clients told us "It's a delight to work with such consistent professionals". We're sure this is echoed across the many systems across the world that have had input from this ever-expanding organisation".





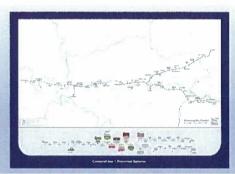
#### Mott MacDonald LRT credentials

- Over 500 staff contributing to light rail development
- Wide ranging project experience around the world
- Staff Experience Technical, operational and management
- Expertise covers whole project life from concept to operation and rolling stock, including asset management





#### Mott MacDonald Contribution to CrossRail



Currently the largest infrastructure project being undertaken in Europe.

Mott MacDonald have had continuous involvement since 2001



#### Over 40 LRT projects since 2012

#### Nottingham Blackpool Rotterdam Blackpool Salt Lake City Vancouver Wirral, Liverpool Manchester London (Croydon) Honolulu Edmonton Toronto London Docklands Light Rail Waterloo, Ontarlo Antwerp Birmingha Dublin Utrecht Kuała Lumpur Groningen Nijmegen-Kleve Kaohslung Sacremento Leeds NGT Los Angeles Pittsburgh Portland, Orego Ufa. Russia

#### Brief History of CrossRail

Scheme first proposed in the "County of London Plan" in 1943 as an underground railway from Paddington to Liverpool Street. Final report completed in 1948 and also considered north-south routes.

1974 - London Rail Study Report Also included Jubilee Line and Chelsea-Hackney Line Mott MacDonald have had detailed involvement with both schemes.

1989 - Scheme resurrected and Bill submitted to Parliament in 1991, but rejected in 1994. Mott MacDonald first involvement with detailed design of Tottenham Court Road Station (TCR) and tunnels from TCR to Allen Gardens

2001 - Present, Current Scheme. Continuous Mott MacDonald involvement Over 700 staff have been engaged



#### Mott MacDonald Roles in Current Phase

2001 - First commission Feasibility Study for alignment east of Liverpool Street Station

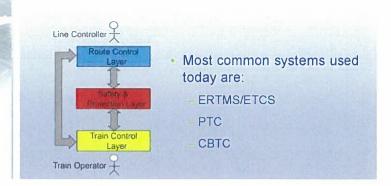
2002 – 2008 Led preparation of Hybrid Bill with preparation of Concept Design for alignment tunnels, 8 underground stations, architecture, construction methodology & construction programme Royal Assent (Parliamentary Approval) granted in 2008.

2006 – 2009. Developed Reference Designs for 3 stations (Farringdon Liverpool Street & Whitechapel) 100-strong team co-located for design

2007 Appointed for the design of Rolling Stock and Rail Systems - covering trackform and alignment, tunnel and station ventilation system, tunnel and station and aigminent, unner and station ventration system, turner and station aerodynamic modelling, M&E systems, communications and controls including SCADA, signalling, traction power supply, and platform screen doors.



#### Train Control Systems





**ERTMS/ETCS** 

#### Mott MacDonald Roles in Current Phase





Crossrail

Design work ongoing

# In-cab signalling & train protection system Interoperability

- **MM** Projects
  - Netherlands Pilot
  - Malaysia Feasibility Study
  - **Thameslink**
  - **UK Rolling Stock**

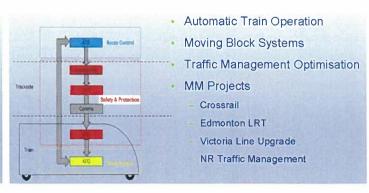
Mott MacDonald

**CBTC** 

#### **Current Assignments**

# Construction Supervision Ongoing

Also undertaking Feasibility Study for Crossrail 2 - assessing various routes across London, including cost estimate and programme as input to the TfL (Transport for London) **Business Case** 







## Train Control Capability & Services

Full System Solutions
Feasibility Studies
Technical Advisor
Signalling Design
Rolling Stock Specifications
Communications Surveys
Power Surveys
Assurance/Approvals
Notified Body (NoBo)
Designated Body (DeBo)
Assessment Body (AsBo)
Independent Safety Assessor (ISA)



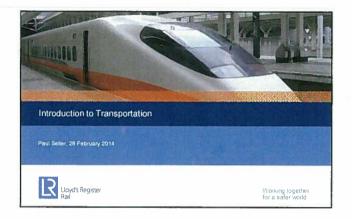


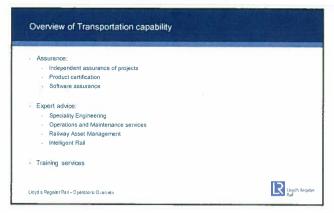


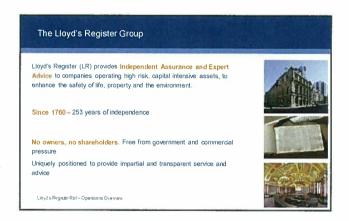




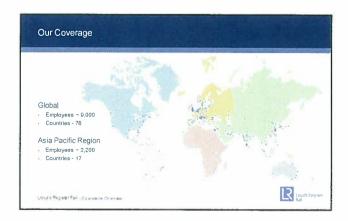
# 附件3.5-02: Lloyds Register Rail公司 Introduction to Transportation

