



This is a copy of the HNSA submission to our Golden Boot Award by Jamie Quartermaine. It is a novel and excellent lateral thinking approach to assist quality control on concrete paving. When the enhancements are completed, it may be fitted to all our pavers.

### **Hume Highway Southern Alliance Quality Area Nomination**

#### **“PAVER CCTV CAMERA SYSTEM”**

##### **Summary**

With the goal of continuously improving Abigroup’s concrete pavement rideability quality in mind, Hume Southern Alliance implemented the paver-mounted camera system. This involved the fitting of state of the art “Mobotix” cameras to one front leg and one rear leg of the CMI 6004c paver. These cameras, commonly used in the security industry in closed circuit television (CCTV) provide both real time and stored footage of the paving operation on a daily basis. After successfully running the cameras on Southern Alliance, the team even arranged for the camera equipment to be temporarily installed on the Karuah to Bulladelah project paver to enable the system to be trialed on another Abigroup project.

##### **Why?**

In recent times, Abigroup has placed a significant focus on improving the quality of concrete pavement rideability (or roughness). With the introduction of the California profilometers to Abigroup in 2007, pavement roughness indications have been able to be obtained on a daily basis and that critical information then fed back to field personnel for continuous improvement. However, not all pavement roughness anomalies are able to be explained by profilometers nor detailed field/engineer daily records. So, in an effort to progress this quality control process further than ever before, Southern Alliance trialed and then procured the Mobotix camera system. This had never been undertaken before.

##### **How Does it Work?**

The Mobotix cameras are mounted on both the front and rear paver legs and are designed to power up whenever the paver master power is engaged. They are powered using a 24V output from the paver engine. The cameras are completely weather resistant and have actually been used previously in Antarctic research.

