

The Practical Applications of System Dynamics to Identify System Specific Maintenance Strategies.

John McLuckie, Director International System Dynamics Pty Ltd

Mark Heffernan, Director International System Dynamics Pty Ltd

Trevor Armstrong, General Mgr Business Development Energy Australia

ithink@mail.mpx.com.au

This paper outlines 3 case studies where system dynamics feedback modeling (SDFM) was used to:

- develop maintenance strategies;
- gain significant commercial advantage; and
- improve system performance.

Case Study No. 1 - maintenance of Water Pumping Stations. Strategies were identified for maintaining water pumping stations within the Sydney Metropolitan region that were then used to successfully tender for this work. Issues identified included creation of work backlogs, flexible working arrangements, multi-skilled teaming arrangements and strategies for reducing lost time associated with travelling.

Case Study No. 2 - proposed Direct Reduction Iron Plant. The SDFM approach was used to predict probable production (for financial closure) from a proposed \$1.5 Billion DRI plant. The model took into account all factors likely to impact on production, including "random" and cyclical events (such as environmental impacts, tides, reliability of services, scheduled and unscheduled maintenance, buffer capacities and shipping capacities and cycles). The Model was used to determine probable production over a 30 year design life for various plant configurations and maintenance strategies.

Case Study No. 3 - power pole replacement. Energy Australia maintains a population of approximately 100,000 timber electrical power poles in the Sydney Region. SDFM was used to determine strategies for improving the efficiency of removing and replacing defective poles. This approach identified, amongst other things, that:

- collapsing the cycle time; and
- using work backlog as a KPI

resulted in reduced productivity. Strategies were developed and local rules implemented that resulted in increased production (200%) and reduced unit costs (35%).