SmartCap Reports

What the Numbers Tell Us

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Fatigue Manager gives you the ability to generate data reports for insight into fatigue profiles, particular events or system utilisation. This document discusses each of the reports available in Fatigue Manager, and provides guidance on interpreting the information to draw useful conclusions.

Types of Fatigue Manager Reports

Operator Report

The operator report provides usage and fatigue information for a single operator. This report can be useful for operators to review their alarm history, or view their fatigue profile (Fatigue distribution) compared to the site average.

Data Overview Report

The data overview report consolidates data from an entire crew or workforce, providing an overall analysis of usage and fatigue data.

Shift Overview (previously Shift Investigation Report)

The Shift Overview Report is targeted at providing information isolated to a single operator shift.

> **Handy Hint:**
>
> The Data Overview report is the best way to look overall trends and usage statistics.

This is the fastest way to access an operator's detailed fatigue trace, SmartCap usage statistics and alarm history for any shift.

Fatigue Data Export

This allows the export of SmartCap fatigue data for one or all operators over a specified time frame, from one or all plant.

The data export provides the highest resolution of information available through Fatigue Manager, revealing each confirmed system status and the corresponding timestamp for the date range selected.

The Fatigue Data export is useful for producing high resolution plots of an individual's fatigue history or when conducting investigations that require detailed information about fatigue levels and/or non-fatigue system states (e.g. Cap Off). Once generated, the Fatigue Data Export will be shown on-screen, however can be exported to a CSV file to be opened using standard spreadsheet software.

Alarm Data Export

This allows the export of SmartCap alarm data for one or all operators over a specified time frame, from one or all plant.

The Alarm Data export includes each instance of triggered alarm in the specified time frame for all alarms, or a single alarm. It is useful for performing advanced analysis on alarm distributions, or when conducting investigations that require detailed information about SmartCap alarms.

Learn more at: **www.SmartCapTech.com/Info**

Once generated, the Alarm Data Export will be shown on-screen, however can be exported to a CSV file to be opened using standard spreadsheet software.

Interpreting the Report Contents

SmartCap Data Hours

This is a measure of the total number of hours of SmartCap use for a person or group, and should be used a gauge of how valid the other statistics and trends in the report are.

Over a 12-hour shift, you could expect to see between 7-10 hours of SmartCap data, if SmartCap is being used while operational.

As a good rule-of-thumb, we consider the trends and statistics in SmartCap reports to be valid when the report contains greater than 150 hours of SmartCap use.

> **Handy Hint:**
>
> Trends and alarm rates in a SmartCap report should only be considered relevant if the SmartCap Data Hours are greater than **150 hours**.

Cap-Off Percentage

The cap-off percentage represents the fraction of SmartCap data hours where the system did not detect the signals needed for fatigue calculations. This could be due to operators not wearing the SmartCap, operators wearing the cap in a manner contrary to training, or the presence of damaged or faulty SmartCap headwear.

A value below 6% is considered normal, and a figure above 10% is considered high. If the value for an individual operator is above 10% while they are wearing their SmartCap headwear as instructed, this may indicate the need to try a different style or size SmartCap.

> **Handy Hint:**
>
> An alarm rate **of 0.1 alarms per hour** indicates more than one SmartCap alarm per operator shift. This is **above average**.

Alarm Rate

The alarm rate is the number of alarms per hour experienced based on the parameters (time period, etc.) of the report. An alarm rate of 0.05 alarms per hour is the equivalent of 1 alarm every 20 hours of SmartCap use.

If an individual or group has an alarm rate above 0.1, this would indicate more than one alarm per operator shift, which is above the average experienced by most SmartCap sites.

Note: SmartCap Fatigue Manager allows the configuration of many alarms, so it is important when running reports to select the particular alarm of interest.

Learn more at: **www.SmartCapTech.com/Info**

Fatigue Distribution

The Fatigue Distribution is a plot of the **average fatigue level** spread across the 24 hours of the day. A higher value represents an increased risk, and is typically seen during the early hours of the morning.
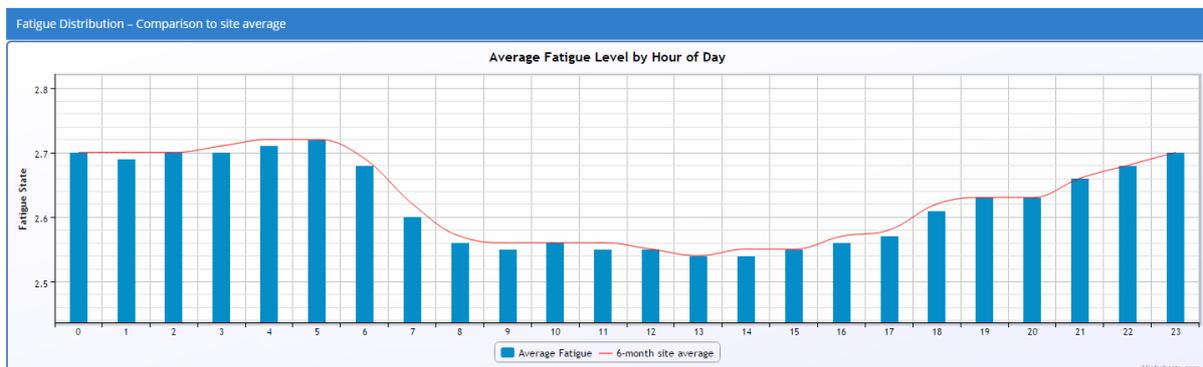
Assuming that the report contains sufficient SmartCap data hours, the Fatigue Distribution can be a useful way to **identify the specific patterns for an individual or group** (e.g. crew of segment of the workforce). The example above is the most common pattern seen, and shows lower fatigue levels during daylight hours, and higher fatigue levels during the night.