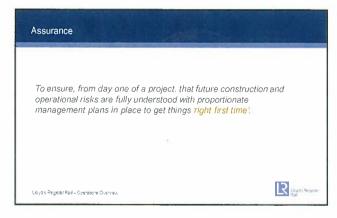






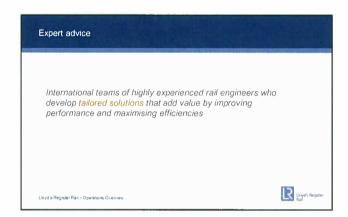




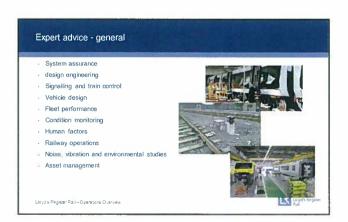


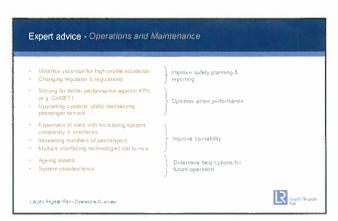


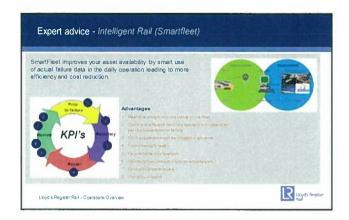


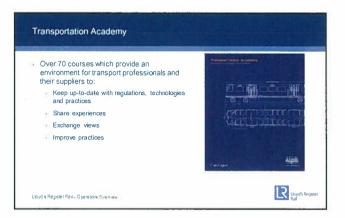


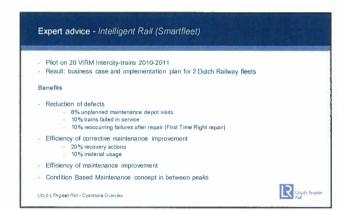








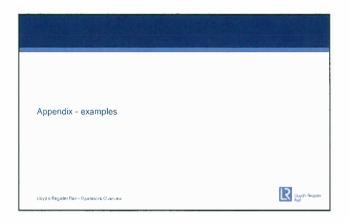


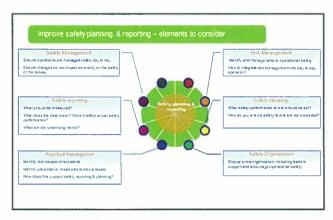




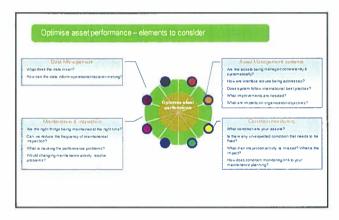


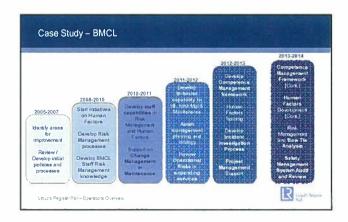


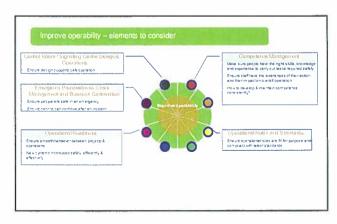






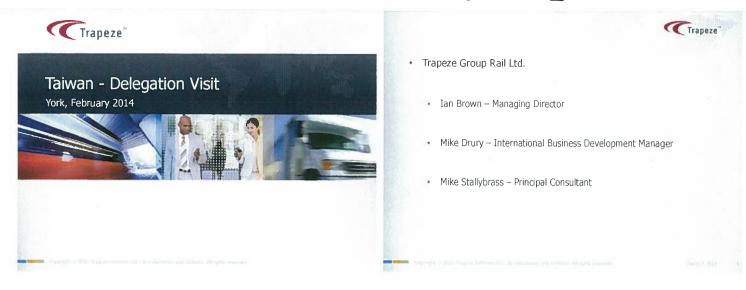






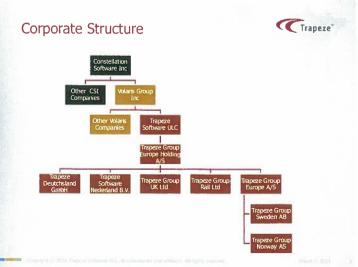


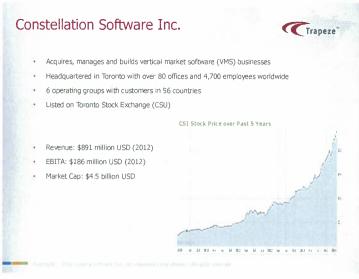
# 附件4.1-01: Trapeze 公司與Timetable等簡報 - york-27021\_published







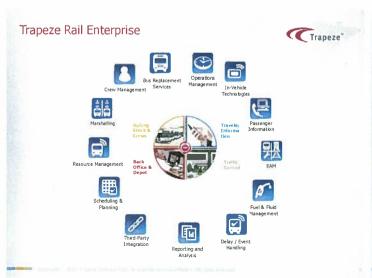














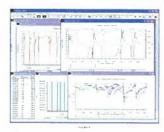




# Modelling - PowerPlan



- Fully integrated with RailPlan, this tool models the electrical supply network and the electrical requirements of trains
- Use of this tool helps identify weaknesses and hotspots in the power supply network
- Simulate and analyse the electrical network(s) overlaid on RailPlan model
- Can model AC and DC networks Interactive feedback with RailPlan affecting train performance
- Full network analysis or single train, as well as Perturbed running
- Electrical outage/emergency scenarios possible
- Regenerative braking and Energy Storage Systems





# Trapeze Group Rail's Product Suite Trapeze

# RailPlan / PowerPlan



- Simulation based on first principles
- · Extremely useful when about to invest in high cost projects.
- Can calculate train running times

  - Gradient, speed limits, curvature
     Mass, Acceleration & Braking characteristics
     Integral part of TrainPlan.
- Can simulate multiple train scenarios

