

**FATIGUE RISK MANAGEMENT**

**40**years  
1968-2008

association luxembourgeoise  
des pilotes de ligne

## **CONFERENCE**

**Luxembourg, Europe**

**2 – 3 OCTOBER 2008**



**Presenter**  
**Len Pearson**



# AGENDA

1. About InterDynamics Pty Ltd
2. Development of FAID® and its use in Fatigue-risk Management
3. FAID® - software Outputs
4. FAID® - industry experience

# 1. About InterDynamics

- Developed and implemented the Inbound Logistics Scheduling System for the Sydney 2000 Olympics.
- Provide Planning, Scheduling & Risk systems to Alcoa, BNSF Railroad, bhpbilliton, Canadian Pacific, easyJet, Fonterra, Linfox, NSC Railroad, Pacific National, QR National, RailCorp, Sydney Ports Corp, Toll NZ, Union Pacific, etc
- Developed FAID<sup>®</sup> (Fatigue Audit InterDyne<sup>®</sup>) – based on research data developed by the Centre for Sleep Research, University of South Australia.
- Developed FaidSafe<sup>®</sup> - risk-based integrated fatigue management approach, based on a risk engineering framework, developed in alliance with Zurich Insurance

## 2. Development of FAID®



Winner of the



Information Technology  
Solution

# Work-related Fatigue

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graph TD; A[Hours of work] --> B[Work-related Fatigue]; C[Tasks/other factors] --> B; D[Modelling FAID®] --> B; E[Risk Management] --> B;
