

E-Consult International Ltd.

in association with

CCT InfoTech (Hong Kong) Ltd.



***Capability in
Systems Engineering
&
Systems Assurance***

1. INTRODUCTION

E-Consult International Limited was established In March 2000 and in that year formed a partnership with CCT InfoTech (Hong Kong) Limited, with shared resources and premises.

E-Consult International Limited (“E-Consult”), together with CCT InfoTech (HK) Limited (CCT-HK), provide professional engineering and technical services covering many aspects of transportation, industrial and infrastructure systems

E-Consult & CCT headquarters are based in Hong Kong with projects and assignments undertaken throughout Asia-Pacific, Europe and the Middle East.

The original “CCT” company (Communication and Control Technology Limited) was founded in London in 1984 and became involved in a diverse range of projects, including oil and gas production, chemical process plants, transportation and civil infrastructure projects, including conceptual studies for the Channel Tunnel rail link, space satellite risk and reliability, automated road bridges, tidal barriers and ferry terminals.

Since 2000, E-Consult and CCT have gained a reputation throughout the Asia Pacific region, for excellence, balanced with cost-effectiveness in railway systems engineering, safety assurance and software assurance.

The overall capabilities of E-Consult and CCT, together with Associate Companies, have been significantly strengthened by close working relationships forged with major International contractors and consultancies, to extend collective expertise into all aspects of infrastructure and operations.

E-Consult and CCT currently provide a range of services under the following main headings:

- Systems & Software Engineering
- Systems Assurance / Reliability, Availability, Maintainability and Safety (RAMS)
- Independent Software Assessment (ISwA)
- Independent Safety Assessment (ISA)
- Fire Safety Engineering
- Electromagnetic Compatibility



E-Consult & CCT InfoTech
Systems Engineering & Assurance Capability

This capability statement summarises E-Consult and CCT's experience gained in transportation, industrial and infrastructure projects during recent years.

<ul style="list-style-type: none">❖ Railway Systems Software Assurance❖ Rolling Stock and Infrastructure Independent Software Assessment❖ EMC Analysis of Railway Systems and Operating Environment❖ Ergonomic & Human Factors Engineering❖ Rolling Stock Fire Safety Studies Analysis❖ Power Supply Systems Analysis & Assessment❖ Railway Information & Communications Technology (ICT) Security Analysis	<ul style="list-style-type: none">❖ Railway Infrastructure and Rolling Stock Systems RAMS Analysis❖ Safety Case Preparation❖ Software Engineering & Management❖ Requirements Management❖ Project Risk Assessment❖ Protective & Control Systems Audit & Assessment❖ Signalling and Train Control System Safety Assessment❖ Railway Systems Safety Integrity Level Analysis
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E-Consult and CCT staff and associates have experience in control and protective systems, from concept design and specifications stage to on-site validation for revenue operation, as well as safety assessment. This experience has been gained on advanced technology infrastructure projects, in addition to modifications, upgrades and extensions to operational systems. In recent years E-Consult and CCT have been involved in communication based control systems, employing the latest available technology.

Over the past twenty years, E-Consult and CCT have participated in a large number of software projects, ranging from the provision of engineering and programming support to clients to the overall management of turn-key solutions. The company's experience has also included the preparation of software quality plans, requirements management, software test planning, on-site testing, conducting software audits and preparation of documentation packages to satisfy the most demanding clients' requirements and International Standards, for the transportation sector.

In recent years, E-Consult and CCT teams have been assigned to some of the World's most advanced transportation projects for clients, in countries including Australia, China (PRC), Hong Kong, Philippines, Qatar, Singapore, Taiwan, Thailand and United Arab Emirates.



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PROJECTS UNDERTAKEN

Examples of projects undertaken by CCT & E-Consult are tabulated below:

Project:	Hanoi Pilot Light Metro Line
Project Client	Hanoi Metropolitan Railway Management Board
CCT Client	BSL Hong Kong Ltd. / Colas Rail (Prime Contractor)
Scope of Services (by CCT)	Appointed by BSL as Software Assurance Consultant
Duration / Status:	December 2020 to Present – In progress

Project:	Manila Line 2 East Extension
Project Client	Light Rail Transit Corporation
E-Consult Client	Marubeni
Scope of Services (by E-Consult)	Appointed by Marubeni as Systems Assurance and EMC Consultant
Duration / Status:	June 2019 to Present – In progress

Project:	Manila Line 1 Depot Expansion
Project Client	Light Rail Transit Corporation
E-Consult Client	Hitachi Plant Construction Ltd.
Scope of Services (by E-Consult)	Appointed by Hitachi as Systems Assurance and EMC Consultants for Expansion of the Existing LRT Line 1 Depot and Construction of a New Satellite Depot at Zapote, in Manila.
Duration / Status:	June 2019 to Present – In progress

Project:	Doha Metro
Project Client	Qatar Rail Corporation
E-Consult Client	Mitsubishi Heavy Industries (MHI)
Scope of Services (by E-Consult)	Appointed by MHI as Independent Software Assessor for Infrastructure systems, including Tunnel Ventilation System with SCADA System interfaces.

