

T O R O N T O

canadā

Workshop 2

Commences at: 09:55

Reporting: Getting the most out of your data

Presented by: Dr. Steven Hursh

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Workshop Topics

- **How to build the following reports:**
 - Minimum Effectiveness less than 77
 - Minimum Effectiveness less than 77, Sleep Reservoir at 75 or lower
 - Fatigue Hazard Area
- **A look at reports/data that can be extracted to third party BI tools**
 - Standard Reports
 - Summary CSV
 - Details CSV
 - Schedule Results to CSV
 - Using the Events Table to isolate key data



Min. Effectiveness <77

Report 1

A photograph of a commercial airplane flying over the ocean at sunset. The sky is a mix of blue and orange, and the water is calm. The text "The Worldwide Leader in Aviation for Fatigue Management Solutions" is overlaid on the image in white.

The Worldwide Leader
in Aviation for Fatigue
Management Solutions

SAFTE®FAST Calibration Values

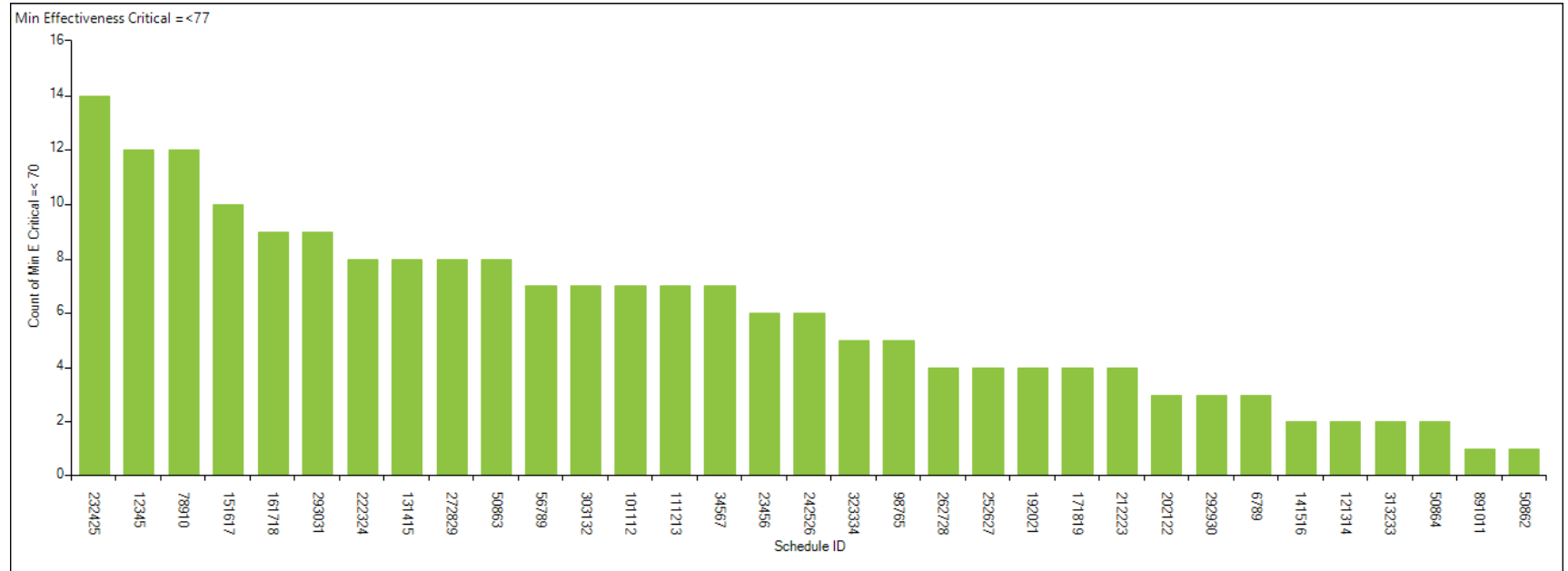
Continuous Hours of Wakefulness	Effectiveness (% of Baseline)	Reaction Time (% increase from Baseline)	Lapse Likelihood (relative to 1 for rested)	Mean Cog	BAC
18	80	+25%	3.1	88.3	
18.5	77	+30%	3.7	86.3	0.05
19	75	+33%	4.0	84.5	
21	70	+43%	5.2	81.4	0.08
40 ³	65 ¹	+54%	6.5	77.7	

- US FAA has a threshold of 77 for flight and duty period evaluations
 - https://www.faa.gov/about/office_org/headquarters_offices/agc/practice_areas/regulations/Part117/Part117_General/media/Final%20Flight%20Duty%20Rule.pdf
- Below 77, USAF applies countermeasures to improve performance
- Increase is non-linear because of circadian interactions