```

Hours of  
work

Tasks/other  
factors

Modelling  
FAID®

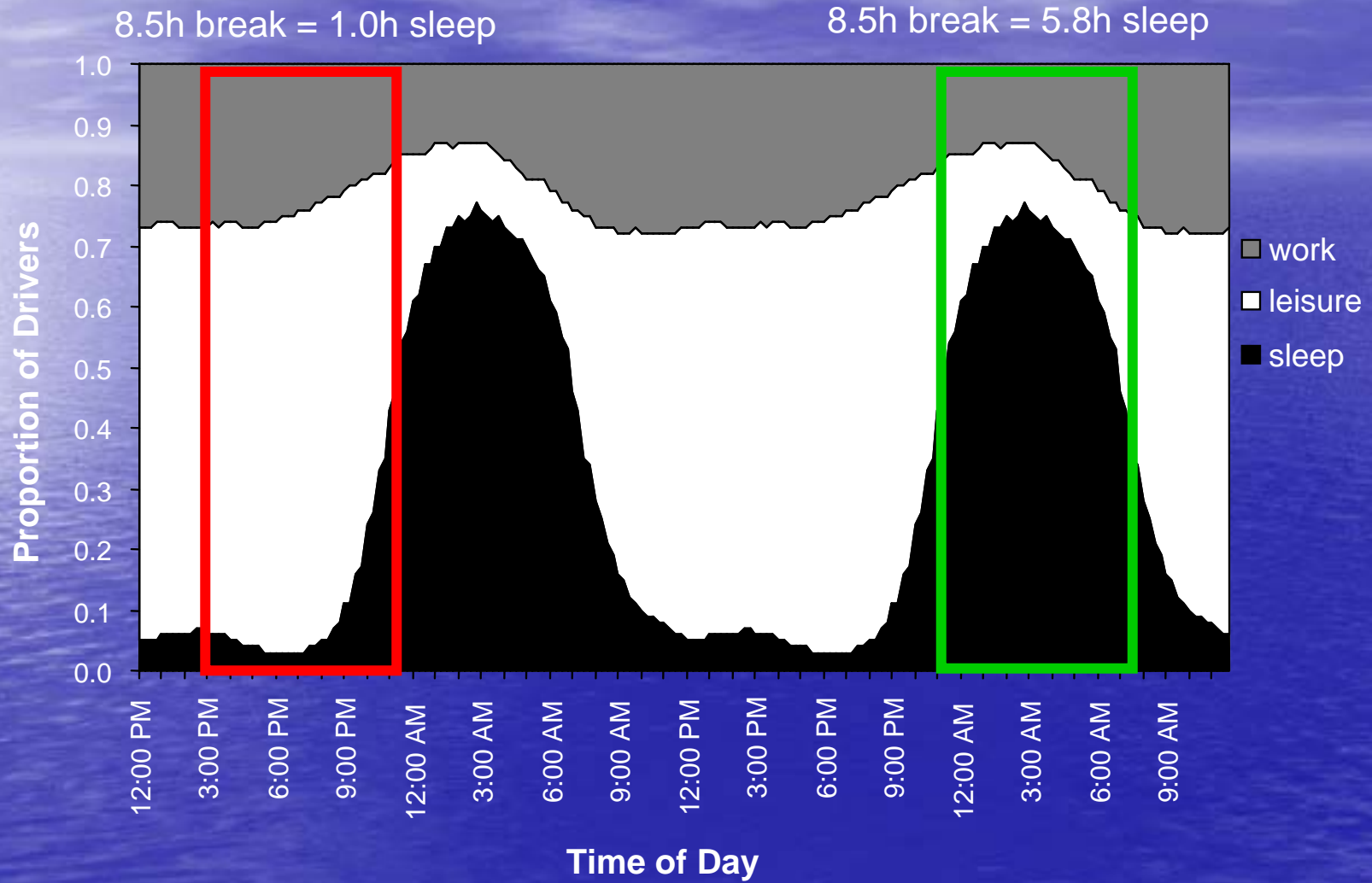
Risk  
Management



Specifically, FAID® takes consideration of:

- length of each work or break period
- time of day at which the work or break will occur
- prior (seven-day) work history of the individual
- biological limitations of sleep and recovery

# 48 hours





## Fatigue Scoring Approach

- The FAID® scoring approach is representational
- Example: for a Monday to Friday 0900 to 1700hr standard work week.
  - Result is a score of ~ 40.
- For the same work week (40 hours), with work hours from 2300 to 0700hr.
  - Result is a score of ~ 80.

# FAID

- A recent study (1) indicated that scores between 80 and 100 are equivalent to the predicted level of work-related fatigue achieved after 23-24 hours of continuous sleep deprivation (starting at 0800h).
- This result was observed when the sleep deprivation started at 0800h on a Monday, following a week working Monday to Friday 0900-1700h and with Saturday and Sunday off.

(1) Dawson, D. and Reid, K. Fatigue, alcohol and performance impairment. Nature July 1997, 388: 235.