  - Signal positions,
     Switches, interlocking

# Modelling - RailPlan

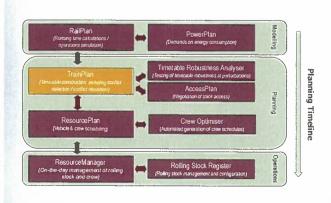


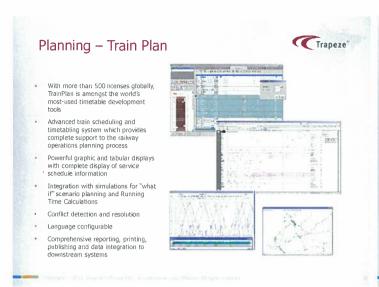
- Powerful simulation tool that enables rail experts and engineers to predict the behaviour of rolling stock, signalling systems and power supply networks
- Advanced graphical user interface and capability to identify and manage conflicts
- Broad range of applications, e.g. determining signal headways, assessing the locations of points and crossings and validating the viability of timetables
- Examine impact of different infrastructure parameters
- Examine impact of signalling changes to proposed train service
- Explore junction conflicts and design to minimise disturbance
- Examine the performance of different rolling stock on specific infrastructure
- Explore service the performance of a proposed train service for a given infrastructure configuration and rolling stock
- Explore service resilience by simulating perturbed operation

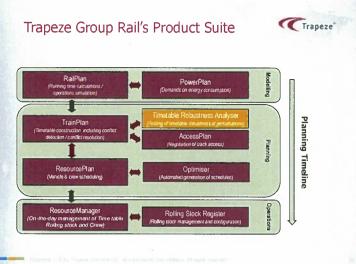


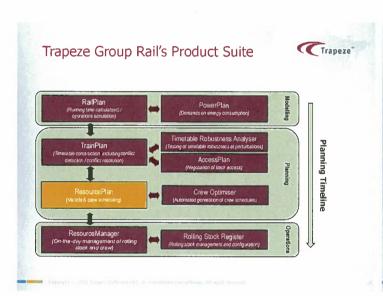
# Trapeze Group Rail's Product Suite

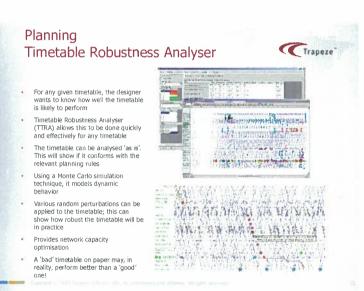


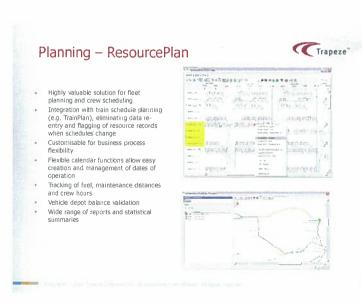


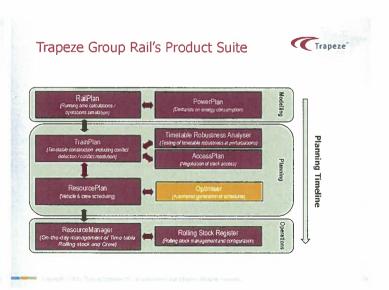


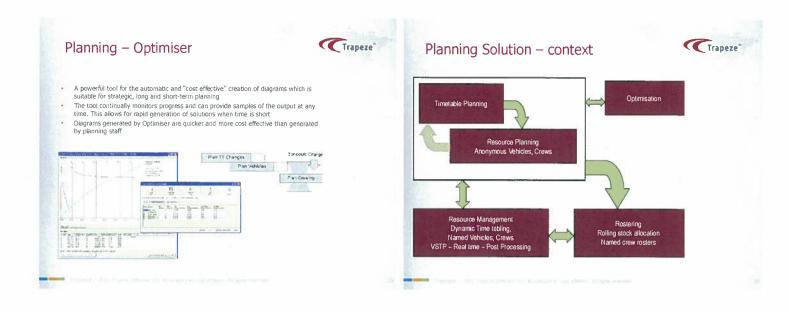


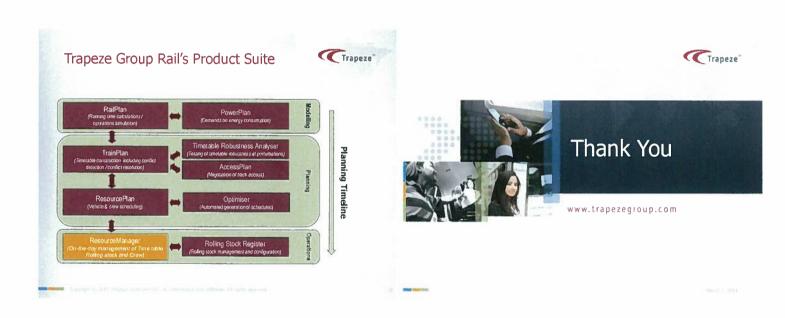


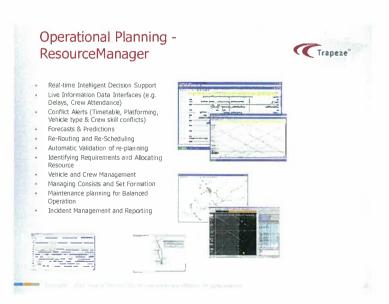












# 附件4.2-01: LPA-Excil Electronics- LED Technology Overview

# LPA EXCIL ELECTRONICS











February 2014

# LPA Excil Electronics Overview



- Our current market sector involvement includes rolling stock interior lighting, transport infrastructure, Industrial/OEM and selected commercial applications.
- The company was formed in 1982 and joined the LPA Group PLC in July 2000.
- Located in Normanton, West Yorkshire, UK, where all design and manufacture is performed.
- EN ISO 9001 certified.