- Frequency of Minimum Effectiveness Critical < 77

Minimum Effectiveness less than 77



Report Building: Min E<77

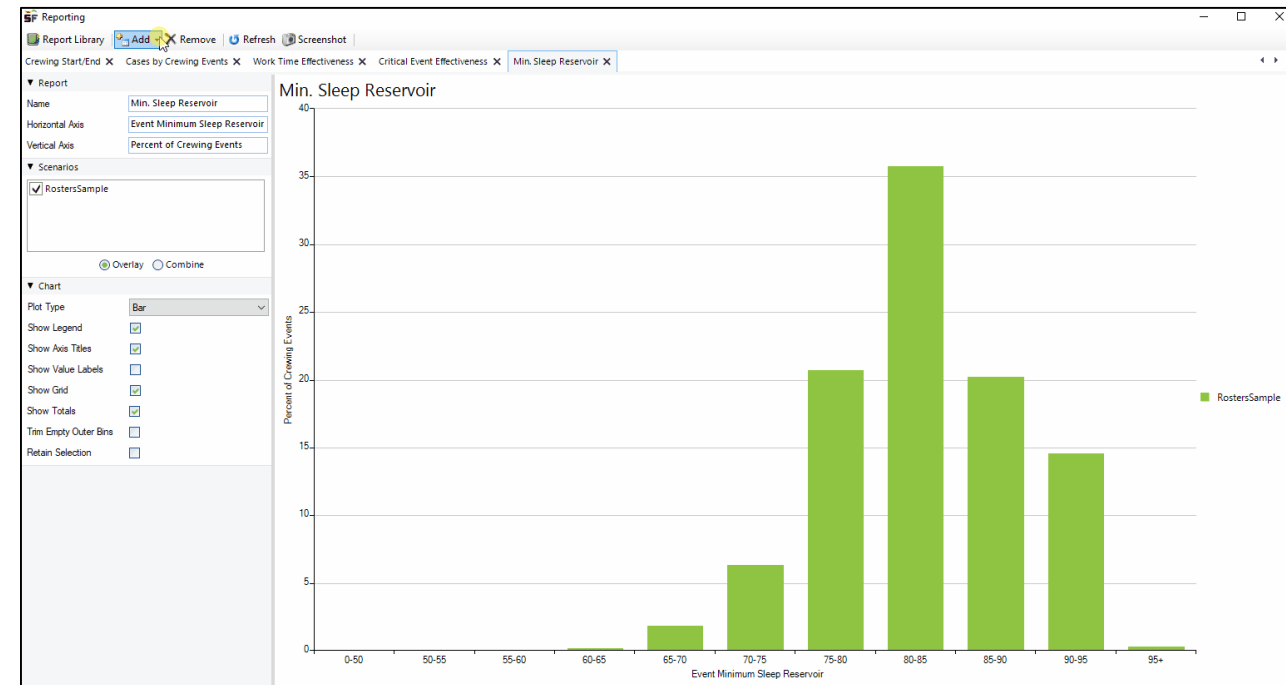
To build this report, follow the steps below:

- a) **Add Pivot Events** report
- b) **Row Labels:** Schedule ID
- c) **Report Filter:** Effectiveness Minimum(Critical)
- d) **Values:** Count of Effectiveness
- e) **Report Filter:** Crewing
- f) **Effectiveness Minimum (Critical) Filter:** set to *is less than or equal to 77*
- g) **Crewing Filter:** Un-select False
- h) **Schedule ID Filter:** set to *Sort Descending (Z-A) by: Count of Effectiveness Minimum (Critical)*
- i) **Deselect:** Show Totals, Show Grid, Show Legend
- j) **Plot Type:** Bar

Report Name: Min Effectiveness Critical =<77

Horizontal Axis Name: Schedule ID

Vertical Axis Name: Count of Min E Critical =< 70



Min E<77, Min R<=75

Report 2

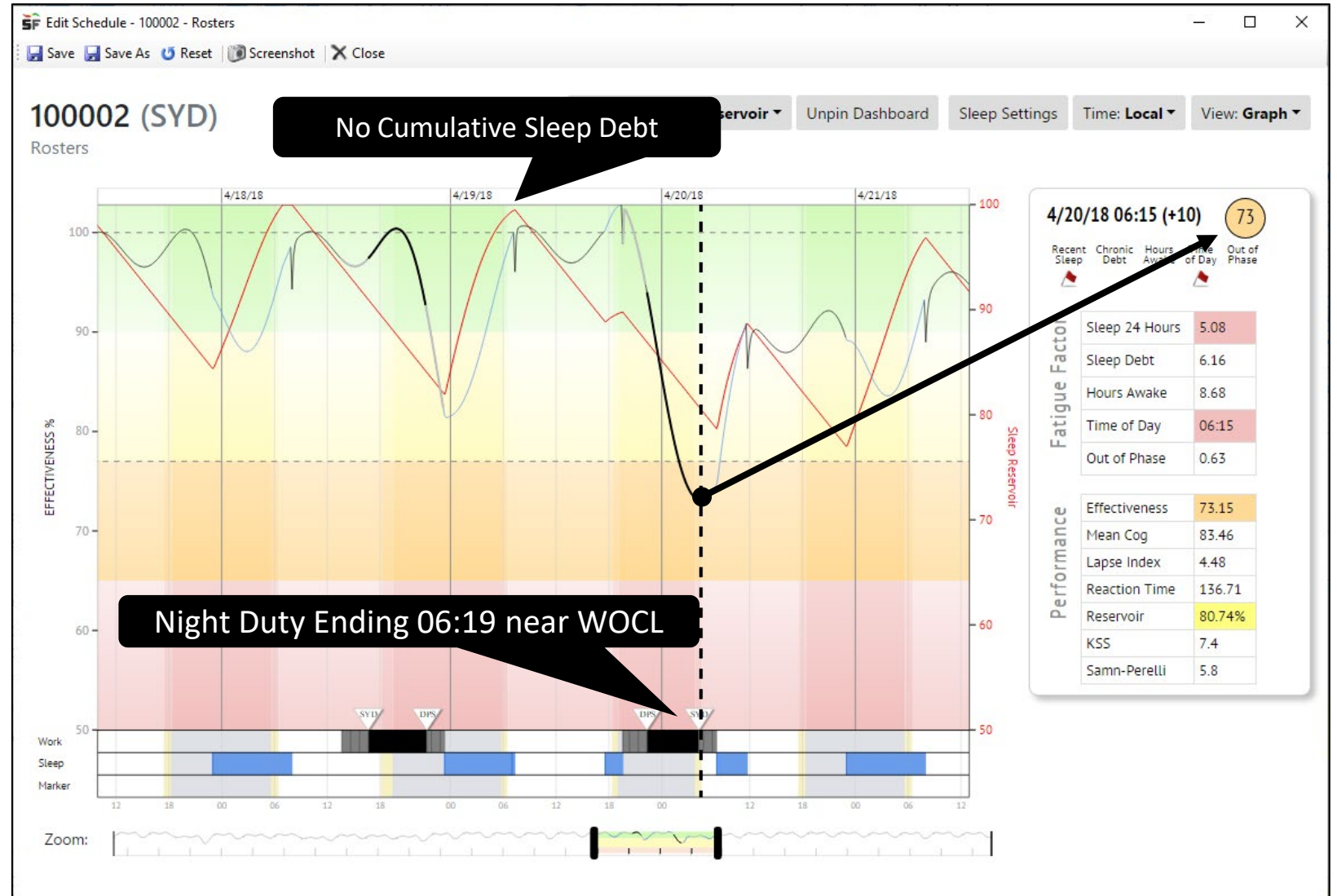
A photograph of a commercial airplane flying over the ocean at sunset. The sky is a mix of blue and orange, and the water is calm. The text "The Worldwide Leader in Aviation for Fatigue Management Solutions" is overlaid on the image in white.

