# Supervisory Control and Data Acquisition - Functional Overview

## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisory Control and Data Acquisition - Functional Overview</td>
<td>2</td>
</tr>
<tr>
<td>Commercial In Confidence</td>
<td>3</td>
</tr>
<tr>
<td>Introduction</td>
<td>4</td>
</tr>
<tr>
<td>Purpose</td>
<td>4</td>
</tr>
<tr>
<td>Executive Summary</td>
<td>4</td>
</tr>
<tr>
<td>Business Benefits</td>
<td>4</td>
</tr>
<tr>
<td>Scope</td>
<td>4</td>
</tr>
<tr>
<td>Baselines</td>
<td>4</td>
</tr>
<tr>
<td>Functional Scope</td>
<td>4</td>
</tr>
<tr>
<td>Business Rules / Design Decisions</td>
<td>5</td>
</tr>
<tr>
<td>Transformation and Data Enrichment</td>
<td>5</td>
</tr>
<tr>
<td>Data Mapping</td>
<td>5</td>
</tr>
<tr>
<td>Availability Information</td>
<td>5</td>
</tr>
<tr>
<td>Interface Details</td>
<td>5</td>
</tr>
<tr>
<td>Process Overview</td>
<td>5</td>
</tr>
<tr>
<td>Work Requests</td>
<td>6</td>
</tr>
<tr>
<td>Work Orders</td>
<td>6</td>
</tr>
<tr>
<td>Condition Monitoring Values</td>
<td>6</td>
</tr>
<tr>
<td>Operating Statistics Values</td>
<td>7</td>
</tr>
<tr>
<td>Production Statistics Values</td>
<td>7</td>
</tr>
<tr>
<td>Equipment Downtime Values</td>
<td>7</td>
</tr>
<tr>
<td>Lost Production Values</td>
<td>7</td>
</tr>
<tr>
<td>Log Sheet Entries</td>
<td>8</td>
</tr>
<tr>
<td>Ellipse Configuration</td>
<td>8</td>
</tr>
<tr>
<td>Condition Monitoring Set</td>
<td>8</td>
</tr>
<tr>
<td>Operating Statistics Profile</td>
<td>9</td>
</tr>
<tr>
<td>Production Statistics Model</td>
<td>10</td>
</tr>
<tr>
<td>FAQs</td>
<td>11</td>
</tr>
</tbody>
</table>
Legal Disclaimer

The product described in this documentation may be connected to, and/or communicate information and data via, a network interface, which should be connected to a secure network. It is your sole responsibility to ensure a secure connection to the network and to establish and maintain appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, etc.) to protect the product, the network, your systems, and the interface against any kind of security breach, unauthorised access, interference, intrusion, leakage, damage, or corruption or theft of data. We are not liable for damages or losses related to any such security breach, unauthorised access, interference, intrusion, leakage, damage, or corruption or theft of data.
Introduction

Purpose

The purpose of this document is to explain the business intent of the standard Supervisory Control and Data Acquisition (SCADA) integration solution, including how to configure and use the new functionality. There is no "user interaction" within the integration solution, business processing will occur in Ellipse utilising the data received from a 3rd party SCADA system. Business analysts/consultants will need to understand the functionality of the SCADA integration in order to instruct the technical resources as to how to implement and configure this integration.

Executive Summary

Mines, processing plants, power generation facilities and other industrial sites all have a large number of field instrumentation points which monitor and control the operation of equipment. This document addresses the supply of this information to Ellipse to drive the maintenance planning and production monitoring business processes. The standard Ellipse / SCADA integration solution provides a means of integrating Ellipse with third party systems such as:

- Minestar
- Plant control systems
- SCADA systems

This will allow the following Ellipse data to be created when particular events occur in the third party systems. The following Ellipse data entities are available for integration through the standard Ellipse / SCADA integration solution:

- Operating Statistics
- Production Statistics
- Equipment Downtime
- Lost Production
- Condition Monitoring
- Work Request
- Work Order

Business Benefits

The key business benefits of this integration solution include:

1. Standardised Ellipse integration software will provide a lower cost and a higher quality solution to meet SCADA business process requirements.
2. Centralisation of asset telemetry information in Ellipse will allow utilisation in day-to-day asset management business processing and further detailed analysis for predictive asset management.
3. Automation of the loading of telemetry data into Ellipse will eliminate potential transposition errors from the process.
4. Automation of the loading of telemetry data into Ellipse will allow for faster reaction times when dealing with failures and early detection of negative trends in an operating environment.

Scope

The Ellipse portion of the interface is contained within the Ellipse Integration Platform (EIP). There will be additional third party software required to integrate between the 3rd party SCADA system and EIP to complete the end-to-end Ellipse / SCADA integration. The scope of the Ellipse / SCADA integration solution is detailed in the following sections.