# Company Locations Yellow: LPA Excil Electronics Blue: LPA-Channel Electric Red: LPA-Niphan Systems Black: LPA-Haswell Engineers

# **Brief Technology Overview**





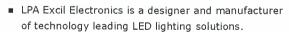


LED Emitter Examples

- · The LED is a totally solid state "PN junction" device.
- There are no fragile filaments or gas discharge processes to fail.
- When a current is passed through the PN junction, photons are released. The colour temperature of white light emitted is determined by a phosphor coating.
- The extremely high reliability potential results in lighting systems with significantly reduced maintenance costs.
- The high luminous efficacy levels compared to traditional light sources results in significant energy savings.

# **LED Lighting**



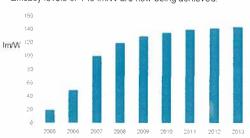


- Our expertise includes design and manufacture of LED light engines, drive electronics and control systems, through to complete luminaire and lighting solutions.
- LPA Excil LED Lighting has a reputation for high reliability with a wide portfolio of highly successful installations across a wide range of industries and blue chip companies.

# **Technology Update**



- LED technology has progressed rapidly in recent years.
- Efficacy levels of 140 lm/W are now being achieved.



· This compares to 15 lm/W for halogen and 90 lm/W for fluorescent.

# **Technology Update**



· Colour rendering has improved from around 65 to 85+



# **Technology Benefits**

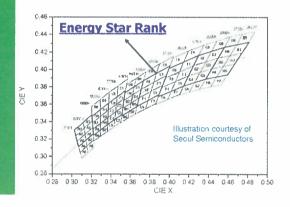


- · Significant Energy Savings:
- The high luminous efficacy level results in significant energy savings compared to traditional incandescent, halogen and fluorescent light sources.
- A typical LPA-Excil LumiMatrix solution would offer around a 45% power saving compared to a conventional fluorescent system.
- A typical LPA-Excil LumiSpot down light solution would offer an 80% power saving compared to a conventional halogen down light solution.

# **Technology Update**



· Colour temperature control has improved radically.



# **Technology Benefits**

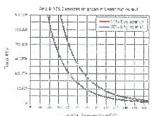


- Full control of lighting levels via dimming including DALI interfaces.
- · Ambient light responsive control systems.
- Both of the above significantly increase LED life expectancy.
- Total freedom from infra-red and ultraviolet content in the light beam resulting in a cool to touch light source which does not degrade polycarbonate diffusers.
- · Environmentally friendly, no lamp disposals

# **Technology Benefits**



- Long service life:
  - When used in conjunction with an optimally designed thermal solution and well designed drive electronics, LED solutions can offer 100,000 hours to the point of 70% initial lumen output.



Graph illustrating the importance of considered thermal management.

 This compares to 3000 hours life for halogen and 15,000 hours life for fluorescent technology.

#### LumiMatrix



- Uses hundreds of chip LEDs achieving extremely high levels of uniformity.
- Available as a complete luminaire or in component form.
- · Luminaire just 30 mm thick.
- · Flexible LED pitch and form.
- Built in drive electronics & optional emergency battery back-up.
- Connects direct to the available power source.
- Up to 40% energy saving.



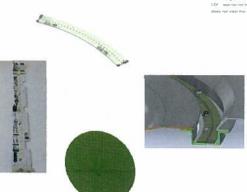




# **Configuration Flexibility**







# LumiPanel



- · Luminaire just 20 mm thick.
- · Built in drive electronics, connects directly to the available power source (AC or DC).
- · 100,000 hours to 70% initial lumen output,
- Up to 30% energy saving.
- · Vandal resistant (IK10 rated-5Kg from 400mm).
- IP65 sealed.
- · Typically applied in tunnels and underpasses.
- · BS6853 cat 1a fire compliant.



# LumiTray



- · LED retrofit lighting gear tray.
- Up to 50% energy saving compared to fluorescent technology.
- · Replaces single and twin lamp fluorescent variants.
- · 80,000 hours to 70% initial lumen output.
- · UMSUG listed/approved.
- 5 year warranty.
- DALL compatible.
- Available in cool, natural and warm white.



# LumiStrip



- Built in drive electronics, connects direct to the power source.
- · Fixes directly to the gear tray.
- · Suitable for indirect lighting applications.
- 100,000 hours to 70% initial lumen output.
- Offers up to 25% energy saving compared to fluorescent.
- · Rolling stock DC and commercial AC versions available.



# LumiTile



- · Uses hundreds of chip LEDs to create a homogenous light source.
- · Variants with 3150 and 4650 lumen output.
- Luminaire efficacy is an industry leading 75 lm/W.
- Up to 30% energy saving compared to fluorescent.
- · 80,000 hours to 70% initial lumen output.

· Integrated drive electronics for direct

• Emergency and DALI compatible variants available.

connection to 230V AC.









# LumiBay



- · Robust IP65 high bay luminaire.
- Over 50% energy saving compared to traditional light sources.
- · Replaces mercury and SON lamp based fittings.
- 100,000 hours to 70% initial lumen output.
- 5 year warranty.
- · Fit and forget.
- · CRI better than 80.
- · Overall total luminous efficacy 100 lm/W.





# LumiSpot

#### **Integrated Drive Electronics or Centralised Power Distribution**

- · Halogen replacement.
- 100,000 hours to 70% initial lumen output.
- 80% energy saving compared to
- Rolling stock DC voltages and commercial AC voltages available.