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Management Solutions

Night Duty Ending Below Threshold

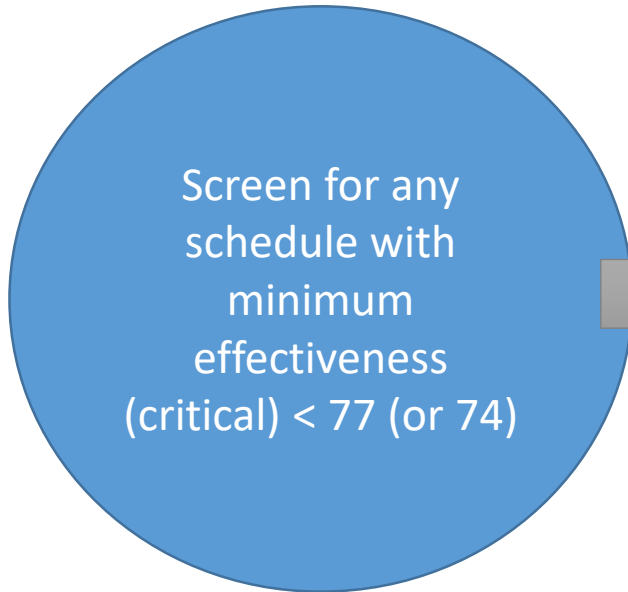
Alertness Score (Effectiveness) Is Not The Whole Story

- If Sleep debt is not the issue AND the job has to be conducted at that time, then fatigue mitigation will focus on crew training and minimizing job specific demands rather than scheduling.



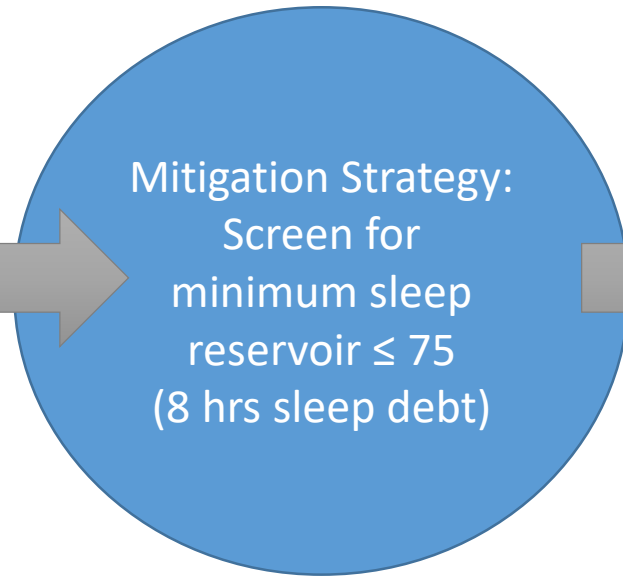
SAFTE-FAST Fatigue Hazard Mitigation Strategy

Screen for Low Performance at critical phase of flight



Root Cause Analysis

Check for Low Sleep Reservoir Excess Sleep Debt



Confirm Time of Day Flag

Mitigations

Low Reservoir Decision

YES

1. Adjust schedule to provide more sleep opportunity
2. Train crews on sleep hygiene
3. Train crews on crew resource management, alertness strategies, and fitness for duty obligations.

NO

1. Pre-brief alert and prep
2. Minimize workload
3. Train crews on sleep hygiene
4. Train crews on crew resource management, alertness strategies, and fitness for duty obligations.

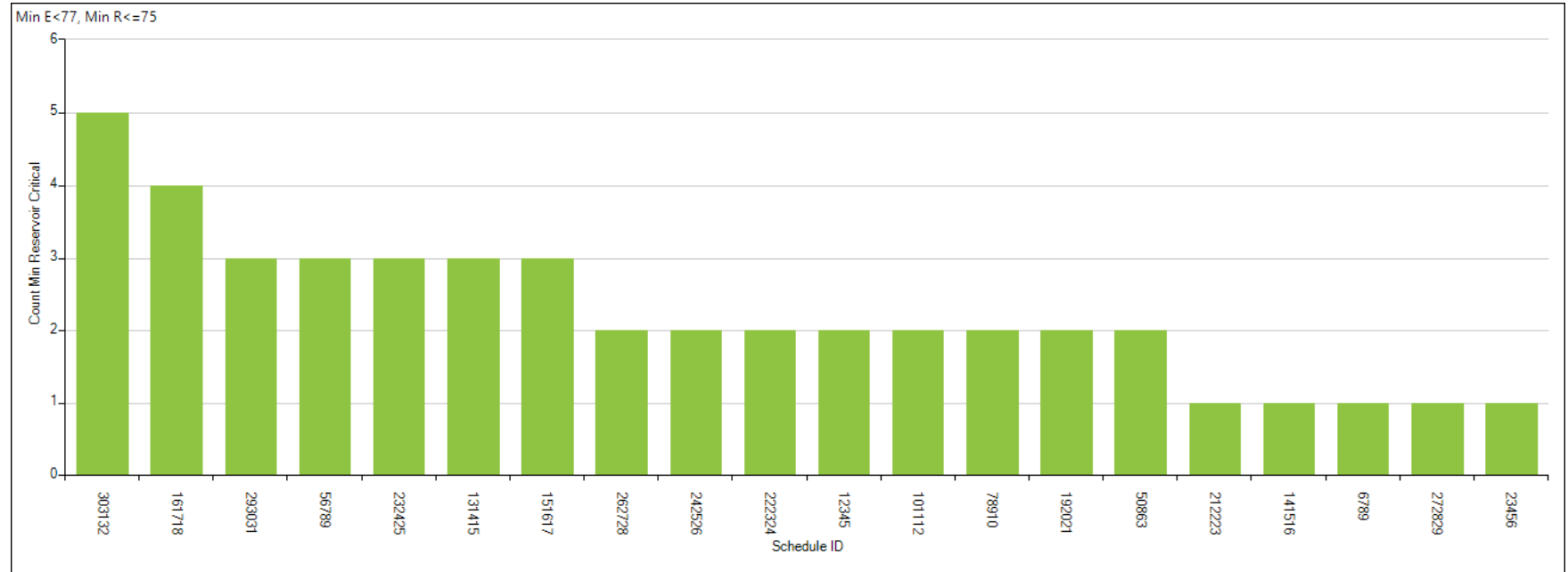
Rational:

- If effectiveness is < 77 but there is no excessive sleep debt (sleep reservoir not less than 75), then pairing construction is not likely to be the key factor – likely time of day.
- Unless the flight can be rescheduled, then crew-centered mitigations are necessary to protect crew performance at night.



