Risk Management of Tunnelling Projects

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Risk Management of Tunnelling Projects

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- The problem with Tunnels…
- Effects of tunnelling losses on the Construction Insurance Market
- Development of the Joint Code of Practice for Risk Management of Tunnel Works
- Implementation of the Joint Code – How it is being used
- Effectiveness and Influence of the Joint Code
- Future development of the Code of Practice

About me…

- Ade Adeyemo
  Risk Engineer, Zurich Insurance
- Chartered Civil Engineer
- Previous Employers:
  ~ Wimpey Engineering & Construction
  ~ Tarmac Civil Engineering
  ~ Carillion Civil Engineering
  ~ HDI-Gerling Insurance
- Member of British Tunnelling Society
- Chairman of the Construction Insurance Risk Engineers Group (CIREG)

The Problem with Tunnels… Insurance Market Concerns

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- Frequency and size of insurance claims
- Major losses occurring both in UK & Overseas
- Tunnelling Sector had become unprofitable for Insurers:

~ Engineering/Construction > 110% Loss Ratio

~ Tunnelling > 500% Loss Ratio

- Insurers withdrawing from tunnelling insurance
- WTC led Insurers' to re-evaluate profitable and non-profitable books of business

Examples of Major Claims…
1994: Munich Metro Project, Germany

Examples of Major Claims…
1994: Heathrow Express Tunnel, London

Examples of Major Claims…
2000: Taegu Metro Project, South Korea

Examples of Major Claims…
2002: SOCATOP A86 Tunnel, France

Examples of Major Claims…
2003: Shanghai Metro, P.R. China

Examples of Major Claims…
March 2004: Singapore MRT Project

Examples of Major Claims…
April 30th 2004: Singapore MRT Project

Hull Wastewater Tunnel
Example of a Typical Tunnelling Claim

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Original Contract Value: £60M

Length of Tunnel: 10km

Therefore, cost per metre: £6,000 per metre

Length of damaged section in tunnel collapse = 150m

Therefore, approximate construction cost for this length
= 150m x £5,000 = £900,000

However, the insurance claim for reinstatement was
IN EXCESS OF £42,000,000

i.e. reinstatement cost was **4,667%** of the original Contract Value!

Examples of Major Claims…
2005: Pinheiros Station, Sao Paulo, Brazil

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Tunnel Losses (1994 - 2005)

Year	Project	Cause	Loss
1994	Great Belt Link, Denmark	Fire	US$33M
1994	Munich Metro, Germany	Collapse	US$4M
1994	Heathrow Express Link, UK	Collapse	US$141M
1994	Taipei Metro, Taiwan	Collapse	US$12M
1995	Los Angeles Metro, USA	Collapse	US$9M
1995	Taipei Metro, Taiwan	Collapse	US$29M
1999	Hull Tunnel, E. Yorkshire, UK	Collapse	US$55M
1999	TAV Bologna - Florence, Italy	Collapse	US$9m
1999	Anatolia Motorway, Turkey	Earthquake	US$115m
2000	Taegu Metro, South Korea	Collapse	US$24m

Tunnel Losses (1994 - 2004)

Year	Project	Cause	Loss
2000	TAV Milan-Bologna, Florence, Italy	Collapse	US$12M
2002	Taiwan High Speed Railway	Collapse	US$30M
2002	SOCATOP Paris, France	Fire	US$8M
2003	Shanghai Metro, PRC	Collapse	US$80M
2004	Singapore Metro, Singapore	Collapse	US$100M
2005	Barcelona Metro, Spain	Collapse	US$???
2005	Lausanne Metro, Switzerland	Collapse	US$???
2005	Lane Cove Tunnel, Sydney, Australia	Collapse	US$???
2005	Kaohsiung Metro, Taiwan	Collapse	US$30M
2005	Pinheiros Station, Sao Paulo, Brazil	Collapse	US$25M
20 Major Losses (17 costs) – Approximate Total Losses:			**US$600m**

Results of Insurers' Claims Analysis

- Tunnelling projects becoming uninsurable
- Size (cost) of Losses vs. Premium
- Reinstatement Cost vs. Original Construction Cost
- Size of Insured Claim vs. Insurer's Possible Maximum Loss (PML)
- Other findings arising from Insurers' Claims Analysis:
  ~ Quality Control Issues in tunnelling industry
  ~ inconsistent approach (of tunnelling industry) to Risk Management
  ~ Insurance industry did not query any of above issues
  ~ Extent of insurance cover provided

This was an unacceptable situation…

Something **had** to be done!

Insurers' Options…

Negative…

- Stop offering Insurance for tunnelling projects – some insurers withdrew completely from tunnelling
- Increase Insurance Terms…
  ~ increase premiums
  ~ increase deductibles
  ~ restrict insurance cover
- Tunnelling projects potentially becoming price prohibitive and uninsurable

Positive…

- Try to tackle problem issues and negative perceptions with a Code of Practice for Tunnelling
- Encourage good Risk Management and 'Best Practice'
- Work with UK Tunnelling Industry to develop a Tunnelling Code, which could then be 'exported' overseas
- Based on positive experience with the *Joint Code of Practice for Fire Prevention on Construction Sites'*.

