Continuous Monitoring of Longwall Undermining

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Lynton Surveys

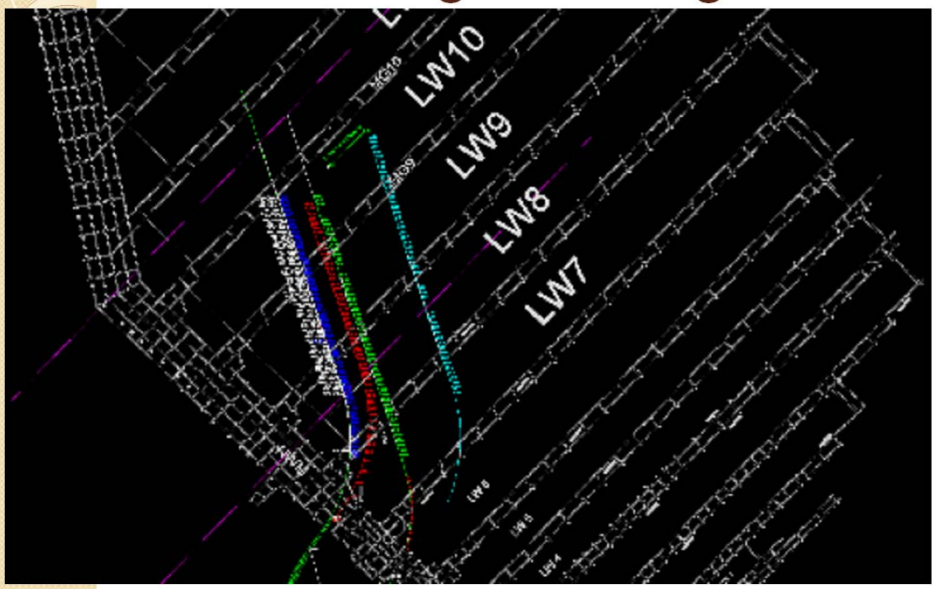
FS 4D – Landslide and Subsidence Monitoring II
FIG 2010

Who Am I? Who Are We?

- Steven Garlinge
- Geomatic Engineering (2000) Hons I UNSW, Sydney

- Lynton Surveys
- Sydney based survey company
- Specialising in:
  - Tunnelling
  - Automation
  - Monitoring
  - TBM, Roadheader and Mining Guidance Systems

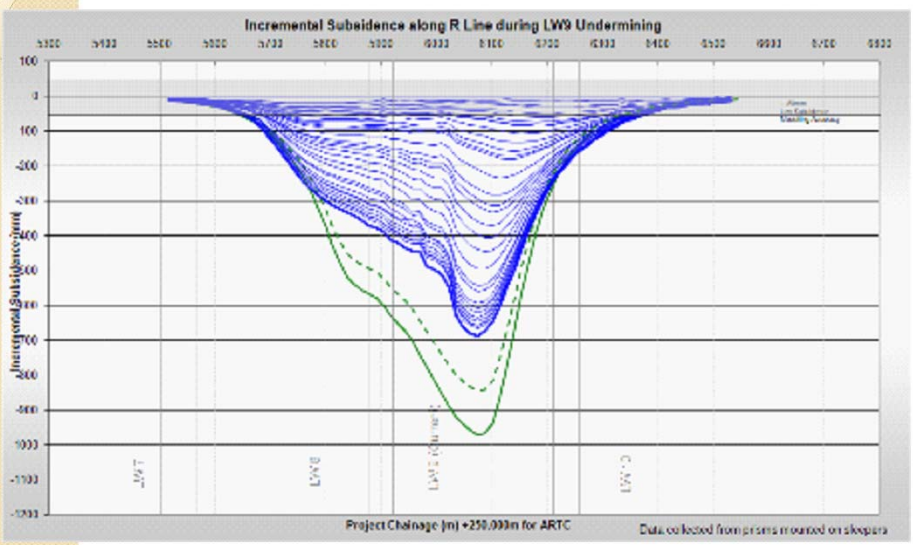
What is Longwall Mining?