Min E<77, Min Res<75

- Frequency of Minimum Effectiveness Critical < 77 AND Minimum Reservoir ≤ 75



Report Building: Min E<77, Min R≤75

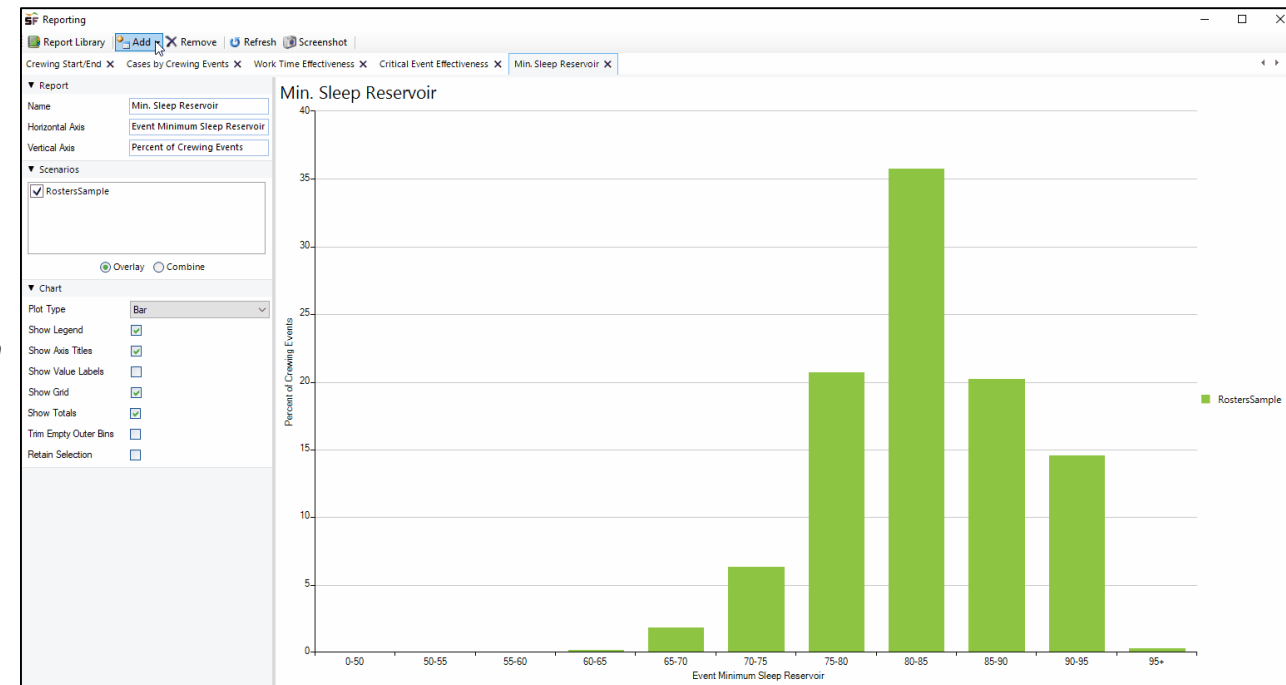
To build this report, follow the steps below:

- a) **Add Pivot Events** report
- b) **Row Labels:** Schedule ID
- c) **Report Filter:** Crewing, Effectiveness Minimum (Critical), Reservoir Minimum (Critical)
- d) **Values:** Count of Reservoir Minimum (Critical)
- e) **Crewing Filter:** Un-select False
- f) **Effectiveness Minimum (Critical) Filter:** set to *is less than 77*
- g) **Reservoir Minimum (Critical) Filter:** set to *is less than or equal to 75*
- h) **Schedule ID Filter:** set to *Sort Descending (Z-A) by: Count of Reservoir Minimum (Critical)*
- i) **Deselect:** Show Totals, Show Legend
- j) **Plot Type:** Bar

Report Name: Min E<77, Min R≤75

Horizontal Axis Name: Schedule ID

Vertical Axis Name: Count Min Reservoir Critical



Fatigue Hazard Area

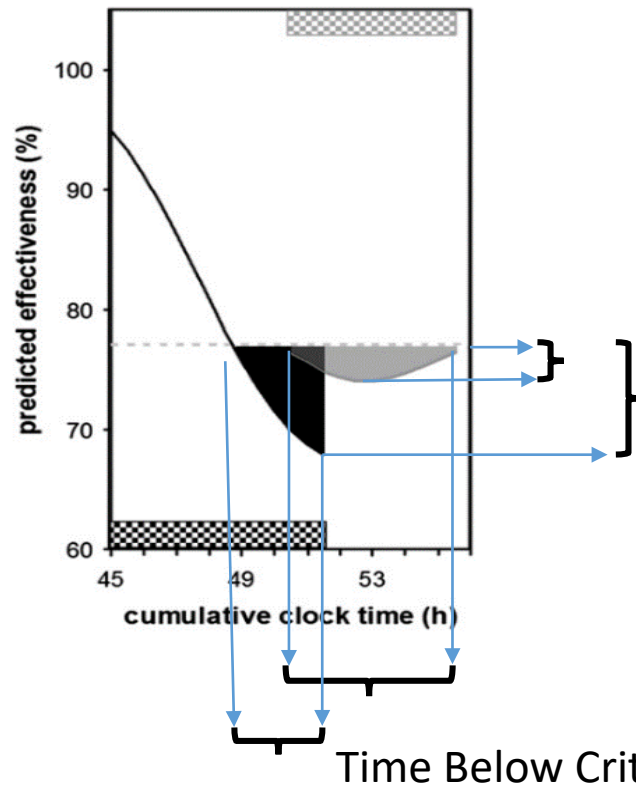
Report 3

A photograph of a commercial airplane in flight, viewed from a low angle, flying over the ocean. The sky is a mix of blue and orange, indicating a sunset or sunrise. The text "The Worldwide Leader in Aviation for Fatigue Management Solutions" is overlaid on the right side of the image in white, bold, sans-serif font.

