Support for Caltrans Statewide MTLS System Usage

Deployment support of Caltrans MTLS systems usage throughout California with training and pilot studies for surveying and other geospatial applications.

WHAT IS THE NEED?

The California Department of Transportation (Caltrans) acquired two Mobile Terrestrial Laser Scanning (MTLS) systems: Trimble MX8 and Riegl VMX-1HA. Maintaining a trained pool of Caltrans professionals to manage two different MTLS systems and process the data from either system remains an on-going challenge. Continued successful MTLS deployment requires MTLS operation and data processing skills, as well as keeping personnel modernized and proficient. With project delivery as the primary role, district surveyors currently experience significant limitations in resources for peer/mutual support and system maintenance and upgrades after the Trimble MX8 maintenance agreement expired.

Caltrans needs a Geospatial Technology Proving Ground (GTPG) to verify mobile mapping data from vendors or other geospatial technology platforms elsewhere in the Department. Without a GTPG, Caltrans cannot calibrate and verify system performance before system acceptance or after component changes and lacks any basis to determine whether any new equipment or third-party data meets Caltrans' design specifications and requirements. Also, Caltrans requires additional MTLS training and deployment support for escalating MTLS operations as current MTLS personnel promote or retire. Caltrans will need new resources and materials for in-house training, education and outreach, and updates to manuals and procedures on emerging MTLS applications for virtual design construction, digital highways, and transportation asset management.
WHAT ARE WE DOING?

This research supports deploying the MX8 and VMX-1HA MTLS systems on Caltrans’ survey projects. The project’s first task entails a brief literature review of current MTLS research in private, educational, survey journal, trade publications, and government institutions. Also, this task includes researcher engagement in MTLS-related webinars, Caltrans Survey Management Board meetings, and Caltrans MTLS user meetings. The next task involves continued deployment support for both Caltrans MTLS units. In addition, the research team plans to support Caltrans in training its personnel and updating documents on MTLS operations.

Besides providing MTLS equipment usage support, the research involves supporting Caltrans Office of Land Surveys’ (OLS’) statewide MTLS data management effort and its associated Information Technology infrastructure deployment. The researchers anticipate integrating external sensors, such as Ground Penetrating Radar, with the MX8 unit. The next task entails establishing a GTPG for calibrating MTLS systems and verifying varieties of geospatial data.

WHAT IS OUR GOAL?

The goal of this research is to provide MTLS operator and post-processing training for new MTLS Caltrans personnel, along with refresher training for existing personnel. In addition, the research will provide education and outreach, ongoing MTLS deployment support, and new MTLS pilot studies in support of the Caltrans Geospatial Strategic Direction and OLS’ leading role in the creation, management, and visualization of geospatial data.

WHAT IS THE BENEFIT?

Caltrans will continue to expand the benefits and value of geospatial survey data as the foundation of the transportation system. In addition, Caltrans will obtain a GTPG that will enable the Department to improve its capabilities and capacities of geospatial data. In particular, the GTPG potentially enables Caltrans to increase the spacing of MTLS control points, which would improve the safety of personnel and California motorists. Also, the GTPG would lead to future research on optimal target spacing, registration of uncontrolled point clouds, and other emerging geospatial techniques and technologies.

WHAT IS THE PROGRESS TO DATE?

The research started with the Advanced Highway Maintenance and Construction Technology (AHMCT) research team on January 2, 2018. Since then, AHMCT initiated an MTLS literature review and participated in Caltrans MTLS end user peer-to-peer meetings. Furthermore, the researchers support the deployment efforts for usage of the MX8 and VMX-1HA MTLS systems in California.

In collaboration with AHMCT, Caltrans OLS updated Chapter 15 of the Caltrans Survey Manual, published the manual on the OLS web site in June 2018, and finalized the Caltrans MTLS Data Management Plan (MTLS Guidelines, Chapter 7). AHMCT completed the District-to-OLS data transfer instructions document. AHMCT continued designing the Ladybug 5+ camera mount and cover and developed a plan for integrating the Ladybug 5+ camera to the MX8 system. Also, AHMCT revised the draft GTPG plan based from OLS’ feedback and developed a GPS survey plan.