The Effects of Longwall Mining

- Subsidence – up to 700mm at the centre of 1km wide 'area of influence'
- Strain – Changes in length of ground of up to 2mm/m
- Tilt – As subsidence is not uniform, changes in tilt (curvature) are measured

The Effects of Longwall Mining



Project Scope

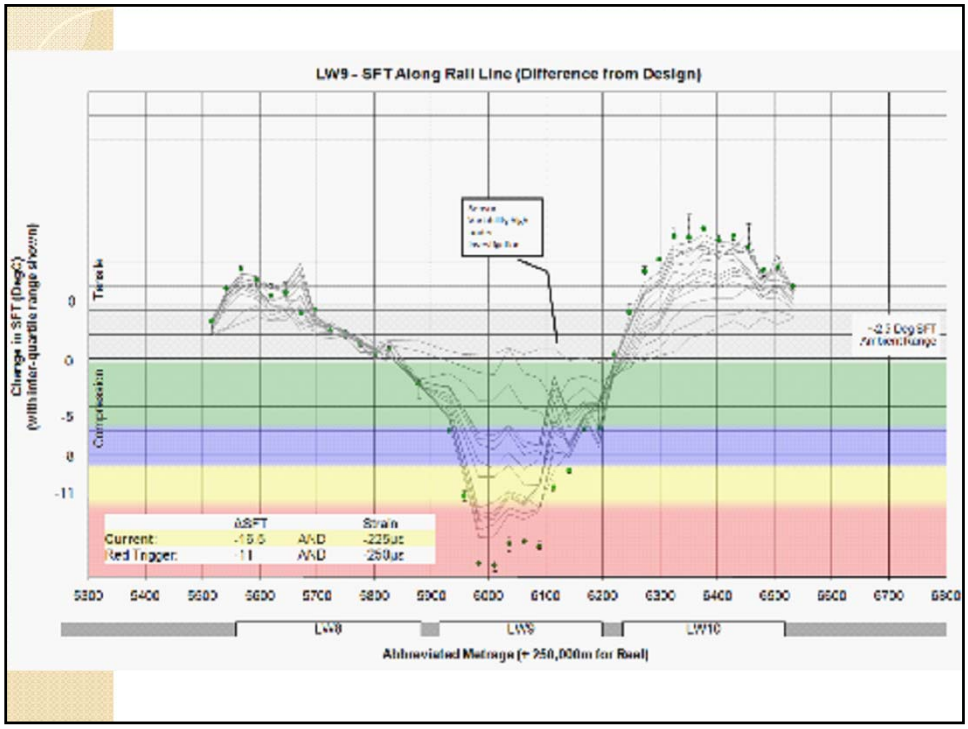
To monitor data suitable for the purposes of:

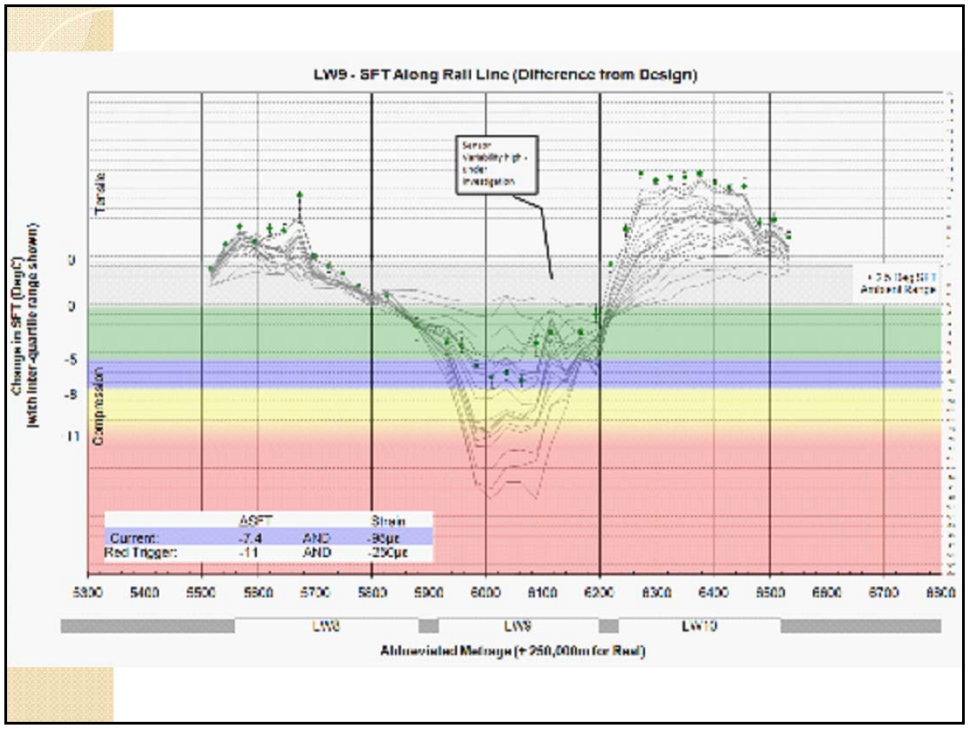
- Gathering a knowledge base to apply to future longwalls
- Refining monitoring techniques (minimising) and management systems
- Keeping trains running safely and not interrupting mining activities