The Worldwide Leader
in Aviation for Fatigue
Management Solutions

Fatigue Hazard Area Calculation

Fatigue Hazard Area is the Time Below Criterion weighted by Distance Below Criterion



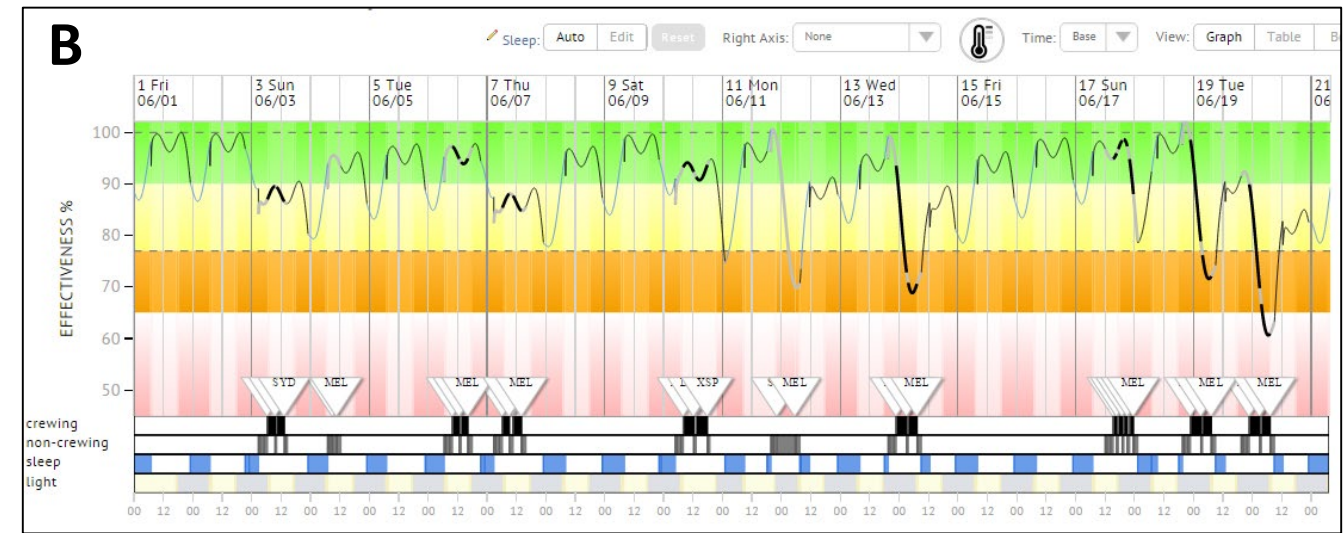
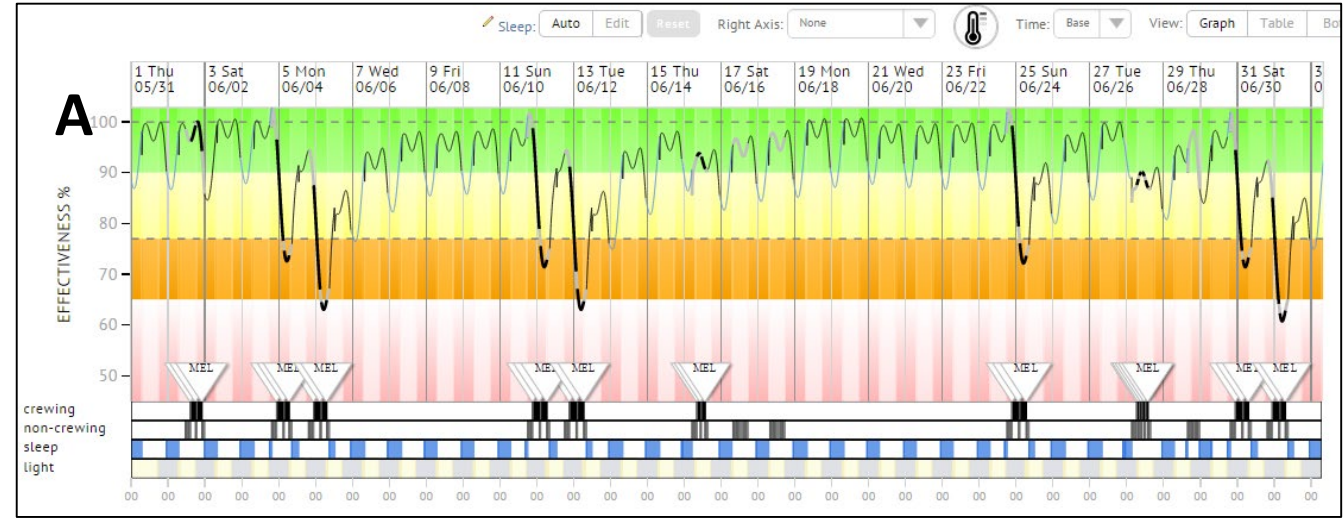
- $FHA = TBC \times DBC$
- The scale goes from 0 to Total Crewing Time
- %FHA divides FHA by Total Crewing Time and scales from 0 to 100