# FAID

- Performance impairment at such a level of sleep deprivation has been associated with a blood alcohol concentration over 0.05% BAC.





- Validation studies suggest that FAID® scores below 80 are broadly consistent with a safe system of work and scores above a 100 are broadly consistent with an unsafe system of work.
- These scores have been independently scrutinised and accepted as evidence by agencies including The Australian Transportation Safety Bureau (ATSB) and The Special Commission of Inquiry into the Waterfall Rail Accident near Sydney.

# Fatigue Hazard Analysis (FHA)

Risk Management Standards, such as:

- Zurich Hazard Analysis (ZHA)
- Australia & NZ Standard AS/NZ 4360
- Canada CAN/CSA-Q850 – 1997
- United Kingdom BS 6079-3:2000

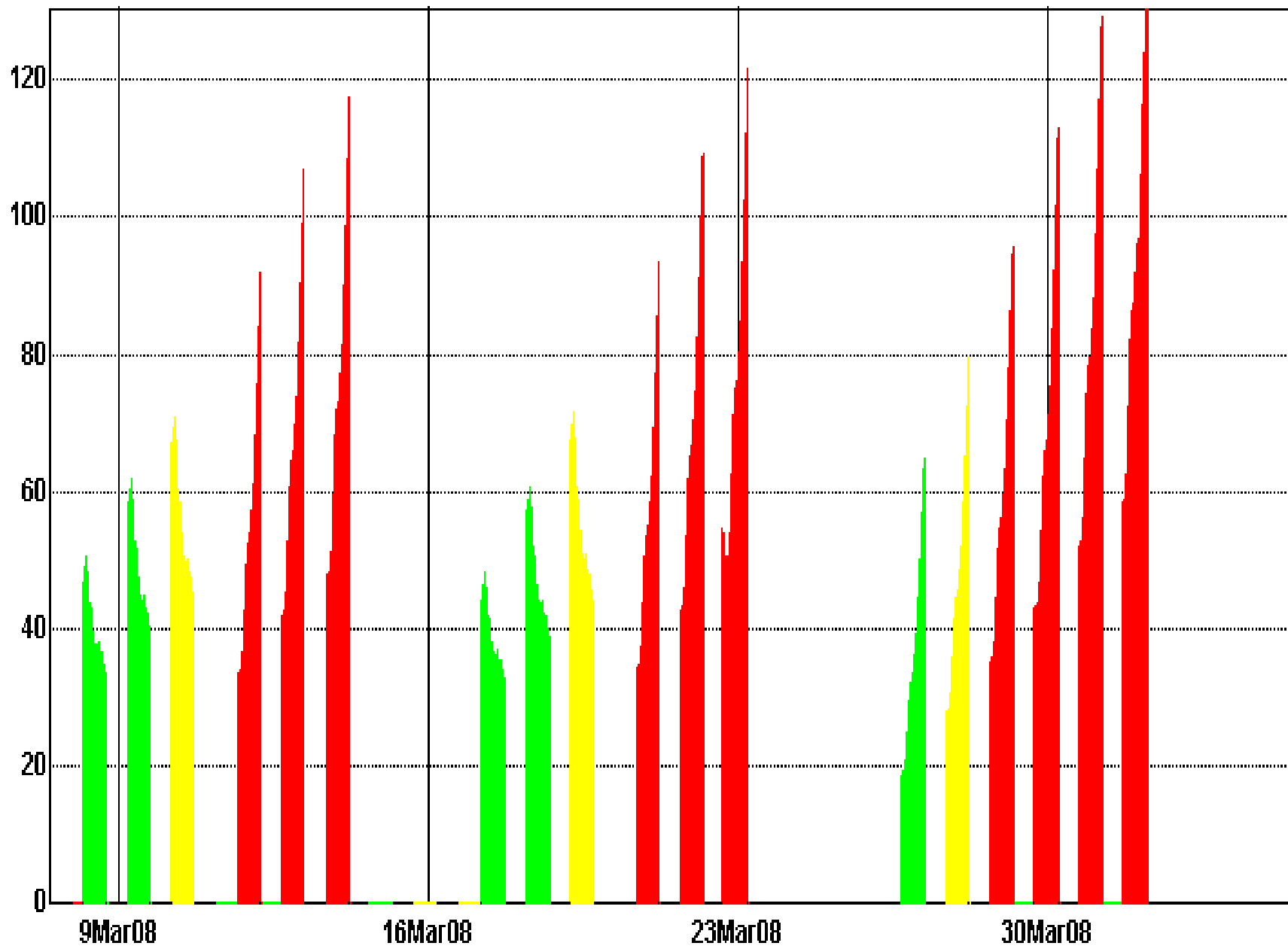
# How to Determine an Appropriate Fatigue Tolerance Level for your Organization

- This process involves the identification of individual workplace tasks
- Selection of Risk Severity and Risk Frequency gradings
- Development of an organizational Risk Tolerance Boundary
- and a Task Specific Fatigue Tolerance Level
- Review of actual hours of work and its associated indicative fatigue levels.



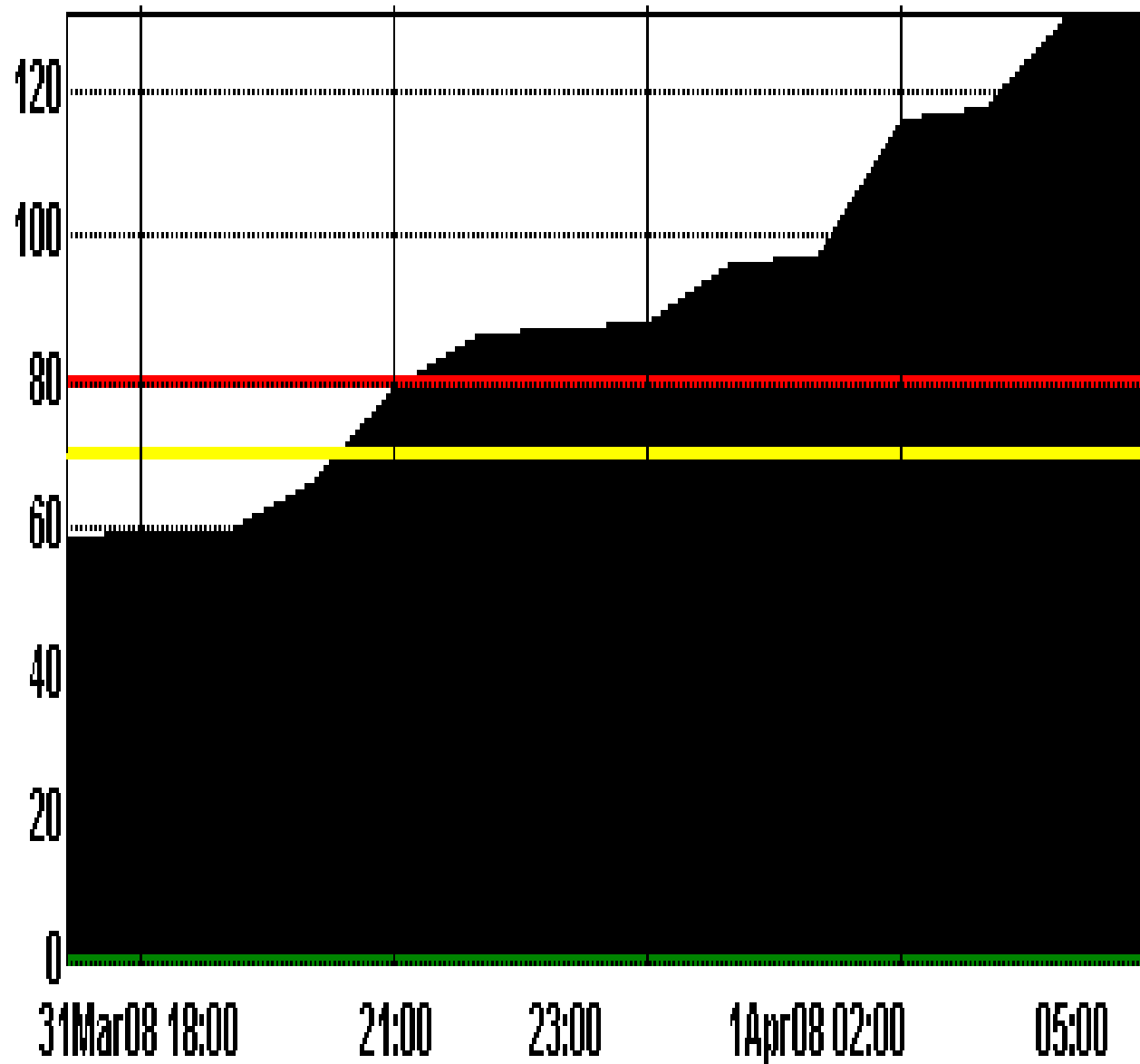
### 3. FAID® Outputs

# FAID® Score Plot



## FAID® Score Table

	ID #	Non- Work	Start	Work	Task	FAID® Condition Green	FAID® Condition Yellow	FAID® Condition Red	Peak FAID® Score	Peak FAID® Cond	
