SMARTOIL-M™ SERIES TECHNOLOGY OVERVIEW

logilube.com

M-UNITS

AUTONOMOUS LIVE SAMPLING

The **SmartOil-M™ Series** of automated fluid samplers from the LogiLube line of condition monitoring technology solutions is suitable for safely collecting LIVE fluid samples, such as engine oils and hydraulic fluids, from operating equipment i.e. mining haul trucks and excavators, in accordance with Elimination of Live Work (ELW) policies.

The fluid sample collection interval period can be programmed by the user for an automated, hands-free sample bottle fill event ensuring that reliable, contaminant-free, in-service fluid is collected from LIVE equipment on time, every time. The sampling process can be initiated in several modes: Manually-remote (via companion wireless mobile app), Manually-local (via integrated user interface panel), Autonomously (per scheduled calendar-time or machine-time), and by Exception (per pre-programmed set of rules, limits, thresholds, etc.).

M-Series hardware enables sampling a wide range of fluid types including:

- Engine Oil
- Transmission Fluid
- Hydraulic Fluid
- Steering Fluid

- Brake Fluid
- Differential Fluid
- Gearbox Oil
- PTO Oil

- Final Drive Oil
- Diesel Fuel
- Coolant

HARDWARE FEATURES

SmartOil-M installation on hydraulic excavator

Connectivity

- Wireless connection to iOS application over long range Bluetooth®, 19 dBm, 1000 ft (305 m) line of site range
- Wired connection over CAN (SAE J1939), RS232, or RS485 interfaces
- Low bandwidth data transfer, 30-sec interval
- Bluetooth® bridge to WiFi or cellular networks
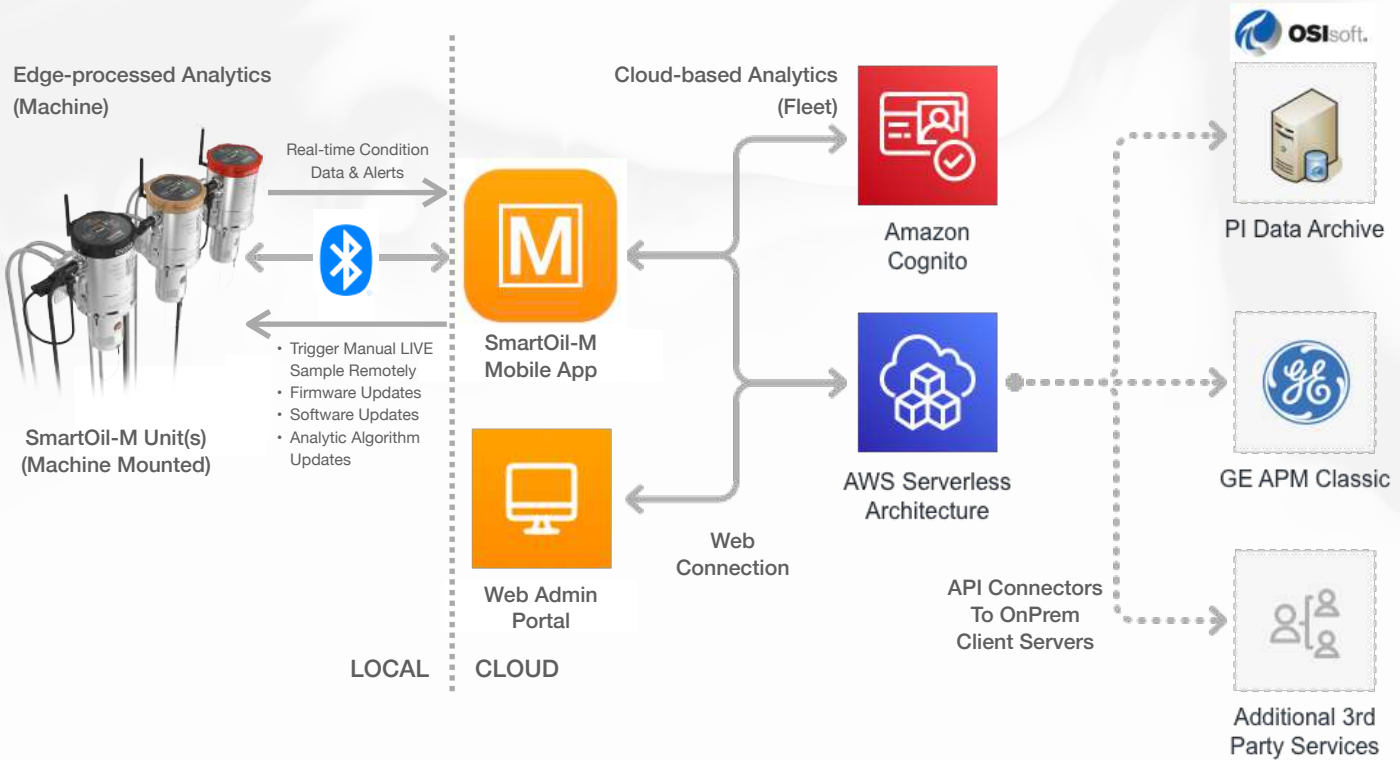- Wired connection to client networks