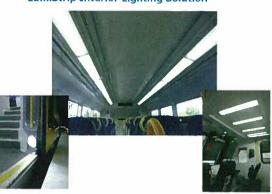






# **Applications**

Waratah/Downer EDi Rail **LumiStrip Interior Lighting Solution** 





# **Bespoke Solutions**

- LPA-Excil is also a solutions provider
- Example of an IP66 sealed LED tunnel luminaire
- Bespoke optical solution employed to extend luminaire placement pitch





Blackfriars-London New Ticket Barrier Area + Subway and Road Underpass







# Compliance

- Rolling stock lighting:
  - EN50121-3-2 (EMC)
  - EN50155 (Performance)
  - EN61373 (Shock and vibration)
  - BRB/LUL/RIA12-Selected products (UK historic standard)
  - BS6853 (Fire compliance)
- Industrial/Commercial/Infrastructure:
  - UL8750,EN61347-1, EN61347-2-13, UL60950-1, TUVEN60950-1 (Safety)
  - EN55015, EN61000-3-2 Class C, EN61000-3-3 (EMC emission)
  - EN61000-4-2,3,4,5,6,8,11, EN61547, EN55024 (EMC immunity)
  - Working on section 12 (Fire compliance).



# Siemens-Warsaw and Munich Metro





Warsaw Metro



Munich Metro

# Saira Seats **LED Reading lights**













**SNCF- Le Rayon Vert** LED Down lights and Fluorescent Replacements













LTA / Singapore LumiStrips





**Balcony Light Oasis Of The Seas** 











Javelin Class 395-Hitachi Fluorescent/LED

solution



**London Underground Central Line LumiPanel** 









East Coast MK3 Fluorescent/LED Solution











TGV R/ SNCF

**LumiSpots** 

**RFU Reception Area Twickenham LumiStrip Ceiling Backlighting** 









# Panorama Car/VIA Rail Canada LumiSpot







- 30 years experience in designing and manufacturing electronic and lighting solutions for the Rail Industry and other high reliability markets, worldwide.
- 10 years experience in designing and manufacturing LED lighting products and solutions.
- Have gained a reputation for supplying high quality, reliable and long life products and solutions.
- · Familiar with rolling stock, commercial and industrial specifications.
- · Experienced in supplying technical solutions for OEMs.
- Part of LPA Group and thus able to use group expertise and manufacturing facilities.
- · Experienced in managing multi-million pound contracts.
- UK design and manufacture of cost effective, reliable, safe and sustainable products.



# Major LumiMatrix Opportunities





• OTIS Escalators-Crossrail.



• Crossrail platform illumination.



· Crossrail Liverpool Street.

# Thank You



LPA EXCIL ELECTRONICS www.lpa-group.com

#### Conclusions



- Ultra high reliability offering reduced maintenance and operating costs.
- Low power consumption resulting in significant energy savings.
- Low temperature light beam resulting in a more comfortable environment and reduced air conditioning load.
- A variety of control options including dimming, pre-set emergency levels and response to ambient light conditions.
- Long life, green solution.

# **Product Summary**







# CONTENT



Company Profile **Product Summary** Rail Jacks Engine removal table Bogie / Wheelset drop Bogie Handling Bogie Press Bogie Storage Rail vehicle handling Depot Equipment Cranes Customer service References

Thank you

- Controls system/ Jacks Types

- Turntables / Rotators



# + RAIL JACKS

- W User friendly the software gives simple & intuitive step by step instructions to the operator
- # Jacks can be used without cable installation in the floor
- # The system is expandable it can control up to 48 jacks as standard from a single Mega-Link control box

# **Company Profile**



- // UK based and privately owned // Over 40 years experience
- // Extensive product knowledge
- // In-depth Industry understanding
- // World leader in our field
- // Sales and service capabilities

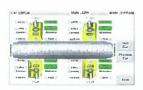
# RAIL JACKS





- Megalink control system advantages, that put Mechan ahead of the competition







RAIL JACKS

# "A Different Class of Jack"





- // Mobile jacks, moving anvil
- // Mobile jacks, fixed anvil
- // Rail mounted jacks, moving anvil
- // Offering multiple advantages over alternative lifting choices....



#### + BOGIE / WHEELSET DROP SYSTEMS

Bogle Drop Systems

Machine's bogie drop systems allow the asis removal and replacement of complete bogies, wheelests and undercar equipment from coupled rail whichs.

A pit continuation gives full clearance under the bogie and side platforms offer all-round access to the item being changed.

Mechan provides bogic drops with either a hydrautic solssor type lifting mechanism or the recently developed intelligent screw jack lifting system, which offers a reduced pit depth and greatly minimises installationcosts.

- Wheel Drop Systems
  Wheel Drop Systems
  Wheelsoft dop systems allow the safe removal and replacement of wheelsets only from coupled rail vehicles.
  Like the bogie drops, the road is safe for other fraffic when the system is not in use.
  Available as simple talkelop systems or with pir continuation for full access under the bogie.
  Adjustable bogie jacks are included to provide support during removal of the wheelset

#### RAIL JACKS





Mobile Jacks, Fixed Arvel





#### RAIL BOGIE / WHEELSET DROP





Hydraulic scissor type bogle drop, First Great Western Depot, Old Oak Common



# + ENGINE REMOVAL TABLES



- // Offers an alternative to under floor systems
- ///Lateral & longitudinal adjustments
- // Central slew



**MECHAN** 

Engine Removal Table for Irish Rail in raised position

# RAIL BOGIE / WHEELSET DROP

# **Eurostar Depot Bogie Drop**



**MECHAN** 





Incorporating Mechan's "intelligent screw jack system and compatible with European gauging, the Temple Mills bogie drop is a self-contained assembly that enables traction motor/gearbox units and air conditioning equipment, as well as wheel leaks and logists, to be whitched without litting or splitting the formation, installed beneath two depot roads and an exchange road, this assembly has two trigges, one of which can pass bereath the other whits cornering a bogie without interropting affertainties used of the other road. Sophisticated intelocking systems and other safety measures help to safeguard depot personnel.

