

## 7. Development of an Evaluation Method of Wet Conditions on Concrete Slabs - Building a System Incorporating Optical Sensors and Autonomous Mobile Robots -

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Maintaining optimal moisture conditions on the surface of concrete slabs after pouring and finishing helps prevent surface cracking and other problems; this is a critical factor in construction quality management. However, surface conditions are often judged by visual inspections alone; accurate quantitative judgments are often difficult to make. In the study reported here, we developed an evaluation method based on circular polarized light in the near-infrared region to perform quantitative evaluations of surface conditions. We confirmed the effectiveness of this method under conditions of multiple experimental parameters. We confirmed that the values measured by this method correlate with changes on the slab surface. Setting thresholds for these measured values allowed evaluations at three stages: wet, semi-dry, and dry.

We mounted a device equipped with these sensors on an autonomous mobile robot and deployed this as part of a construction project involving a floor slab area of 860 m<sup>2</sup>. The system allowed discrete and quantitative evaluations as the robot remained in motion. Including the optical device, autonomous robot, and visualization unit, the system thus developed allowed the visual representation of the surface drying process on a color map within just 20 minutes.

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