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Duration / Status:	June 2017 to Present – Railway commenced revenue service [Support services ongoing]
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Project:	Bangkok Red Line
Project Client	Bangkok Metro
E-Consult Client	Mitsubishi Heavy Industries (MHI)
Scope of Services (by E-Consult)	Appointed by MHI as Software Assurance Consultant and Software Assurance Manager for Railway Core Systems, including all Communications Systems, Rolling Stock and Signalling.
Duration / Status:	May 2017 to Present – In progress
Project:	Doha Metro
Project Client	Qatar Rail Corporation
CCT-HK Client	Kinki Sharyo Company Limited (KSCL)
Scope of Services (by CCT/E-Consult)	E-Consult is appointed RAMS Support Consultant by KSCL.
Duration / Status:	February 2016 to Present – In progress

Project:	Doha Metro
Project Client	Qatar Rail Corporation
CCT-HK Client	Kinki Sharyo Company Limited (KSCL)
Scope of Services (by CCT/E-Consult)	CCT is appointed by KSCL as Design Verification Engineer and Independent Software Assessors Doha Metro rolling stock.
Duration / Status:	January 2015 to Present – In progress

Project:	Hong Kong Rolling Stock Conversion
Project Client	MTR Corporation, Hong Kong
CCT	Itochu-Kawasaki-Kinki Shryo (IKK)
Scope of Services (by CCT)	Appointed by KSCL (on behalf of IKK) to provide systems assurance (RAMS), software assurance, requirements and risk management support for MTRC existing rolling stock (KCRC West Rail, Ma-On-Shan and East Rail) conversion for Shatin-Central Line (SCL) Phase 1. CCT was consultant to IKK for the original KCRC rolling stock contract from 1999 to 2003)
Duration / Status:	January 2014 to Present – In progress [Partial revenue service commenced on SCL]

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Project:	Singapore Rolling Stock Procurement (Contract C151C)
Project Client	Land Transport Authority of Singapore
CCT Client	Kawasaki Heavy Industries (KHI) / RB Consulting
Scope of Services (by CCT)	Appointed by KHI under a subconsultant agreement with RB Consulting, as Independent Software Assessor for C151C contract to conduct assessment of rolling stock software to EN50128.
Duration / Status:	Completed July 2018

Project:	Taiwan High Speed Rail Extension
Project Client	Taiwan High Speed Rail Corporation (THSRC)
CCT/ E-Consult Client	Mitsubishi Heavy Industries (MHI)
Scope of Services (by CCT/E-Consult)	E-Consult was appointed by MHI as Software Assurance Consultant for railway core systems.
Duration / Status:	Completed

E-Consult & CCT InfoTech
Systems Engineering & Assurance Capability

Project:	Singapore Rolling Stock Procurement (Contract C151B)
Project Client	Land Transport Authority of Singapore
CCT Client	Kawasaki Heavy Industries (KHI) / RB Consulting
Scope of Services (by CCT)	Appointed by KHI under a subconsultant agreement with RB Consulting, as Independent Software Assessor for C151B contract to conduct assessment of rolling stock software to EN50128.
Duration / Status:	Completed

Project:	Taipei-Taoyuan Airport Access MRT System (previously “CKS Airport Line”)
Project Client	Bureau of Taiwan High Speed Rail
E-Consult Client	Marubeni Corporation
Scope of Services (by E-Consult)	Systems Engineering and Systems Assurance (RAMS) support for the Project. E-Consult is appointed by the main contractor for E&M systems, including all rail systems and rolling stock, to take over responsibility for systems assurance (RAMS), including fire and life safety, from final design stage to commencement of revenue service.
Duration / Status:	Completed

Project:	North West Rail Link (NWRL) Reference Design & Tender Preparation
Project Client	Transport for New South Wales (TfNSW, formerly NSW Department of Transport)
CCT	Parsons Brinkerhoff, a member of the ERSA Consortium, lead by Aecom
Scope of Services (by CCT)	Systems Engineering and Systems Assurance (RAMS) support for NWRL Project, as part of the NWRL Technical Advisor’s scope of services.
Duration / Status:	Completed

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Project:	OHS Safety Systems Support, Auburn Maintenance Facility
Project Client	Transport New South Wales, Australia
CCT	EDI Rail PPP Maintenance Pty Ltd. / Headway Consulting Group
Scope of Services (by CCT)	<p>Safety & systems assurance support</p> <p>Seconded to EDI Rail to undertake management of the AMF Hazard Register:</p> <p>Consolidating hazard causes and controls to ensure acceptance of SHA (safety hazard analysis) produced from the Hazard Register - accepted for Practical Completion of new rolling stock; Developing the Company Works Instruction procedure for the ongoing management of the hazard register and its content for the lifetime of the project.</p>
Duration / Status:	Completed