Distance Below Criterion (DBC)
 (Criterion - Minimum)/Criterion → 0 to 1.00

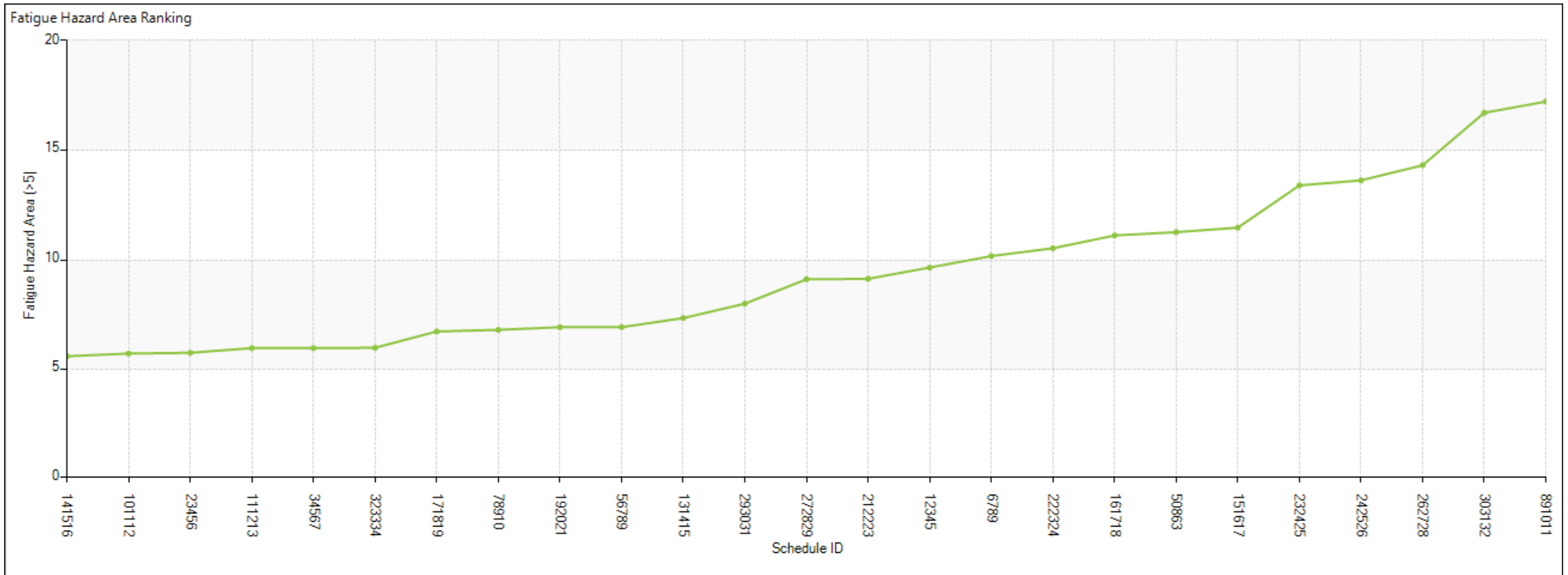


Fatigue Hazard Area Examples

- Schedule A:
 - FHA: 199.6
 - Min Effectiveness: 61.5
- Schedule B:
 - FHA: 79.8
 - Min Effectiveness: 60.7



Ranking Schedules by Fatigue Hazard Area



Report Building: Fatigue Hazard Screening

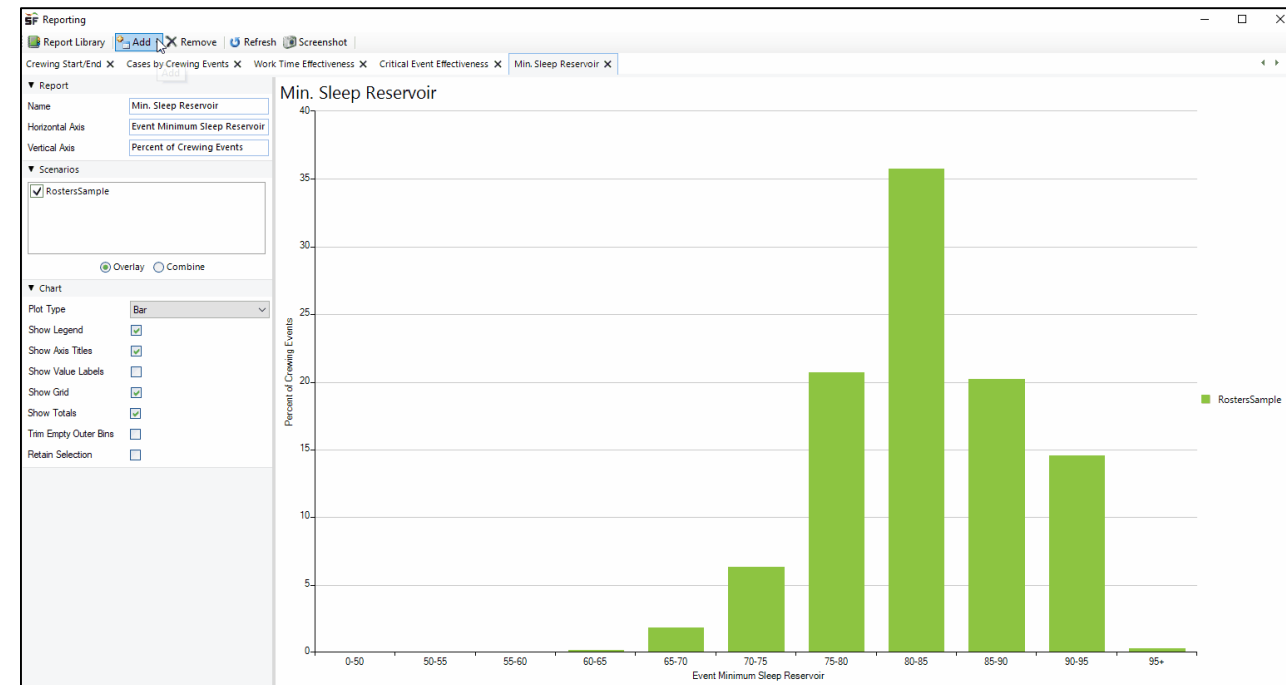
To build this report, follow the steps below:

- Add Pivot Events (Crewing)** report
- Row Labels:** Schedule ID
- Values:** Average of Fatigue Hazard
- Report Filter:** Fatigue Hazard Area (Crewing)
- Fatigue Hazard Area (Crewing)** – Filter set to: *is greater than 5*
- Schedule ID Filter** - set to Sort Ascending (A-Z) by: *Average of Fatigue Hazard Area (Crewing)*
- Deselect:** Show Totals, Show Legend
- Plot Type:** Line