How Did We Do It?

Supplemented traditional longwall monitoring techniques with hardware suitable for continuously monitoring the railway (stress and geometrical parameters)

Designed systems, software and processes to facilitate continuous capture, calculation and analysis of data


LW9 - SFT Along Rail Line (Difference from Design)
Change in SFT (DegC)
(with inter-quartile range shown)
Tensile
Compression
0
-5
-8
-11
ΔSFT
Strain
Current:
-10.6
AND
-225με
Red Trigger:
-11
AND
-250με
5300
5400
5500
5600
5700
5800
5900
6000
6100
6200
6300
6400
6500
6600
6700
6800
LW8
LW9
LW10
Abbreviated Metage (+ 250,000m for Real)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Tensile
Compression
0
-5
-8
-11
ΔSFT
Strain
Current:
-7.4
AND
-165με
Red Trigger:
-11
AND
-250με
5300
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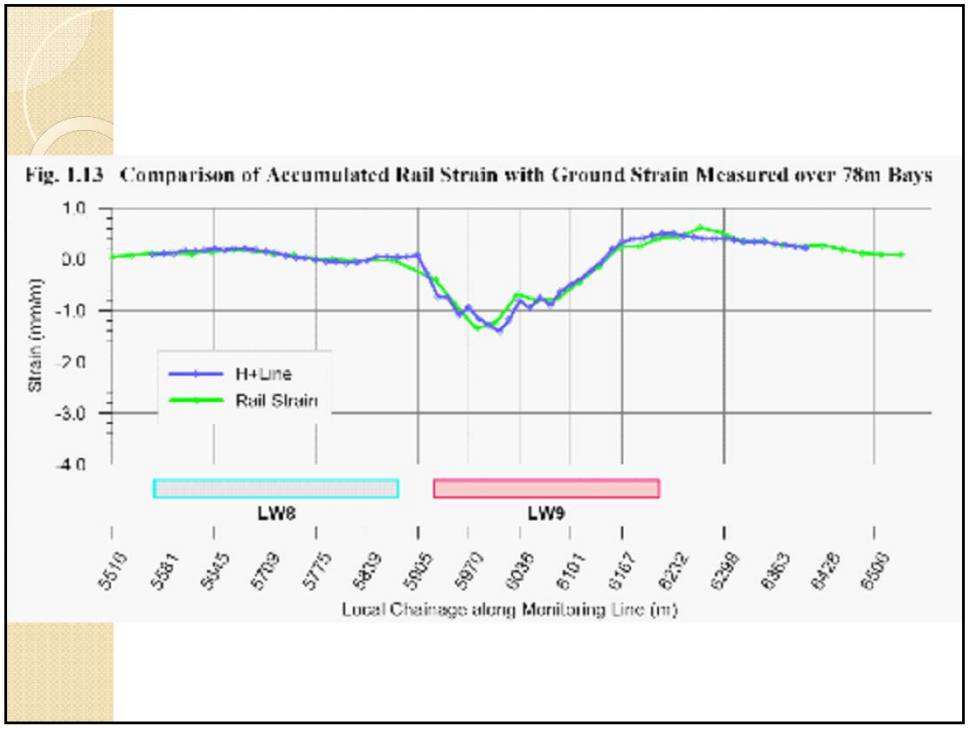

Conclusions

- Highly Successful project, combining multiple technologies:
  - Traditional Survey measurements
  - Alternative measurement technologies
  - Communications – GSM etc
  - Web data access

Conclusions

- Reinforced, to me, the changing role of the Geomatic Engineer

…more precisely:

How the Core Competencies of our profession, (and our organisations) can be leveraged in new ways to support engineering and industry