



## **Truck Dispatching in Open-pit Mining: A Decision Making Application**

**Prof. Guilherme Sousa Bastos**

**Short Course:** 25 August 2013; 9h – 17h;

Hyatt Regency Mission Bay Spa & Marina, San Diego, California, USA

Truck dispatching is an important issue to be tackled in the Open-Pit Mining Area because of the costs of material transportation, which can represent up to 60% of operating expenditure in realistic settings. The problem usually involves a truck dispatching system in which decisions on truck assignments and destinations are taken in real-time. Due to its significance, several decision systems for this problem have been developed in the last few years, improving productivity and reducing operating costs. As in many other real world applications, the assessment and correct modeling of uncertainty are crucial requirements as the unpredictability originating from equipment faults, weather conditions, and human mistakes, can often result in truck queues or idle shovels.

This course presents a methodology based on the Markov Decision Process (MDP) to model and solve the truck dispatching problem in open-pit mining. Additional models are presented, with their results compared in order to evaluate their performance in the discussed problem.

### **Who Should Attend**

This course would be beneficial to corporation and mine managers, engineers, technologists, researchers and students involved in the development, implementation, and control of truck dispatching systems or other real-time decision making related problems.

### **Course Outline**

The participants taking this course will improve their knowledge in the truck dispatching problem applied to open-pit mining, and they will be able to discuss as well as propose new strategies for improving daily results (e.g. maximizing the tonnage material transported during a shift). Additionally, the participants will learn a powerful decision making method (the MDP), which can be used to model and solve the truck dispatching problem, and any other sequential stochastic decision problems.

At the end of the course the participants will acquire these specific skills:

- Model the truck dispatching problem in a reduced open-pit mine:  
The course will present a simplified truck dispatching problem, which will be modeled using the MDP theory.



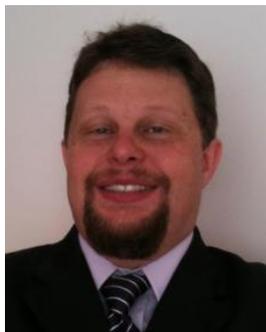


- Identify the main objectives of the truck dispatching problem in open-pit mining: The productivity and quality policies applied to the objectives of the truck dispatching problem will be presented. Comparisons between both policies will be made to explain their use in day-to-day mining.
- Use the MDP to model decision making problems: Decision making problems will be presented and modeled using the MDP. Results will be shown by constructing the models and running the MDP using Matlab.
- Evaluate the size of a discrete problem and avoid the curse of dimensionality: Discrete systems models suffer from the curse of dimensionality. This characteristic will be presented as well as how to avoid it.

### **The participants will also receive**

- CD with course material
- Certificate of completion
- A copy of instructor's recently published articles related to decision making
- Lunch and refreshments

**Course Instructor: Guilherme Sousa Bastos, PhD, MSc., Eng., Assistant Professor of Federal University of Itajuba, Brazil**



Brazilian Electrical Engineer (2001) and Master in Electrical Engineer: Automation Area (2004) at Federal University of Itajubá. PhD in Electronic and Computer Science (2010) at Aeronautics Institute of Technology, with a period (6 months) at Australian Centre for Field Robotics (ACFR). He is Assistant Professor at Federal University of Itajubá since 2003 in Automation and Intelligent Robotics area. His research concerns: Intelligent Robotics, Decision making applied to real world problems, Discrete event systems modeling using Automata and Petri Nets, Supervisory Control, Industrial automation, Electrical systems automation, and Thermography applied to substations. Prof. Guilherme is advisor of PhD, Masters, and undergraduate students. He works in Research and Development programs with several companies and research foundations, such as Furnas, EDP, and Fapemig. Some researches concern Decision Making applied to Cooperative robotics, Robotics competition, Mining, Business Intelligence, Thermography procedures, Corona Effects, and Transformer Oil Analysis. Many courses are given to companies by Prof. Guilherme, such as: Programming Logic Controllers, Instrumentation, Hydraulics and Pneumatics, Robotics, and Thermography; some companies are: Petrobras, Furnas, Vale, CSN, Eletronuclear, etc.

**REGISTRATION:** <http://www.flogen.org/MMM2013/registration.php>