Report Name: Fatigue Hazard Area Ranking

Horizontal Axis Name: Schedule ID

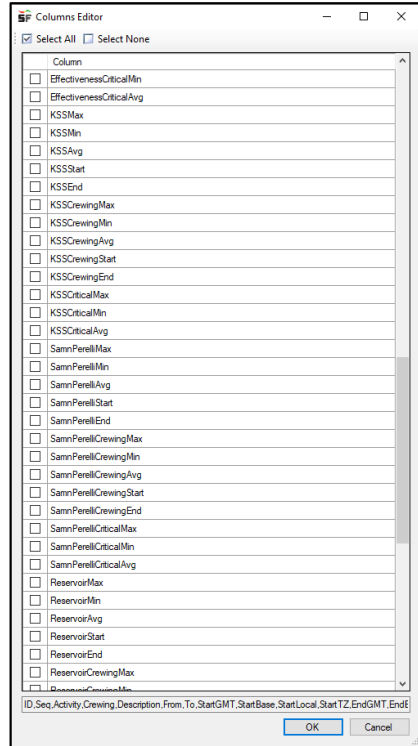
Vertical Axis Name: Fatigue Hazard Area (>5)



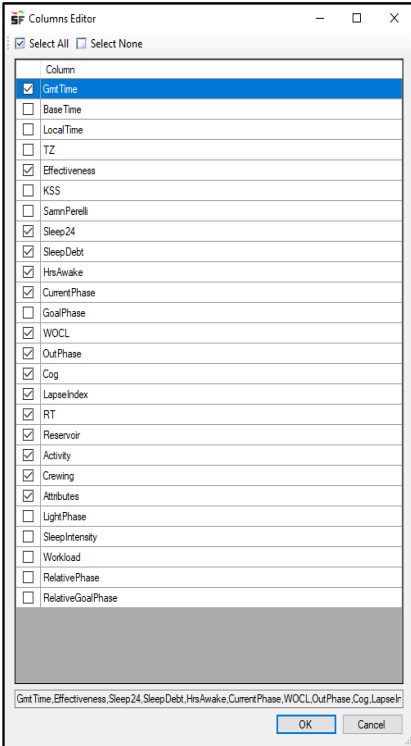
Reports & Data in the SFC

- **Summary CSV:** contains over 100 configurable data options. Typically set as default in Output parameter
- **Detail CSV:** approx. 30 configurable data options. Typically not enabled by default. Runs minute by minute calculation per schedule.
- **Schedule Results to CSV:** exports all column headers and data analysis from the Modeling Results Table.
- **Events Table:** data can be grouped/filtered on to then be extracted and paste into BI tools.

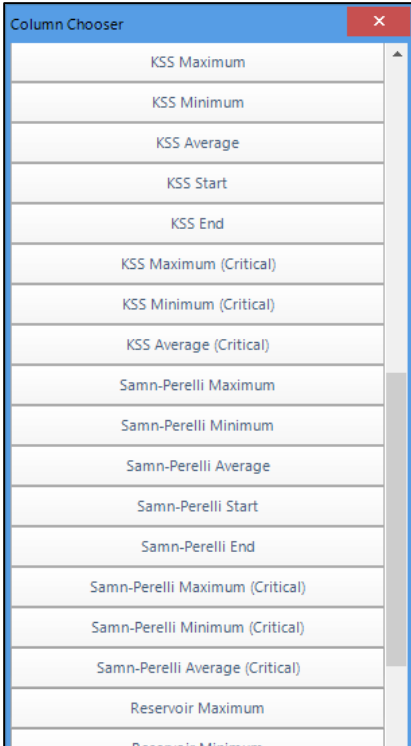
Summary CSV



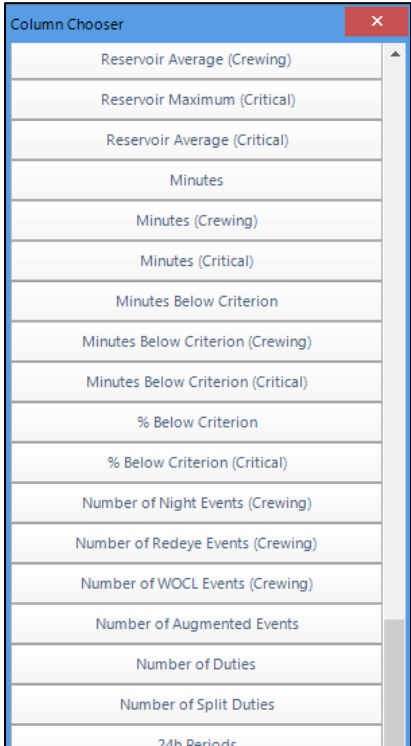
Detail CSV



Schedules Results to CSV



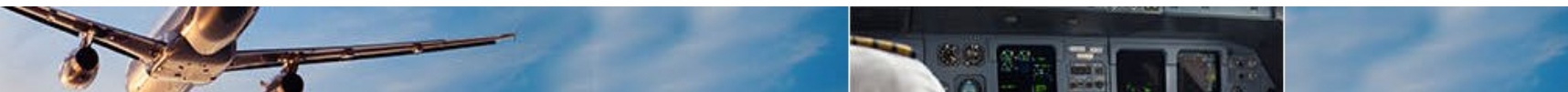
Events Table



Extracting Data: Summary, Detail & Schedule Results to CSV

The screenshot displays the SAFTEFAST software interface. On the left is a configuration panel for a scenario named 'RostersSample'. The main area features a data table with columns for Schedule ID, Date, Route, Total Duration, Number of Events, and various effectiveness and workload metrics. Below the table are summary charts for 'Results', 'Effectiveness Average (Crewing)', 'Effectiveness Minimum (Crewing)', 'Effectiveness Minimum (Critical)', 'Reservoir Minimum (Critical)', and '% Below Criterion (Crewing)'. The bottom status bar shows 'Schedules: 47 Events: 3305 Duration: 1577101'.