Additional Features

- Powerful ARM edge-processor
- Local memory storage for minimum 2 years of sample event data and real-time sensor data logs
- Robust, IP67 rated machined aluminum design for use in harsh environments
- Integrated physical oil sample bottle receptacle (38x400 neck)
- Meets FCC Part 15 Rules
- Certified EMC compatible per EN 301 489-1, EN 61000, CE, AU RCM

PLATFORM ARCHITECTURE

Edge-processed Analytics
(Machine)

Real-time Condition
Data & Alerts

SmartOil-M Unit(s)
(Machine Mounted)

- Trigger Manual LIVE
  Sample Remotely
- Firmware Updates
- Software Updates
- Analytic Algorithm
  Updates

SmartOil-M
Mobile App

Web Admin
Portal

LOCAL   CLOUD

Cloud-based Analytics
(Fleet)

Amazon
Cognito

AWS Serverless
Architecture

Web
Connection

API Connectors
To OnPrem
Client Servers

OSIsoft.

PI Data Archive

GE APM Classic

Additional 3rd
Party Services

PLATFORM OVERVIEW

LogiLube **SmartOil-M Series** devices communicate with the cloud by connecting via Bluetooth® to nearby mobile devices running the companion SmartOil-M Mobile App. The cloud uses REST micro-services to allow mobile and web users to interact with transactional data, view reports, and interact with 3rd-party SaaS business applications.

The backend application runs in an Amazon AWS serverless infrastructure with various integration points for potential data extraction. New API integrations can be made available upon request. However, GE APM Classic and OSIsoft PI are in the current roadmap.

The system is designed for advanced data analytics, machine learning, artificial intelligence and predictive analytics so that quick decision can be made about machine health based on consistent reliable data. The platform continues to evolve to improve end user decision making and extend the useful life of machinery.

PLATFORM ARCHITECTURE

HOSTING

The LogiLube SmartOil-M Series Cloud is hosted in an Amazon AWS datacenter with a serverless architecture and built in high availability. This platform is Software as a Service (SaaS) and does not allow for the ability to host on premise at client sites. Data can be extracted to client internal system with API integrations upon request. The platform inherits the AWS security standards and compliance certifications including PCI-DSS, HIPAA/HITECH, FedRAMP, GDPR, FIPS 140-2, and NIST 800-171, helping satisfy compliance requirements for virtually every regulatory agency around the globe.