When a pattern such as this is evident, it can prove powerful in demonstrating the validity of SmartCap values, which may not always match how we feel.

Alarm Distribution

Similar to the Fatigue Distribution, the alarm distribution shows **when alarms have occurred**. This is useful in identifying the high risk times for an individual or group, which may be important for planning resource allocations, relief staff availability, or optimal crib/break times.

Fatigue History

The fatigue history is a plot of each SmartCap measurement, and represents a detailed story. If the user took their cap off, or struggled to get a good fit, the plot will show values of zero.

If an operator claims to have received a Level 4 alarm without receiving the early warning 3+ alerts, the Fatigue History (shown on the Operator Report and Shift Investigation Report) is a useful tool to investigate.
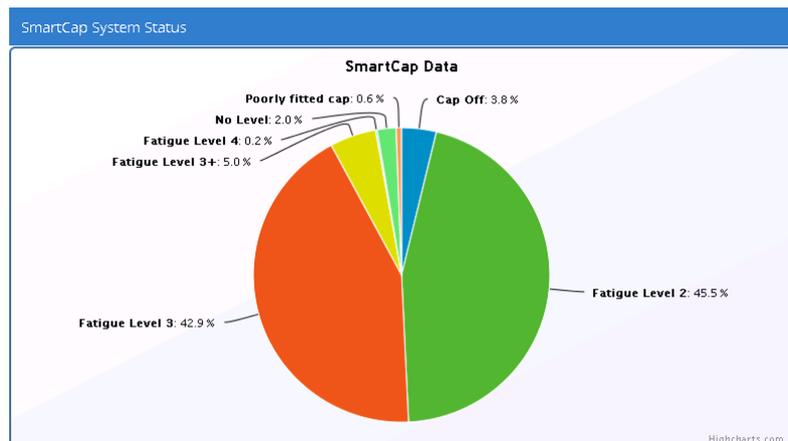
Handy Hint:

The **Fatigue History** can be useful in identifying the number of Level 3+ early warnings that occurred prior to a Level 4 alarm.

Learn more at: **www.SmartCapTech.com/Info**

SmartCap System Status

This chart of the relative proportion of system states is useful in identifying something out of the ordinary.

It is common to see similar values for Level 2 and Level 3, for which a value of approximately 40% is normal.

SmartCap System Status

SmartCap Data

Poorly fitted cap: 0.6 %
No Level: 2.0 %
Fatigue Level 4: 0.2 %
Fatigue Level 3+: 5.0 %
Cap Off: 3.8 %
Fatigue Level 2: 45.5 %
Fatigue Level 3: 42.9 %

Highcharts.com

Advanced Analysis

The Fatigue Data Export and Alarm Data Export provide raw data available for more advanced or specific analysis if required. Advanced analysis can be used to answer very specific questions, or identify interesting trends unique to your workforce. Presenting the information in a meaningful way can assist in operator acceptance of the SmartCap technology, and create a culture of awareness and informed debate.

Here we include a few suggestions for analysis that may prove useful.

Dealing with 3+

When performing your own numerical analysis, we recommend treating a level 3+ as a numerical value of 3.8. This is indicative of its interpretation of suspected impairment, and will ensure your calculations are in-line with Fatigue Manager Reports.

Early warning or alarm effectiveness

An interesting analysis is to review the data before and after level particular events. For example, looking at the average fatigue level in the 10 minutes before and after each Level 4 alarm can provide an indication if the alarm and subsequent actions of the operator are leading to a more alert state.

Distribution of alert states

Excluding all other data other than Levels 2 & 3, it is informative to plot the relative proportion of each state across the 24 hours of the day. This represents a **profile of alertness**, and typically reveals trends consistent with expectations – that is, greater proportion of Level 2 during daylight hours, and lower proportion during night time. Again, a distribution consistent with expectations can prove useful in demonstrating the accuracy of SmartCap.

Shift analysis

If shift roster information is available, it is valuable to perform an analysis of the average fatigue level and/or alarm rates for different shift within the repeating roster. This can answer questions such as:

- Is the first night shift the highest risk for our business?
- Are extended breaks in the roster providing the opportunity for rest?

> **If you require any assistance with SmartCap data analysis, our team is always happy to help. Contact us at support@smartcaptech.com**

Learn more at: **www.SmartCapTech.com/Info**