Schedule ID	Date (Base)	Route	Total Duration (Work)	Number of Events	Effectiveness Minimum (Crewing)	Effectiveness Average (Crewing)	Effectiveness Minimum (Critical)	KSS Maximum (Critical)	Samn-Perelli Maximum (Critical)	Reservoir Minimum (Crewing)	Reservoir Minimum (Critical)	% Below Criterion (Crewing)	Workload Maximum	Workload Median	To H
98765	02/06/17	YYZ, YHZ,...	4219	57	74.0	88.7	74.0	7.3	5.7	79.2	79.2	20.7	26.8	13.3	
12345	01/06/17	YXE, YQR,...	7869	120	66.7	82.9	66.7	7.9	6.1	72.9	72.9	47.2	32.8	14.4	
23456	01/06/17	YYZ, EWR,...	7369	97	68.4	91.4	68.4	7.7	6.0	74.4	74.4	17.0	41.0	22.0	
34567	01/06/17	YYZ, YOW,...	5353	77	69.8	82.6	69.8	7.6	6.0	75.4	75.4	47.6	34.9	20.0	
45678	13/06/17	YYZ, EWR,...	4502	46	96.5	98.1	96.5	2.5	2.1	83.8	83.8	0.0	27.3	13.6	
56789	10/06/17	YYZ, YOW,...	7312	92	67.0	90.2	67.0	7.8	6.1	72.8	72.8	21.1	38.6	23.4	
6789	01/06/17	YMX, YQM,...	8016	86	73.1	88.7	73.3	7.3	5.7	74.1	74.1	14.9	35.2	12.3	
78910	02/06/17	YYZ, YWG,...	7454	98	69.9	83.4	69.9	7.6	6.0	71.4	71.4	42.2	27.6	16.4	
891011	31/05/17	YYZ, YOW,...	10344	115	67.4	92.2	67.4	7.8	6.1	75.4	75.4	11.4	28.2	11.5	
91011	13/06/17	YYZ, EWR,...	4502	45	96.5	98.1	96.5	2.5	2.1	83.8	83.8	0.0	27.3	13.6	
101112	01/06/17	EWR, BDA,...	8338	101	69.5	90.9	69.5	7.7	6.0	74.1	74.1	19.0	38.6	21.1	
111213	01/06/17	YYZ, YOW,...	6787	94	69.8	83.3	69.8	7.6	6.0	75.4	75.4	44.8	34.9	19.9	
121314	16/06/17	YYZ, YWG,...	2432	31	73.5	88.6	73.5	7.3	5.7	79.4	79.4	24.7	25.4	16.8	
131415	01/06/17	YXE, YQR,...	4713	65	66.5	81.2	66.5	7.9	6.1	67.5	67.5	47.4	46.4	22.9	
50642	30/06/17	YOW, YYZ	315	6	99.4	100.4	99.4	1.3	1.2	87.2	87.2	0.0	5.8	5.8	
141516	12/06/17	YYZ, YYC, Y...	4995	49	71.0	84.0	71.0	7.5	5.9	74.6	74.6	21.8	11.5	6.6	
151617	01/06/17	ATL, YYZ, Y...	6372	87	54.8	79.0	54.8	8.4	6.6	63.9	63.9	44.8	28.8	18.2	



Extracting Data: Events Table

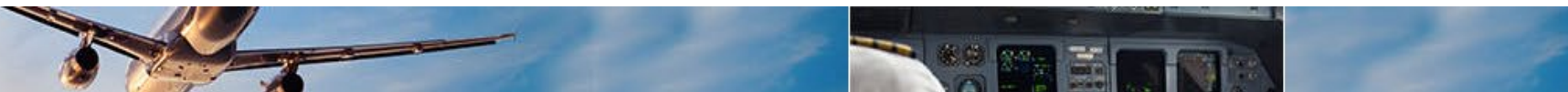
The screenshot displays the SAFTEFAST software interface. On the left is a configuration panel for a scenario named 'RostersSample'. The main area features an 'Events Table' with columns for Schedule ID, Date (Base), Route, Total Duration (Work), Number of Events, and various effectiveness and workload metrics. Below the table is a 'Summary' section with six pie charts representing different metrics: Success (37), Effectiveness Average (Crewing), Effectiveness Minimum (Crewing), Effectiveness Minimum (Critical), Reservoir Minimum (Critical), and % Below Criterion (Crewing).

Schedule ID	Date (Base)	Route	Total Duration (Work)	Number of Events	Effectiveness Minimum (Crewing)	Effectiveness Average (Crewing)	Effectiveness Minimum (Critical)	KSS Maximum (Critical)	Samn-Perelli Maximum (Critical)	Reservoir Minimum (Crewing)	Reservoir Minimum (Critical)	% Below Criterion (Crewing)	Workload Maximum	Workload Median	To H
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34567	01/06/17	YYZ, YOW...	5353	77	69.8	82.6	69.8	7.6	6.0	75.4	75.4	47.6	34.9	20.0	
45678	13/06/17	YYZ, EWR...	4502	46	96.5	98.1	96.5	2.5	2.1	83.8	83.8	0.0	27.3	13.6	
56789	10/06/17	YYZ, YOW...	7312	92	67.0	90.2	67.0	7.8	6.1	72.8	72.8	21.1	38.6	23.4	
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131415	01/06/17	YYZ, YOW...	4713	65	66.5	81.7	66.5	7.9	6.1	67.5	67.5	47.4	46.4	22.0	

Summary Results:

- Success: 37
- Warning: 10
- Effectiveness Average (Crewing): 77-90 (22)
- Effectiveness Minimum (Crewing): 90+ (15), 90+ (4)
- Effectiveness Minimum (Critical): 0-65 (9), 65-77 (24)
- Reservoir Minimum (Critical): 90+ (4), 0-65 (9), 65-77 (24)
- % Below Criterion (Crewing): 65-75 (19), 0-65 (1), 75-90 (17)
- Workload: 10-20 (12), 0-1 (4), 1-10 (4), 20+ (17)

Schedules: 47 Events: 3305 Duration: 1577101



A large commercial airplane is shown from a low-angle perspective, flying towards the viewer against a dramatic sky with a sunset or sunrise. The sky transitions from a deep orange near the horizon to a clear blue at the top. The airplane's wings, tail, and engines are clearly visible.

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Questions?

Conclusion of Presentation