

**Visibility Assessment and Knowledge Transfer for Mobile Vehicles**

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Dr. Paul Dunn spent some years lecturing and consulting to the mining industry with Curtin University in Western Australia. Following completion of his undergraduate degree, Paul spent 7 years in the South Africa Gold mining industry where he was in mine production, research and development.

Dr. Dunn is currently an Associate Professor with Laurentian University's School of Engineering, the Chair in Mining Technology and the Graduate Coordinator for the School of Engineering. At MIRARCO's Centre for Mining Technology, Paul is focusing his research on water-jet technologies and virtual reality applications in health and safety, training and developing long term mine planning tools.

### **Problem under Study**

Laurentian University, in partnership with the Mines and Aggregates Safety and Health Association (MASHA), has been examining visibility issues associated with the operation of mobile equipment since 1999. The research team at Laurentian has made use of state of the art computer simulation and virtual reality technology in order to improve the project assessment methods but to also help in transferring the project results to multi-disciplinary groups and the wider community.

### **Objectives**

Laurentian University opened a state of the art Virtual Reality Laboratory (VRL) in 2001 and has utilized this for transferring complex spatial information to various interest groups in the safety and health area. With the linking of these VRL facilities around Ontario and Canada in the future, the technology will become more available to a wider audience and the synergies between various safety research groups efforts exploited further.

By examining visibility of Load-Haul-Dumps (LHD's), assessments can be made, equipment modifications suggested and then examined in 3D in Laurentian's VRL. It is also hoped that a standard for quantifying the most important areas for visibility around an LHD can be created and adopted by the mining equipment industry.

### **Methods**

In order to examine LHD visibility issues, the visibility profiles of the LHD model are created from laser scanned data or from a 3D model. These visibility profiles are modeled in 2D and 3D (using recently developed visibility assessment techniques at Laurentian University) and then analyzed. The results can then be used to identify components on the LHD that, when modified, have the potential to improve the LHD operator's line of sight.

In addition to the use of VRL's, virtual reality software (VR.. eg. Jack and Blender) on PCs utilized at Laurentian University have aided in the analyses of research data within several of the projects investigated to date. As training is often an important outcome from research findings, a fully interactive game has been designed around the visibility research projects in order to allow the results to be experienced in an interactive way.

## **Results**

Recently, 2 mobile equipment companies made use of visibility assessment methods conducted on new LHD vehicles. Some visibility improvement suggestions have already been made and incorporated into the LHD design.

## **Conclusions**

Embracing new computer technology and working closely with safety associations and industry has helped significantly with the transfer of WSIB visibility project results and in facilitating the adoption of research based services. Using computers for knowledge transfer is also important when transferring complex visibility information to stakeholders.