Baselines

Ellipse 8.5 onwards. This item is not suitable for back fit to prior versions of Ellipse 8.

Functional Scope

The functional scope of the Ellipse side of the integration solution encompasses the following:

1. Update of Operating statistics (cumulative, daily entry or meter) into Ellipse for further use in maintenance planning processes.
2. Update of Production statistics into Ellipse for further use in production monitoring processes.
4. Update of Lost Production statistics into Ellipse for further use in production monitoring processes.
5. Update of Condition Monitoring data into Ellipse for further use in maintenance planning processes.
6. Creation of Work Orders in Ellipse to address issues that have arisen in operations activities.
7. Creation of Work Requests in Ellipse to address issues that have arisen in operations activities.

**Business Rules / Design Decisions**

**Transformation and Data Enrichment**

It is assumed that all transformation and enrichment of the data passed from the 3rd party system required for the message to be processed into Ellipse, will be carried out within EIP. The provision of third party software required to integrate between the 3rd party system and EIP will need to be catered for.

**Data Mapping**

The XML messages to be passed to the EIP adapters for SCADA will be required to conform to the relevant OAGIS standard. Refer to the EIP adapter documentation under the Ellipse Knowledge Repository for the specific details of the messages required for each EIP adapter.

**Availability Information**

Where Availability Information is required the statistics data will need to be loaded into Ellipse as a Logsheet entry. This is due to the fact that these values are created in Ellipse via log sheets.

**Interface Details**

**SCADA Interface Schematic**

**Process Overview**

Telemetry information will be collected in relevant source systems as part of the standard, daily business processing. This will then be automatically passed to Ellipse through integration for centralisation, monitoring and data analysis. This information includes the following:

- Operating statistics (as either cumulative, daily or meter entries).
- Production statistics.
- Downtime statistics.
• Lost Production statistics.
• Condition Measurements

This information will be used in Ellipse in multiple ways as part of operations monitoring, plant breakdown processing and maintenance planning processing. Monitoring of operations processing in Ellipse through the Performance Monitoring module will be possible through the update of Ellipse with data for Production, Lost Production and Equipment Downtime statistics. This information will allow the identification of negative trends, from which appropriate action can then be taken to remedy.

Where a breakdown has occurred Work Requests and/or Work Orders can be raised in Ellipse by the 3rd party systems to enable action to be taken. Where a breakdown has not occurred but is likely to occur (i.e. a condition measurement value for engine oil indicates a likely occurrence of a breakdown), Work Orders can be automatically generated in Ellipse through configuration in the Condition Monitoring module. The collection of Operating Statistics for equipment in Ellipse will processed as per the profile defined for each item of equipment. These statistics will be used in other modules of Ellipse such as Work Planner, Equipment Tracing and Condition Monitoring, either to predict maintenance requirements, or to provide more meaningful maintenance history for the equipment item.

**Work Requests**

To reduce equipment down time, it is beneficial to have unscheduled maintenance carried out as quickly as possible. To facilitate this, a Work Request can be created in Ellipse when an alarm is triggered in the third party system that is monitoring equipment via the Work Request adapter. When the third party system detects that a value or the rate of change of a value, as measured by a sensor, meets some predefined condition then Ellipse may be requested to create a Work Request. This will be achieved via a Create Work Request service. Information from the Variable Tag/Alarm Tags properties will be used to create the Work Request. Work Requests will be created with the following fields being populated:

- Equipment number
- Work Request type
- Work Request classification
- Requestor
- Description

The adapter will return the Work Request Identifier.

**Work Orders**

As an alternative to the method of creating Work Requests mentioned above, a Work Order can also be created in Ellipse when an alarm is triggered in the third party system that is monitoring equipment via the Work Order adapter. The Work Order is based on a predefined Standard Job that defines the majority of the information needed to create the work order. The third party system needs to be aware of what the correct Ellipse Standard Job is in each instance.

When the third party system detects that a value or the rate of change of a value, as measured by a sensor, meets some predefined condition then Ellipse may be requested to create a Work Order. This will be achieved via a Create Work Order service. Information from the Variable Tag/Alarm Tags properties will be used to supplement the details of the Standard Job that is used when creating the Work Order. Work Orders will be created based on a nominated Standard Job and will contain a single task. The Work Order will be created with the following fields being populated, with the majority of the information coming from the Standard Job itself, refer below:

- Equipment number, from message
- Description, from message
- Standard Job, from message
- Work Order type, from standard job
- Maintenance type, from standard job
- Originator, from standard job
- Work group, from standard job
- Cost centre, from standard job

The adapter will return:

- District
- Work Order number
- Work Order Task number

**Condition Monitoring Values**

When a particular event occurs, such as the end of each day or shift, in the third party system, it may request Ellipse to create Condition Measurement values. This will be achieved via a Condition Measurement adapter. Information from the Variable Tag/Accumulators will be used to create the Condition Measurement values. Ellipse will expect to receive this information in summary format only. Condition Measurement values will be created with the following fields being populated:

- Equipment number
Operating Statistics Values

When a particular event occurs, such as the end of each day or shift, in the third party system, it may request Ellipse to create Operating Statistics values. This will be achieved via the Statistics adapter. Information from the Variable Tag/Accumulators will be used to create the Operating Statistics values. Ellipse will expect to receive this information in summary format only. Whether Statistics are to only ever be created in Ellipse or can be created and modified can be specified through configuration of EIP. Operating Statistic values will be created with the following fields being populated:

- Equipment number
- Date
- Shift
- Entry Type
- Statistic Type
- Statistic Value

Production Statistics Values

When a particular event occurs, such as the end of each day or shift, in the third party system, it may request Ellipse to create Production Statistics values. This will be achieved via the Statistics adapter. Information from the Variable Tag/Accumulators will be used to create the Production Statistics values. Ellipse will expect to receive this information in summary format only. Whether Production Statistics are to only ever be created in Ellipse or can be created and modified can be specified through configuration of EIP.

Production Statistic values will be created with the following fields being populated:

- Equipment number
- Date
- Shift
- Statistic Type
- Statistic Value

Equipment Downtime Values

When a particular event occurs, such as the end of each day or shift, in the third party system, it may request Ellipse to create Equipment Downtime values. This will be achieved via Statistics adapter. Information from the Variable Tag/Accumulators and/or Alarm Tag properties will be used to create the Downtime values. Ellipse will expect to receive this information in summary format only. Whether Downtime values are to only ever be created in Ellipse or can be created and modified can be specified through configuration of EIP.

Downtime Statistic values will be created with the following fields being populated:

- Equipment number
- Date
- Shift
- Downtime Cause Code
- Equipment Stop Time
- Equipment Start Time; or Downtime Duration

Lost Production Values

When a particular event occurs, such as the end of each day or shift, in the third party system, it may request Ellipse to create Lost Production values. This will be achieved via the Statistics adapter. Information from the Variable Tag/Accumulators and/or Alarm Tag properties will be used to create the Lost Production values. Ellipse will expect to receive this information in summary format only. Whether Lost Production values are to only ever be created in Ellipse or can be created and modified can be specified through configuration of EIP.
Lost Production Statistics values will be created with the following fields being populated.

- Equipment number
- Date
- Shift
- Lost Production Code
- Production Stop Time
- Production Start Time; or Lost Production Duration

**Log Sheet Entries**

When a particular event occurs, such as the end of each day or shift, in the third party system, it may request Ellipse to create Logsheet entries. This will be achieved via the Statistics adapter. Information from the Variable Tag/Accumulators and/or Alarm Tag properties will be used to create the Logsheet values. Ellipse will expect to receive this information in summary format only.

Logsheet values will be created with the following fields being populated.

- Equipment number
- Model code
- Operator
- Shift
- Date

**Ellipse Configuration**

In order for some of the data to be loaded into Ellipse via the SCADA adapters, there will be configuration required in Ellipse to allow this. Specifically to load Condition Monitoring Measurement data, Operating Statistics data and Production Statistics data there will be configuration required in Ellipse. The sections below briefly outline the requirements for this configuration.

**Condition Monitoring Set**

In order for Condition Measurements to be recorded in Ellipse for an Asset, a Condition Monitoring Set must be setup for the Asset. This can be setup against an Equipment Group Identifier (EGI) or directly against an Equipment. Where it is setup against an EGI, it will apply to all Equipment within that EGI. To access this select application MSE340 via the quick launch in the Ellipse UI. To create a new Condition Monitoring Set select the ‘New’ option at the top of the screen, to update an existing Condition Monitoring Set enter the identifying details:

- Equipment or EGI Reference
- Component Code
- Modifier Code
- Position Code
- Condition Monitoring Type

The information to be entered for a Condition Monitoring Set is as follows:

- Scheduling Details
- Standard Jobs
- Life Expectancy
- Analysis Levels
- Standard Deviation
- Rules
- Notifications
- Extended Text
- Equipment Commentary

Refer to the Ellipse Online Help available via the Ellipse UI for the details to be entered for each of these sub-categories for the Condition Monitoring Set.
MSE340 - Update Condition Monitoring Set

Operating Statistics Profile

In order for statistics to be recorded in Ellipse for an Asset, an Operating Statistics profile must be setup for the Asset. This can be setup against an Equipment Group Identifier (EGI) or directly against an Equipment. Where it is setup against an EGI, it will apply to all Equipment within that EGI. To access this select application MSO615 via the quick launch in the Ellipse UI. From this application select option ‘3. Maintain Operating Statistics Profile’ and the profile to be maintained (either an EGI or an equipment id). If another profile is to be used as a template then enter either the EGI or equipment id that the profile is to be copied from should be specified.

