Reducing alarm flooding, lowering stress level and improving communication during troubleshooting by integrating rig maintenance information in real time and improving communication during troubleshooting by integrating rig maintenance information in real time

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What is Machine Control Diagnostic Tool (MCDT)?

- Software that identifies the source of a machine error and provides diagnostic analysis to correct the fault.
- Provides digital real-time 3D images of affected components to aid the technician in locating the error and troubleshooting a solution.
-Executes consistent machine calibration values.
How does MCDT work?

- Drilling controls software that communicates with machines via the Smart Machine Integrator interfaces.

- Each PLC or SBC machine controller has a local MCDT interface used to pass information, enabling MCDT development independent of tool controller code.

- Electrical technician communicates with MCDT via an HMI in the LER.
Purpose

MCDT is a valuable tool for real-time day to day troubleshooting, diagnostics and calibration. This relieves alarm flooding and furthers rig communication.

As a single point hub for diagnostics, drawing references, calibration and more it improves:

- Efficiency
- Rig performance
- Uptime
- Cost saving of service personnel
- Commissioning\re-classification time
Correcting Machine Control - Today

1. Alarm received
2. Mobilizing personnel
3. Stop operation
4. Sealing of affected area on rig
5. Troubleshooting activity
   - PLC Program
   - P & IDs and Instrumental Drawings, Sensor Emulators
   - Multi-Meters (volt, hydraulic, current meters)
6. Identify affected part & part number
7. Locate part in shop
8. Install
9. Calibrate
10. Test
Correcting Machine Control with MCDT

1. Alarm received
2. Mobilizing personnel
3. Stop operation
4. Sealing of affected area on rig
5. Troubleshooting activity
   - PLC Program
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MCDT automated diagnostics & calibration checks parts and initiates action required

All actions are performed automatically through the software diagnostics and checked through instrument sensors on the equipment

Manual Operations

1. Alarm received
2. Mobilizing personnel
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4. Sealing of affected area on rig
5. Troubleshooting activity
   - PLC Program
   - P & IDs and Instrumental Drawings, Sensor Emulators
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MCDT

Alert!
MCDT Gets Machine Running Exponentially Faster

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All actions are performed automatically through the software diagnostics and checked through instrument sensors on the equipment.
Diagnostics – Conventional vs. MCDT

• Relies on technical personnel experience
• Personnel with PLC experience needed to find cause of error
• OEM service personnel required to troubleshoot; at times tech lacks information to accurately diagnose

• Tools assist with best practices and structured troubleshooting
• Advanced diagnostics together with software interlocks to detect machine stops
• Integrated with NOV tech support; embedded logging functions sent to NOV center for quick response aided analysis
P & ID – Conventional vs. MCDT

• Hard copies and PLC monitoring from LER
• Information located in different places requiring communication between more personnel to retrieve information
• Personnel from multiple disciplines required

• Drawings, datasheets, PLC values, part numbers and other documentation available on tablets in field
• Animated real-time hydraulic and electrical drawings ensure correct interpretation; removes the need of additional PLC monitoring of single instrument values
• Reduced personnel needed for diagnosis
Calibration – Conventional vs. MCDT

- Calibration and parameters set in PLC
- Reduced functionality of machines; manual machine position adjusting required due to no optimized tuning

- Reduce in-field software changes with a strict interface and automated calibration routines
- Calibration routines for various instrumentation aims to ensure safe operation and uptime; consistent valve performance throughout lifecycle