Project:	Shanghai Metro Line 12
Project Client	Shanghai Shentong Metro Research and Consultancy Company Limited (“Shanghai Shentong”)
CCT Client	Atkins China Ltd.
Scope of Services (by CCT)	Signalling System Independent Safety Assessment (software); conducting audits and documentation assessments of the signalling contractor (Alstom – China & France), for compliance with European standards EN50126, EN50128 and EN50129.
Duration / Status:	Completed

Project:	Singapore Rolling Stock Procurement (Contract C151A)
Project Client	Land Transport Authority of Singapore
CCT/E-Consult Client	Kawasaki Heavy Industries (KHI) / RB Consulting
Scope of Services (by CCT/E-Consult)	Appointed by KHI under a subconsultant agreement with RB Consulting, as Independent Software Assessor for C151A contract to conduct assessment of rolling stock software to EN50128. The appointments of CCT’s Lead Software Assessor and assessment team was approved by Land Transport Authority (LTA) of Singapore.
Duration / Status:	Completed

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Project:	Taipei-Taoyuan Airport Access MRT System (previously “CKS Airport Line”)
Project Client	Bureau of Taiwan High Speed Rail
E-Consult Client	Marubeni Corporation
Scope of Services (by E-Consult)	Electromagnetic Compatibility (EMC), Earthing design and Power Supply analysis
Duration / Status:	Completed

Project:	Manila Metro Line 1 North Extension
Project Client	Light Rail Transit Authority
E-Consult Client	Miescor-GTC Joint Venture
Scope of Services (by E-Consult)	Appointed Systems Assurance Consultants including RAMS, Software Assurance, EMC & Earthing for Power Supply and Station Services
Duration / Status:	Completed

Project:	Taiwan High Speed Rail
Project Client	Taiwan High Speed Rail Corporation
CCT/E-Consult Client	Atkins China Ltd
Scope of Services (by CCT/E-Consult)	Safety Assessment of Signalling System Software Modifications (to ATP / SPAD)
Duration / Status:	Completed

Project:	Sydney Metro (Stage 1 CBD Metro & Stage 2 West Metro)
Project Client	Sydney Metro Authority (SMA), Government of New South Wales
CCT	PBACH Consortium
Scope of Services (by CCT)	Reference Design Systems Assurance, including safety risk assessments, risk register, RAM analysis and train / tunnel fire events analysis
Duration / Status:	Completed
Comment	The project was suspended by SMA on completion of the reference design for West Metro.

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Project:	Beijing Metro Line 4
Project Client	Beijing MTRC
CCT Client	Atkins China Ltd.
Scope of Services (by CCT)	Signalling System Independent Safety Assessment (software); conducting audits and documentation assessments of the signalling contractor (Thales – Canada & France), for compliance with European standards EN50126, EN50128 and EN50129.
Duration / Status:	Completed
Comment	CCT InfoTech (New Zealand) Ltd. was appointed under a sub-consultant agreement with Atkins China Ltd. This was the first railway ISA role commissioned by a China (PRC) railway operator.

Project:	Dubai Metro
Project Client	DURL, Dubai UAE
E-Consult Client	Kinki Sharyo (Japan)
Scope of Services (by E-Consult)	Rolling Stock Systems Independent Software Assessment; conducting software safety assessments of the rolling stock contractor and subcontractors in Japan, France and Germany, for compliance with European standard EN50128. The scope also included provision of ad-hoc systems assurance consultancy services, including advice on safety integrity levels and conducting hazard analyses.
Status:	Completed
Comment	Appointment as Independent Software Assessor approved by DURL

Project:	Palm Jumeirah Monorail
Project Client	Nakheel, Dubai UAE
E-Consult Client	Marubeni Corporation (Japan)
Scope of Services (by E-Consult)	Appointed as Systems Assurance (RAMS) consultants and EMC consultants for the Project. RAMS scope included all railway operating systems, infrastructure and civil works. EMC scope included all railway systems and environment compatibility analysis, as well as earthing system design. The scope also included signalling system process assessment and auditing provision of various support services relating to systems integration and interfacing.
Status:	Completed

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Project:	Taiwan High Speed Railway
Project Client	Taiwan High Speed Rail Corporation (Taiwan)
CCT/E-Consult Client	Atkins China / Taiwan Shinkansen Corporation (TSC)
Scope of Services (by CCT/E-Consult)	On behalf of TSC, Atkins China appointed E-Consult / CCT as Software Consultants, with the initial role to provide Software Coordination for TSC. The scope covered all software to be delivered by contractors, sub-contractors and suppliers, as part of the Core System, including rolling stock, signalling and all project-wide protection, control, monitoring, information and communication systems. There were some 35 software-based subsystems, with particular emphasis on software, safety related systems and the application of European Standards (EN50128 and IEC61508).
Status:	Completed



THSR First Train in Service

**E-Consult & CCT InfoTech
Systems Engineering & Assurance Capability**

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Kinki Sharyo / IKK Train operating on MTR East Rail