#### + TURNTABLES

ADOUT, I WHIFE SET THIOTAINES
Mechan furniables are used to aid the transfer of bogies and wheelests between roads within maintenance facilities.

The logic translatin is normally fitted with double cross—rails to allow bogies to run across the surface and can be operated with either a manual push handle or electrically if required.

The absorbed fundable is set up to allow wheelests to pass across it in a cross—track configuration, the unit rolling on its flanges as it traverses the turntables. It is operated manually by pushing the end of the wheelest.







RAIL BOGIE STORAGE

#### + BOGIE STORAGE



Mechan produce a vast range of equipment for stacking lifting and storing bogies, wheelsets, engines\_traction motors and ancillary equipment.

- // Bogie Stands
- Low and high level storage stands
- Wheelset lifting beams



M



RAIL BOGIE HANDLING

#### + BOGIE ROTATORS

Bogie frame rotators are designed to lift and rotate a bogie during maintenance and refurbishment, providing access to all areas in an ergonomic and safe manner.

They are fitted with rolating faceplates on the front of the lifting carriages and have modified feet to provide a wide and stable base. These rotators work in pairs, controlled from a single panel mounted at the rear of the master unit.

- // Suits all bogie types
- // Self sustaining with power off
- // Fully synchronised
- // 360 Degree Rotation in both directions
- // Capacities up to 10t





Heeder picture Mechan &t Bogie Rotators - Southern Railleaus



## + TRAVERSERS

- // Mechan offers clients a completely bespoke service for the design and specification of vehicle traversers and turntables.
- // From concept to manufacture and installation, we can produce traversers that meet individual workshop designs and vehicle requirements. Sizes range from 60 tonne units, capable of lifting a single rail vehicle, to 170 tonne capacity freight locomotive versions.



#### + BOGIE TEST MACHINES

Bogie lest machines i bogio presses are used to set up bogies after build, repair or refurbishment.

The Bogie lest machine i bogio presse apriles weight to the bogie or hims the foods mopped by the rail vehicle and to segie the suspension. This allows the ride leight to be set correctly so no further adjustment is needed when the body is fitted.

Bogie presses bridge the rails and consist of cylinders (that apply the bod to the suspension points.

Bogie presses bringe the rails and consist of cylinders (that apply the bod to the suspension points.

- Single pressing cylorider with guided spenader beam
  Twin pressing cylorider with independent load application
  Load measurement by hydraulic pressure or sold state load cells
  Wheel load measurement to check, load distribution
  Bogle ride height measurement
  Power feed for bogges into press
  Audilary ratio frome bogge into press
  Audilary ratio frome bogge into press
  Audilary ratio frome bogge into press
  Data bogges with report print out and storage.

RAIL DEPOT EQUIPMENT

# + DEPOT EQUIPMENT









**MECHAN** 

Mechan offer a wide variety of bespoke Depot equipment

- Workerar Modula Removal Systems mobile / pit mounted / rail mounted
  | Webica / Bogie Workstands
  | Webica / Bogie Workstands
  | Accommodation Bogies
  | Storage Systems
  | Coupler namoval tool



Mechan designs, develops and manufactures an impressive range of standard and bespoke handling equipment that extends far beyond the simple Jib crane.

- // Slew upto 360 degrees
  // Manual or Powered slewing
  // Free standing / Wall Mounted
  // Heights / Radius to customer requirement
  // Indoor/ Outdoor/ Offshore/ Marine applications
  // Designed to British standard B57333: 1950

# **REFERENCES INCLUDE:**







































# CRANES



270 Degree Powered slewing





Rail depot Jib Crane ~ Designed to pass under overhead line

# **Complete Customer Service**



- // In house design
- // Installation and commissioning
- // Equipment training and certification
- // Dedicated service engineers; mechanical, electrical and electronic
- /// Refurbishment and Service schedules offered on non Mechan equipment





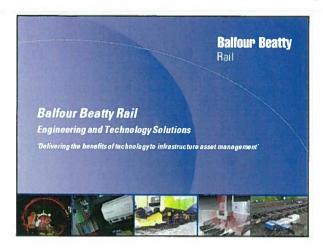




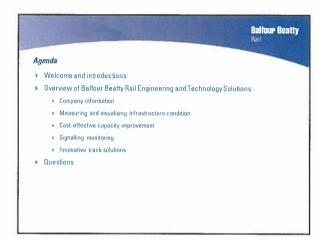


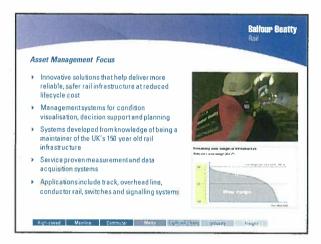


# 附件4.4-01: Balfour Beatty Rail Engineering and Technology Solutions

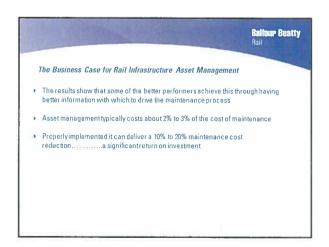


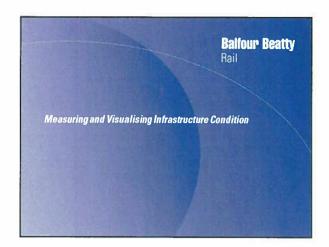








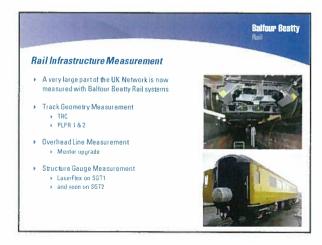












Data Management Challenge

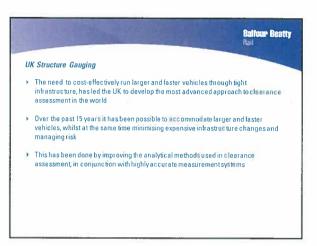
More frequent measurement and earlier identification of faults places greater demands on data management systems