Operating Statistics can be entered directly against equipment or can be inferred from equipment higher in the structure. Equipment higher in the structure does not refer to the productive unit or to an equipment list. Instead, it refers to equipment higher in the equipment tracing hierarchy. For example, if you are updating a piece of equipment that is an engine, which has been fitted to a truck (via Equipment Tracing), the direct entry indicator defines whether statistics can be entered directly against the engine, or whether they can only be inferred down from the item to which the engine is fitted, in this case the truck. Therefore, a statistic type can only be defined as inferred if the piece of equipment is defined on the Equipment Register as being traceable.

The statistic routine uses the Days for Average and Maximum Days values when calculating a daily average for an item of equipment. These fields are used as follows:

- The Maximum Days value determines whether operating statistics are sufficiently up to date to allow a daily average to be calculated for the item. The routine finds the most recent operating statistics record for the item. It then checks that this record is eligible, by comparing the date of the record against today’s date, less the Maximum Days value.
- The Days for Average value determines the number of days over which the daily average is to be calculated for an item of equipment. The routine finds the most recent operating statistic record for the item. The routine then calculates a date at which to begin searching for the next record by subtracting the Days for Average from the date of the most recent record.

The information to be entered for an Operating Statistics profile is as follows:
**Primary Statistic** Enter the operating statistic code to be used as the primary statistic. Entry is validated on Table File 'SS'. It must be one of the operating statistic codes recorded on the selected equipment.

**Operating Statistic Code** Enter the operating statistic codes that can be recorded on the selected equipment. Each entry is validated on Table File 'SS'.

**Direct Entry (Mandatory)** Enter 'D' to show that the statistic type is to be entered directly. Enter 'I' to show that the entered statistic type is to be inferred. For inferred statistics, the statistical information is only updated from equipment higher in the structure.

**Day Ave (Days for Average)** Enter a value indicating the number of days over which the daily average is to be calculated. Entry is optional, but is only available when you have entered a related statistic type.

**Max Day (Maximum Days)** Enter a value indicating the number of days to be used to determine whether the most recent operating statistic record is eligible when calculating a daily average. Entry is optional, but is only available when you have entered a related statistic type.

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**Production Statistics Model**

In order for Production Statistics to be recorded in Ellipse for an Asset, a Production Statistics Model must be setup. To access this select application MSO460 via the quick launch in the Ellipse UI. Refer to the Ellipse Online Help available via the Ellipse UI for the details to be entered for a Production Statistics Model.
The following questions are answered in this FAQ section:

- Can Work Orders be automatically generated from Condition Measurement entries where configured thresholds are exceeded?
- Can Work Orders be automatically generated from Work Requests configuration exists to generate a Work Order?
- Can Production Statistics, Lost Production Statistics and Equipment Downtime all be generated from Logsheet entries?
- Are adapters that are developed by the customer to integrate to the ERP system have to be built to be run in the EIP?
- Does this support the initial load of data entities into Ellipse?

**Question:** Can Work Orders be automatically generated from Condition Measurement entries where configured thresholds are exceeded?

**Response:** Yes, if the Condition Measurement value entered via the interface exceeds a configured threshold that is also configured to generate a Work Order then that will occur.

**Question:** Can Work Orders be automatically generated from Work Requests configuration exists to generate a Work Order?

**Response:** Yes, if the Work Request Classification and Type values on the Work Request are configured to generate a Work Order then that will occur.

**Question:** Can Production Statistics, Lost Production Statistics and Equipment Downtime all be generated from Logsheet entries?

**Response:** Yes, provided the model has been setup in Ellipse then Production Statistics, Lost Production Statistics and Equipment Downtime can all be generated from Logsheet entries.
**Question:** Are adapters that are developed by the customer to integrate to the ERP system have to be built to be run in the EIP?

**Response:** The adapters that are developed to integrate to the ERP system do NOT have to be built to be run in the EIP. Those adapters can be developed to be run in the customer integration OR can be developed to be run in the EIP. The choice of integration platform will be dependent on the specific requirements of each customer. Where the customer integration platform is to be used to host the adapters for the ERP system, OAGIS XML messages will be expected to be passed to and from the EIP (over JMS) by the customer integration platform.

**Question:** Does this support the initial load of data entities into Ellipse?

**Response:** The integration solution is only intended to support the transfer of data in a normal, day-to-day operational environment. For the initial load of data the integration solution may suffice, however the volume of data to be loaded would need to be determined and the timeframe in which this is required to be transferred determined and then load testing on a production strength physical environment conducted to determine if that is possible.