DATA

Fluid sampling event data and fluid condition data from optional IIoT sensors reflecting the health of the fluids being sampled is logged by the edge-processor every 30 seconds and stored locally in non-volatile memory. When an internet connected iOS device is connected via Bluetooth®, the mobile app collects the logged data and ports it to the AWS backend system to be viewed through a web interface, iOS app or raw data interface. Data stored in the LogiLube SmartOil-M Series AWS Cloud can be migrated to user system upon request using an API integration or subscriber model.

PLATFORM SECURITY

The LogiLube SmartOil-M Series Cloud platform follows industry standard IoT security protocols using AWS serverless architecture. Data transport is encrypted at all times and any system access requires authentication. The authentication system itself ensures encryption of data-at-rest and in-transit and is SOC and ISO 9001 compliant. The authentication system allows for future social and identity federation using Google, Amazon or Microsoft Active Directory as examples as well as MFA and SSO.

M-SERIES SOFTWARE
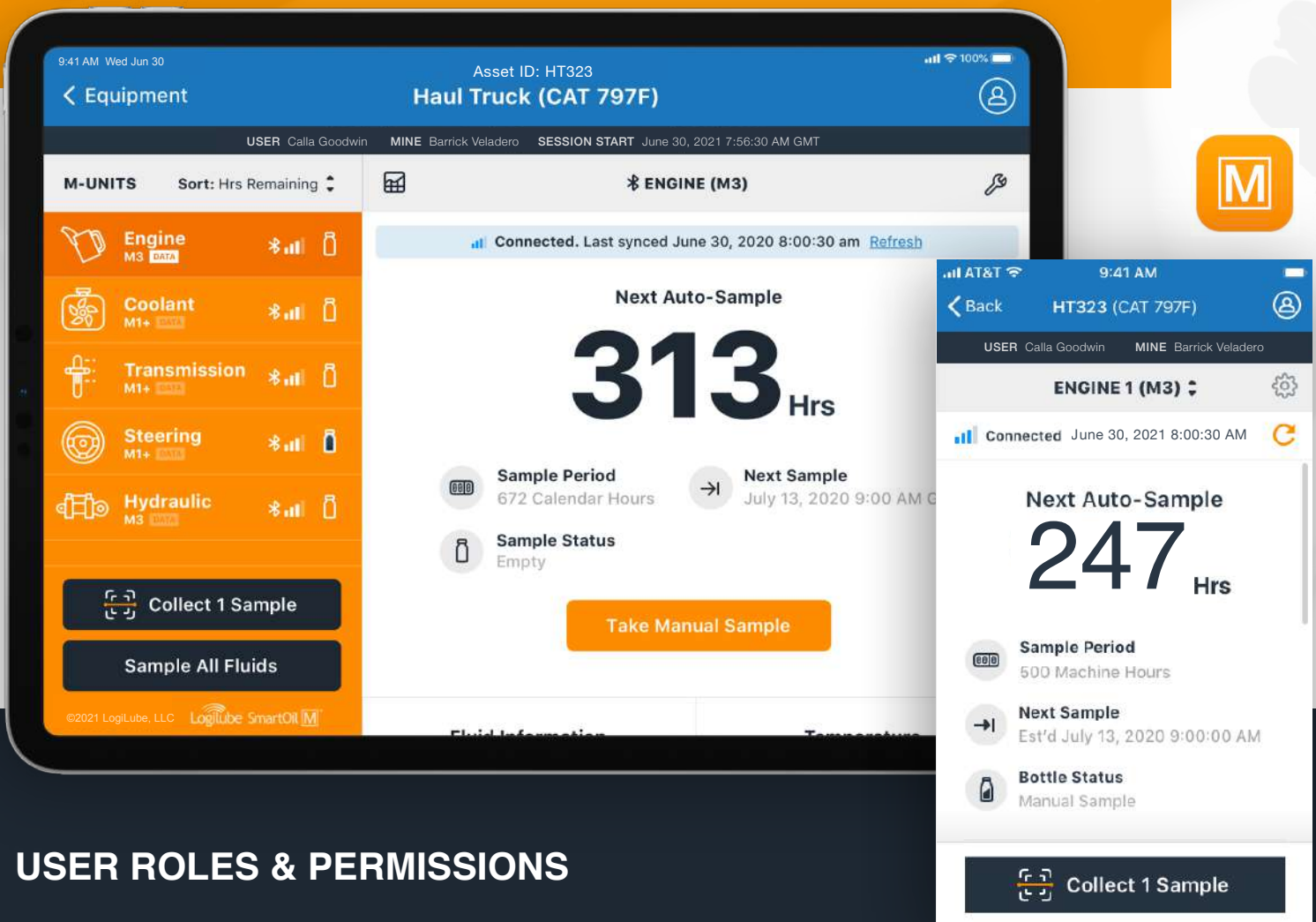
MOBILE APPLICATION
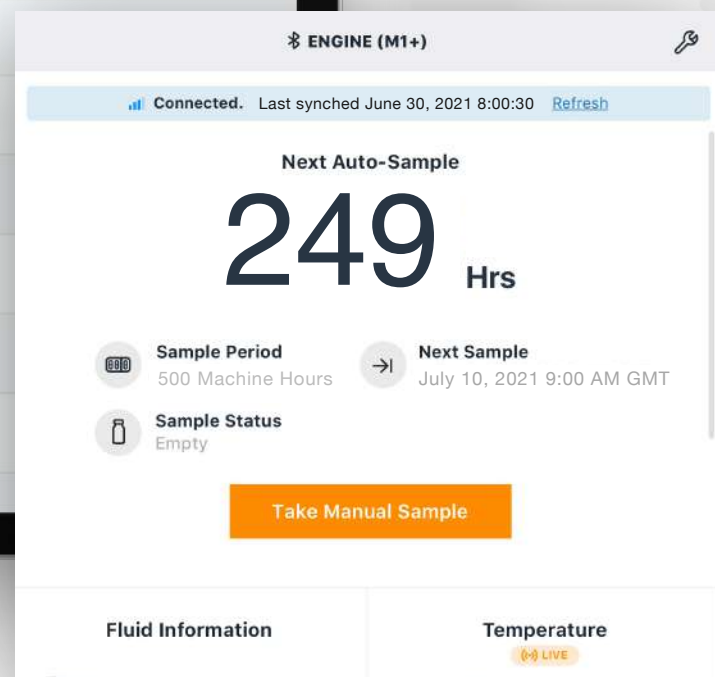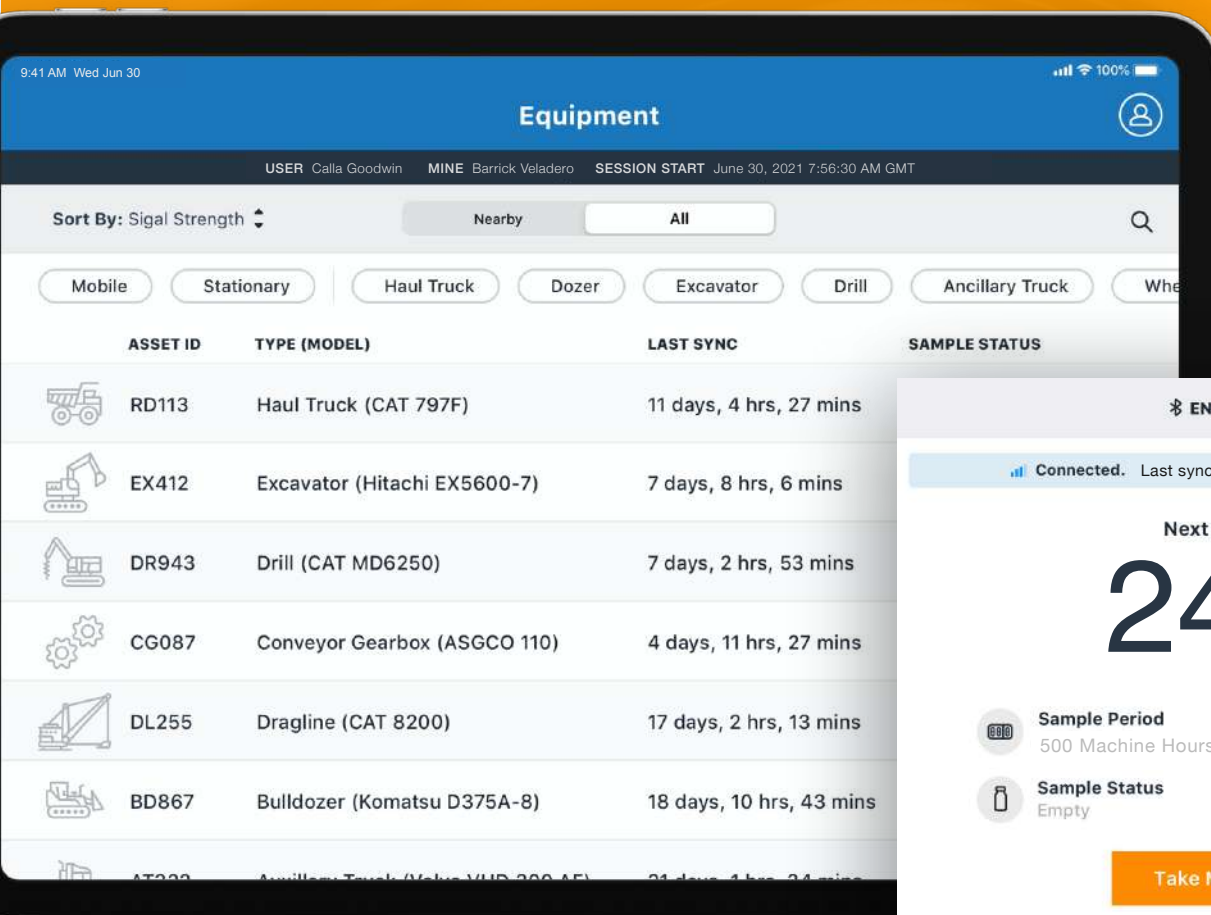
REAL TIME CONTROL