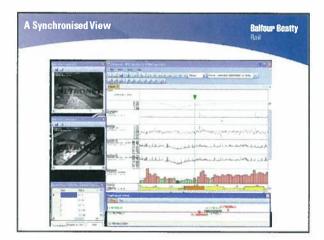
Systems must be more automated and ensure excellent positional repeatability to give confidence in early fault detection and allow right first time intervention

Is that a series of defects, or just one naccurately located?

This led us to develop DataMap™, an asset condition visualisation system, built on a location based model of the network with automated tools to 'fit' data streams with an accuracy of 0.5m even under ground







Traditional and Absolute Gauging

Traditional and Absolute Gauging

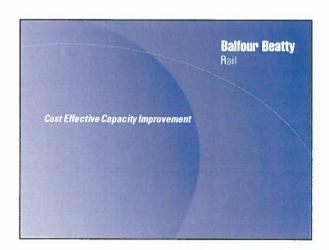
Traditionally, most railways adopt a process called static gauging which is simple but uses worst case conditions and generous allowances

Static gauging over-predicts and can 'waste' up to 300mm of usable space

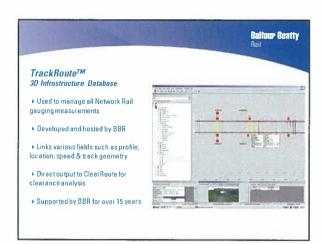
Increasing capacity (larger or faster trains) involves significant civil engineering works so this conservative approach is a very expensive option

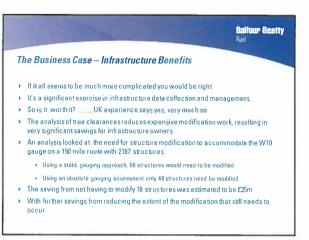
The UK now uses accurate measurementand enhanced analysis to understand the true clearances required, an approach known as absolute gauging

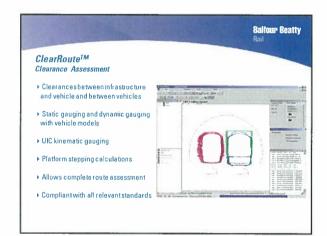
The actual space required to run each type of vehicle along a route is compared with the actual size of structures and the position of adjacent tracks



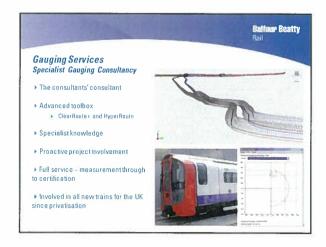


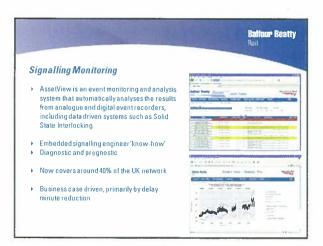


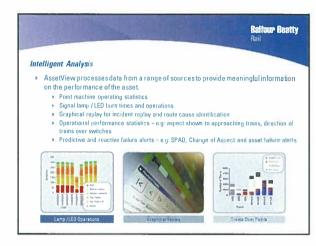




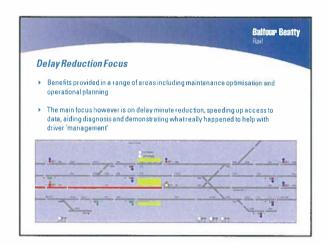




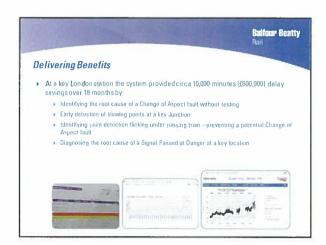


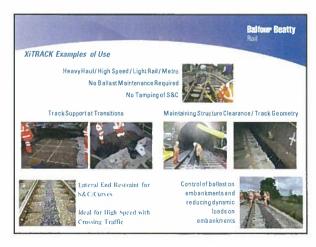




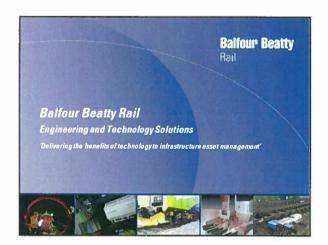
















# Introduction to TRE

- · Introduction
- · TRE background
- · Company Metrics
- UK/Overseas activity
- · Hitachi acquisition
- · Simulate, Validate & Control



- · Simulate TREsim high fidelity simulators for training
- · Validate Modelling and decision support
- · Control TREsa Automatic Route Setting

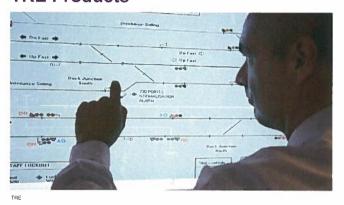


# Introduction to TRE

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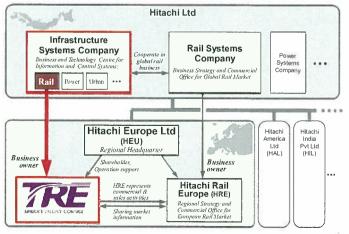
# **TRE Products**