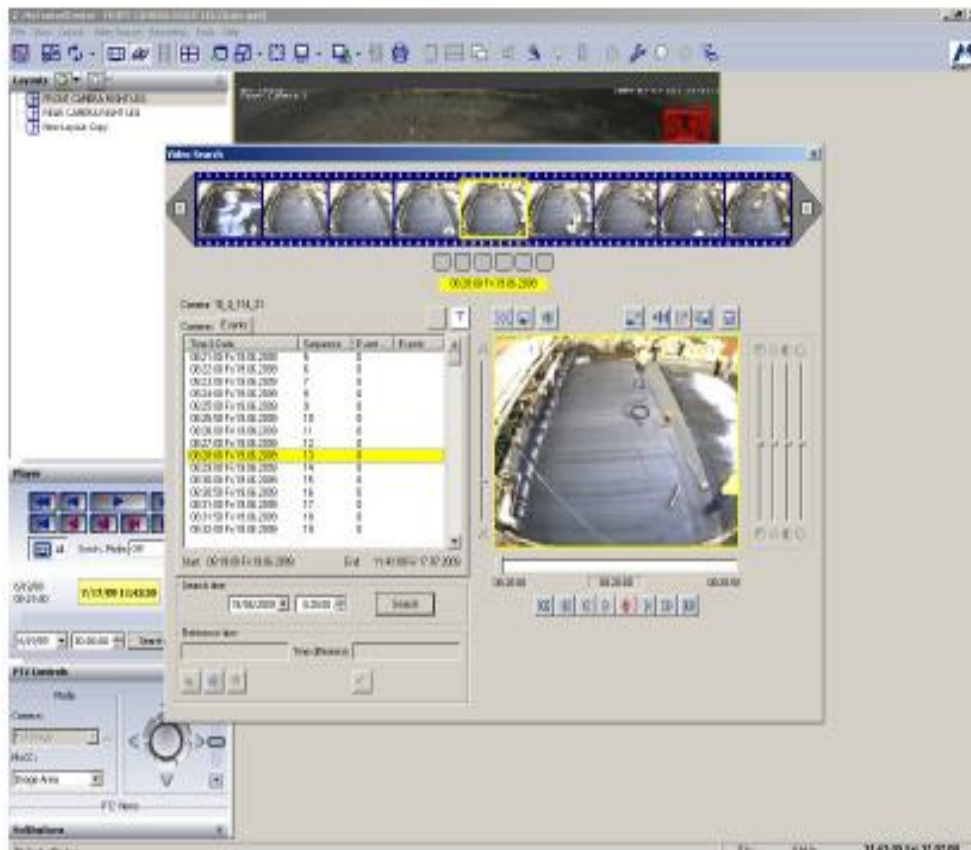


Footage from the entire day is then stored on a Network Storage Device (NAS) which is contained in a communications cabinet mounted on the paver. The NAS is a data storage server (essentially) and data collected on it can be downloaded to PC or laptop when required.



### Viewing the Output Footage

Viewing the captured footage is fundamental to the improvement of ride quality. The footage is able to be viewed using the Mobotix MxCC software. This software enables the footage to be sorted and manipulated. Footage from any point during the day can be easily located using the time sort function. Tools such as panning and zoom enable detail to be viewed in high resolution.





View from front leg camera



View from rear leg camera

#### **Benefiting from the Footage to Improve Roughness Quality**

The paver CCTV footage can help to better understand the anomalies that contribute to pavement roughness. This understanding can then be used to try to eliminate and/or reduce contributing factors with the overall goal being to continuously improve pavement roughness quality. This provides benefits to both client and constructor.

For instance, when a rough area of pavement has occurred and a review of all of the daily field traceability records/observation records has shown no discernable reason as to why, the camera can be used to assist. Some specific examples of factors that have been difficult to qualify with tangible records are:

- Frequency of personnel walking across the float pan to access plant/fresh concrete;
- Personnel winding the paver up and down to adjust level;
- Bumping/knocking of the stringline sensors;
- Size of the concrete head volume in front of paver;
- Auger rotation direction and frequency of use.

Now, with the use of the cameras and the camera records, all of these factors are now able to be investigated at any point of any day.

The assessment procedure used can be summarised as follows:



1. Locate rough area of pavement using profilograph output;



2. Consult all field records, observations and personnel;



3. If no answers are apparent, use field record to locate the time that the concrete in question was paved;

CONCRETE POUR RECORD - PA'

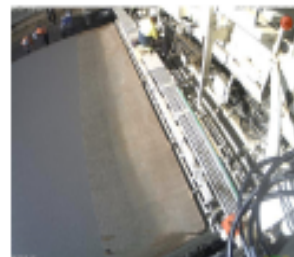
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| 100     | CONCRETE | PA'      | 100     | 10000     | PAID       | 10/10/10  | 10/10/10 | 10/10/10 | 10:00    | 10000    |
| 101     | CONCRETE | PA'      | 100     | 10000     | PAID       | 10/10/10  | 10/10/10 | 10/10/10 | 10:00    | 10000    |
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4. Find this time period in the paver CCTV footage files;



5. Review the footage at both the front of the paver and rear to determine possible causes;



6. CONTINUOUS QUALITY IMPROVEMENT.....  
Rectify for the next day's paving or take measures to prevent future occurrences!

## **Further Development Plans**

To build upon this innovation some additional camera features are planned for during the Hume Highway Woomargama Alliance:

GPS - It is intended to incorporate a "running distance" and "chainage position" display to the camera output footage. Rough areas of pavement will then be able to be correlated even more accurately to the location at which they occurred.

LED Indicator Display - It is intended to set up an indicator display on the camera output footage that will correspond to any manual adjustments that personnel make to the level winders on the paver. Whenever personnel wind the paver up or down, a coloured light or text will appear in the top corner of the frame and remain there until the winding ceases. As this is a difficult factor to monitor normally, it is hoped that this feature will provide a great tool to determine if any correlations exist between winding and areas of rough pavement.