Florida Department of Transportation Research

Redesign of FDOT State Materials Office (SMO) Testing Standards
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The core of laboratory work is recordkeeping. Whatever tests are being conducted, notes will be made of sample numbers, methods applied, responsible personnel, and any number of readings of testing devices.

One source of lab error is the transcription error. Omitting a digit, misplacing a decimal point, or transposing numbers could result in recording a false value, which could distort calculations and lead to erroneous results. Current FDOT standards require digital readouts of lab devices to be recorded manually, used in computations, and then entered by hand into a central database. Even at low error rates, these requirements create many chances for transcription errors.

In this study, University of Florida researchers were tasked with finding ways to reduce transcription errors in Florida Department of Transportation (FDOT) labs through laboratory automation, ensuring integrity of procedures and results. FDOT requested guidance on transferring data from testing equipment to their Laboratory Information Management System (LIMS) based on practices used at the most scrupulous labs.

Lab errors have been investigated extensively in the health care industry. Other labs that might provide comparison were identified. Lab procedures at the Federal Bureau of Investigation, the Tampa Police Department, and the Food and Drug Administration were investigated. Relevant literature was reviewed in the areas of extent of transcription errors, interfacing analytical instruments with systems like LIMS, and methods and equipment for collecting data. The Geotechnical Laboratory of the California Department of Transportation was the basis of a case study of a transportation lab that has implemented automated testing.

With this background, the researchers investigated FDOT's State Materials Office (SMO) as an example of a facility that could benefit from lab automation. SMO's digital balances served as often-used digital testing devices — most tests require a weighing at some point. The researchers produced a schematic layout for each SMO lab, including balance locations. The project goal was only to examine the feasibility of automated data collection; implementation will require careful planning so as not to interfere with work at the SMO. Therefore, the researchers limited their efforts to determining what upgrades or programming would allow existing devices to communicate to LIMS. Some balances were linked to computers to fully explore these issues.

Automatic data entry could improve the integrity of results from this lab at the State Materials Office.

Results showed that automation at the SMO is feasible, but programming such a system may be complicated by command differences between scales and between different test procedures. A budget was prepared to reflect upgrade requirements. Data were insufficient to determine testing integrity; researchers made recommendations about collecting information to support this analysis in the future.

Taking the next step in integration will make FDOT's testing labs more efficient. Results and the planning decisions that are based on them will be more timely and accurate.

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