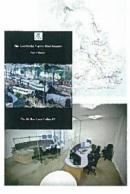
RE



# **Organization Structure**



# **TREsim - High fidelity simulators**



- · Mandated in UK following Ladbroke Grove
- 100% replica, safe off-line environment
- Training & assessment
- Practice response to disruption/emergency
- c.140 TREsims now installed in NR
- > 90% of VDU signalling systems simulated
- Product Acceptance granted for WestCad, MCS, IECC, EBICOS & VICOS Control Centres
- + accurate model of interlocking Relay, SSI, Westlock, Smartlock, SIMIS C +
- · A fully controlled virtual railway
- Combined Dispatcher/Driver Simulator
- Modelling and decision support....





# Signaller/Dispatcher Desk





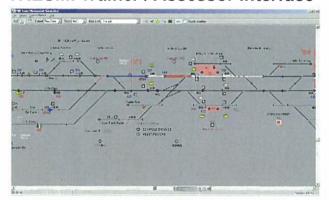
# **TREsa**

# TREsa is TRE's Automatic Route Setting System;

- Compliant with the NR ARS+ specification
- Developed with GETS and roll out programme agreed
- Now also installed with Siemens and progressing well
- NR stated intent to include ARS in all new schemes and Regional Operating Centres
- A SIL2 system talking directly with the interlocking control system
- Provides some future opportunity for train management

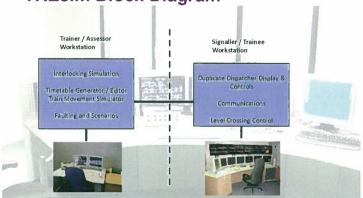


# TRESIM Trainer / Assessor Interface





# TREsim Block Diagram



# **Example of Failures Introduced**



Example shows some typical asset failures introduced by the Assessor

In this example, a number of points and signals have had failures introduced and SSI TFM modules





# **Disturbance Selection Control**



The Assessor may select a number of automatically generated conditions for service delays to be introduced in a session.

Additionally weather and poor railhead conditions can be introduced.

# **Stockholm Prototype system**



TRE



# **East Midlands WestCad Simulator**



# Combined driving/signalling simulation





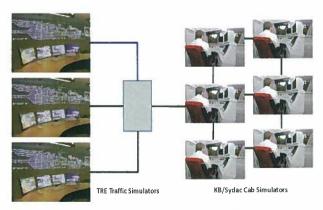
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# TRE

# **East Midlands WestCad Simulator**



# **NJSK Norway Combined Simulator**



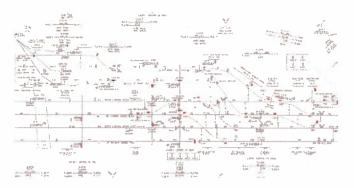
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# Validation, Design & Optimisation

# In Addition to Training and Competence Management;

- · Service reliability
- Design verification new/upgrade schemes
- Construction programme evaluation
- Performance validation
- Timetable testing
- Track and depot infrastructure
- · In fact, simulate throughout the life cycle

# **London Bridge**

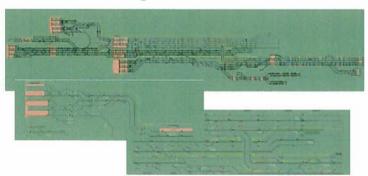




# **Validation Process**



# **Scheme Design Evaluation**









# Validation, Design & Optimisation

# In Addition to Training and Competence Management;

- · Some Examples;
  - -- London Bridge

# **London Bridge Thameslink 2018!**







# **Validation**

#### In Addition to Training and Competence Management;

- Service reliability
- Design verification
- Build programme evaluation
- Performance testing
- Timetable testing
- Maintenance depots
- Some Examples;
  - London Bridge
  - 2012 Olympics Timetable
  - Network Rail TMS Programme

# **Network Rail Traffic Management System**

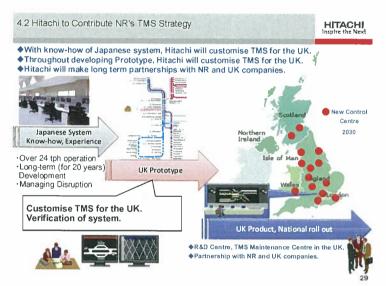
- NR implementing a national Traffic Management System
- · TREsim is being used to evaluate TMS
- · Three prototype suppliers SSL, Thales, Hitachi
- Existing TRE simulations used Thameslink/Leeds
- · Leeds area is virtual test bed for the prototypes
- · Complex joining of 4 workstation areas/24 hour timetable
- · NR plan first deployment, then roll out in ROCs





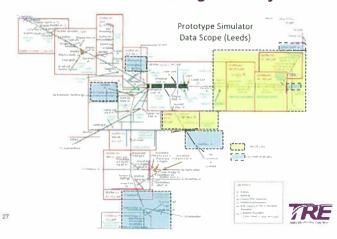
# **Network Rail Traffic Management System**

- · NR implementing a national Traffic Management System
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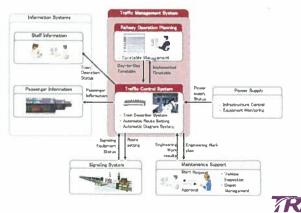




# **Network Rail Traffic Management System**



# **Hitachi Traffic Management**



# Hitachi TMS - Model Office





# **Contact**

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