Code of Practice Working Group

- **Association of British Insurers (ABI)**

  ~ Underwriters

  ~ Risk Engineers

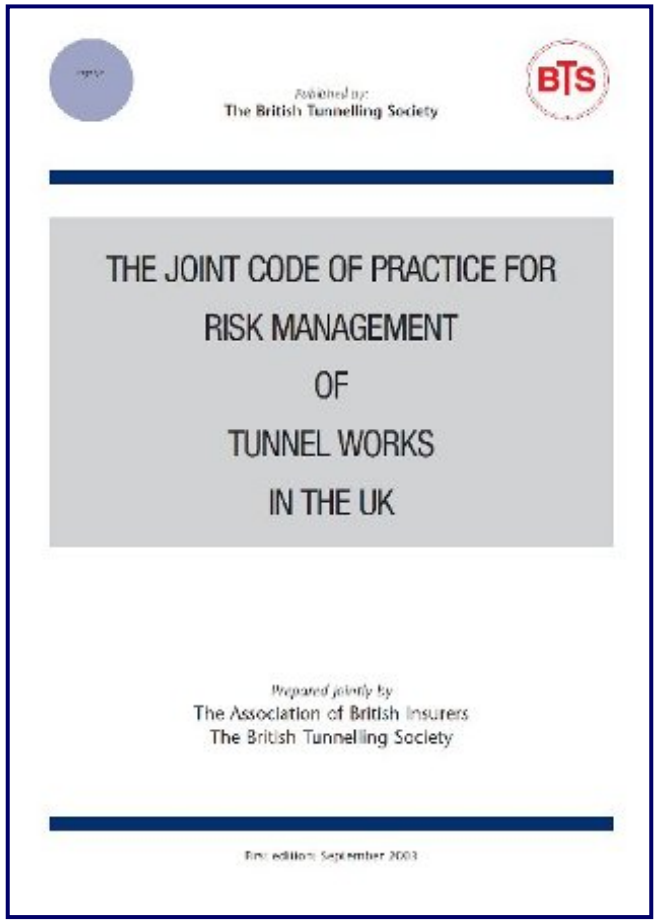
- **British Tunnelling Society (BTS) - Institution of Civil Engineers (ICE)**

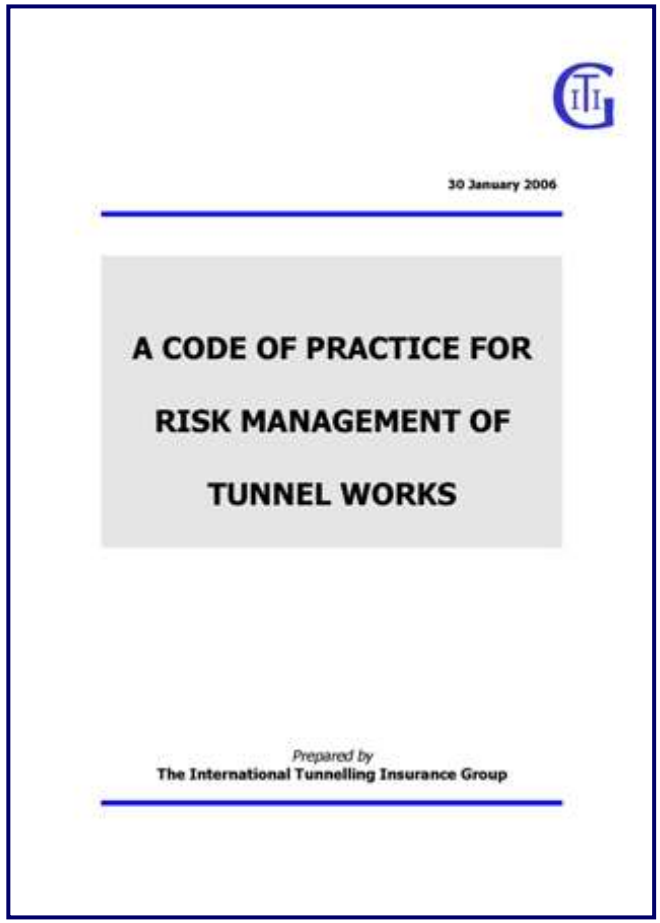
  ~ Tunnelling Contractors

  ~ Designers & Consultants

  ~ Health & Safety Executive (HSE)

The Joint Code of Practice for Risk Management of Tunnel Works





Implementation of the Code of Practice for Tunnel Works

- Code of Practice for Tunnelling is now used worldwide
  ~ Original (UK) version – produced jointly by the BTS & ABI.
  ~ 'International' Version – produced by ITIG

- Translated into several languages, including:
  ~ French, German, Spanish, Chinese & Russian!

- Links to download 'International' versions of Tunnelling Code
  ~ IMIA web site at www.imia.com
  ~ CIREG web site at www.cireg.org

Effectiveness of the Code

- Tunnelling remains insurable!
- Lower frequency and severity (cost) of tunnelling claims
- Code of Practice for Tunnelling now accepted throughout UK and many parts of the world
- Compliance with Code is Condition of all UK policies for tunnelling and most major international tunnelling projects
- ITIG (international) version of the Code adopted by ITA and international Clients, e.g. MTA Singapore

Effectiveness of the Code…
Encouraging Best Practice in Tunnelling

- Risk Sharing
- Risk Retention
- Baseline Ground Conditions
- Risk Management Procedure
- Risk Registers

Future Development of the Code

- General updates to UK and International versions
  ~ resolve USA/North American issues?

- Involving Brokers in development of revised Codes
  ~ early involvement with Clients
  ~ early involvement with Designers & Consultants
  ~ ensuring wider acceptance in insurance market

- Development of UK & International Code of Practice for Construction
  ~ based on Code of Practice for Tunnelling
  ~ general risk management core
  ~ annexes/modules for specific operations…
  e.g. piling, earthworks, roads, rail, bridges, dams, etc.

Projects Insured using the New Code of Practice for Risk Management…

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  now Head of Underwriting, Royal & Sun Alliance Singapore

- Construction Insurance Risk Engineers Group (CIREG)
  www.cireg.org

- International Association of Engineering Insurers (IMIA)
  www.imia.org

- International Tunnelling Insurance Group (ITIG)

Thank you

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