The document to which this page is attached is considered complete and/or delivered according to ASI-Mining standards and practices.



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**PROJECT MANAGER**

FERREXPO - Yeristovo

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**Commissioning and Test Plan**

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# Introduction

To fully bring up the Autonomous truck system at FerrExpo the first time, there will be 3 main commissioning steps required:

1. Do full commissioning roll out of Mobius Server and Client with Simulators (Full 22 cycles on all checklist items)
2. Do full commissioning roll out of Autonomous CAT 793D Haul truck (Full 22 cycles on all checklist items)
3. Do full commissioning roll out of the entire Autonomous system (Mobius server, Mobius Client, Mobius In Cab clients and the Autonomous CAT 793D Haul truck (Full cycles amounts as per items on all checklist)

There will also be commissioning required with trucks return to production from maintenance and with system upgrades as follows:

1. Do truck return to operation commissioning
2. Do Mobius Upgrade commissioning
3. Do VCU upgrade commissioning

Lastly when control systems are upgraded the VCU upgrade commissioning checklist can be followed with added tests for the specific control system upgrade (steering, brakes, hoist, etc)

# Full Autonomous truck systems bring up

Here follows the commissioning and test plan for the initial bring up of all sub systems in the Autonomous truck system

## Do full commissioning roll out of Mobius Server and Client with Simulators

The Mobius server and client would need to be installed before testing can start. The installation will need to be done as follows:

1. On VM where Mobius server application will run on, we would need to create **ASI** folder in C:\ drive and within it two folders called **Old Mobius** and **Current Mobius.** This is just to manage different versions as they are release so roll back can be done effortlessly. This initial installation we will unzip the **Mobius Server zip** file in the **Current Mobius** folder.
2. On operator workstations where Mobius Client application will run on, we would need to create **ASI** folder in C:\ drive and within it two folders called **Old Mobius** and **Current Mobius.** This is just to manage different versions as they are release so roll back can be done effortlessly. This initial installation we will unzip the **Mobius Client zip** file in the **Current Mobius** folder.

Once installed the server can be started and then clients. Accounts will need to be created on server-side client and then simulators will be started. Simulators will be 5 haul trucks with 2 shovel sims to test Mobius futures. Mobius Commissioning document will be used to test the varies Mobius functions. Each Item needs to be checked and operational functions with Sims/trucks need to be tested 22 times.

## Do full commissioning roll out of Autonomous CAT 793D Haul

Before testing and commissioning starts, the **Safety plan for Commissioning and testing** document will have to discuss with all parties present during the tests. The following will be needed:

* A safety perimeter needs to setup physically with cones and surveyed into Mobius to create virtual obstacles in the system that would prevent truck from driving beyond the safety perimeter.
* A safety rider will be needed throughout the test to sit in driver seat while technician operates truck from laptop in passenger seat. Safety rider need to be ready to take control in case the system loses control of the truck as per procedure in **Safety plan for Commissioning and testing.**
* We will need loader operator to load truck for tests. He would need some level of training to know how to call truck and kick it out again in load area.
* Will need to verify AOZ by driving it with the pit boss before we start operating truck in it to ensure we don’t have equipment damage or incident.
* Would need network coverage from control room to AOZ to test full system from workstations to truck (We will need Pit boss pickup to charge laptop from and will run truck from there if network is not available)
* In case network is not available a temp network can be setup with Wi-Fi trailer in the pit and temp GPS base station

Once above is in place we can start the tests according to the **Initial Truck Full Commissioning** document. The Autonomous operational function tests will need to be done 22 times

## Do full commissioning roll out of the entire Autonomous system

Before testing and commissioning starts, the **Safety plan for Commissioning and testing** document will have to discuss with all parties present during the tests. The following will be needed:

* A safety perimeter needs to setup physically with cones and surveyed into Mobius to create virtual obstacles in the system that would prevent truck from driving beyond the safety perimeter.
* We will need loader operator to load truck for tests. He would need some level of training to know how to call truck and kick it out again in load area.
* Will need to verify AOZ by driving it with the Pit boss pickup before we start operating truck in it to ensure we don’t have equipment damage or incident.
* Would need network coverage from control room to AOZ to test full system from workstations to truck (We will need Pit boss pickup to charge laptop from and will run truck from there if network is not available)
* In case network is not available a temp network can be setup with Wi-Fi trailer in the pit and temp GPS base station

Once above is in place we can start the tests according to the **Autonomous system full Commissioning** document. The Autonomous operational function tests will need to be done 5 times.