The SmartOil-M mobile application gives mechanics and service personnel the ability to remotely trigger a LIVE fluid sample bottle fill event safely, human-free, and in accordance with ELW policies. The iOS mobile application, when connected to M-Series devices, gives users access to real-time as well as historical fluid sample and sensor data, allowing mechanics to make data driven decisions.

Features

- User customizable auto-sample interval period
- Remotely trigger manual sample event
- 30 second data reporting interval
- Access to last known readings for M-Units across all equipment, regardless of connection status
- Sample bottle collection workflow that ensures match between sample point and fluid type
- Unique QR code identifying specific machine asset ID, sample point and fluid type to ensure accurate sample collection
- Paperless automated sample collection process eliminates human induced errors common with manually input data via labels and forms

MOBILE APPLICATION

USER ROLES & PERMISSIONS

There are three end user roles within the mobile application and administrative web app. **Administrators** have control over all user definable aspects of the SmartOil-M Series platform. An Administrative account is required to connect a mobile device to a client account. **Supervisors** and **Mechanics** can access the mobile application with a unique personal PIN code. Once a user session is initiated, all activity is logged. A 5 minute session timer automatically logs users out when there is no activity within the app. **Supervisors** have read/write privileges to all M-Unit functions, while **Mechanics** have read-only privileges. Both **Supervisors and Mechanics** are able to initiate and collect fluid samples.

Features

- User PIN code required to initiate mobile app session
- 5 minute session timer logs out when no activity
- Access and data logging tracks all configuration changes to the system and ties them to the end user, date, and time of execution