4:	357309	24.1	11 Mar 08 1704	12.4	Moderate	9hr 34min	1hr 35min	1hr 15min	92	12	
5:	357309	11.6	12 Mar 08 1705	11.9	Moderate	7hr 28min	1hr 50min	2hr 35min	107	27	
6:	357309	12.1	13 Mar 08 1706	12.4	Moderate	4hr 40min	3hr 8min	4hr 33min	117	37	
7:	357309	72.1	17 Mar 08 0535	11.9	Moderate	11hr 53min			48	-32	
8:	357309	12.2	18 Mar 08 0537	12.4	Moderate	12hr 21min			61	-19	
9:	357309	11.7	19 Mar 08 0537	11.9	Moderate	11hr 9min	42min		71	-9	
10:	357309	23.7	20 Mar 08 1708	12.3	Moderate	9hr 24min	1hr 35min	1hr 21min	93	13	
11:	357309	11.7	21 Mar 08 1708	12.3	Moderate	7hr 17min	1hr 54min	3hr 9min	109	29	
12:	357309	10.7	22 Mar 08 1608	13.3	Moderate	5hr 9min	3hr 9min	5hr 2min	122	42	
13:	357309	83.7	26 Mar 08 1708	12.8	Moderate	12hr 50min			65	-15	
14:	357309	11.1	27 Mar 08 1704	12.4	Moderate	11hr 14min	1hr 11min		79	-1	
15:	357309	11.6	28 Mar 08 1705	12.7	Moderate	9hr 23min	1hr 35min	1hr 46min	96	16	
16:	357309	11.3	29 Mar 08 1705	13.2	Moderate	7hr 13min	1hr 58min	4hr 0min	113	33	
17:	357309	10.8	30 Mar 08 1705	12.9	Moderate	3hr 50min	2hr 51min	6hr 11min	129	49	
18:	357309	11.1	31 Mar 08 1706	12.8	Moderate	3hr 13min	51min	8hr 46min	139	59	■



### Work Period

31 Mar 08 1706

to

1 Apr 08 0556

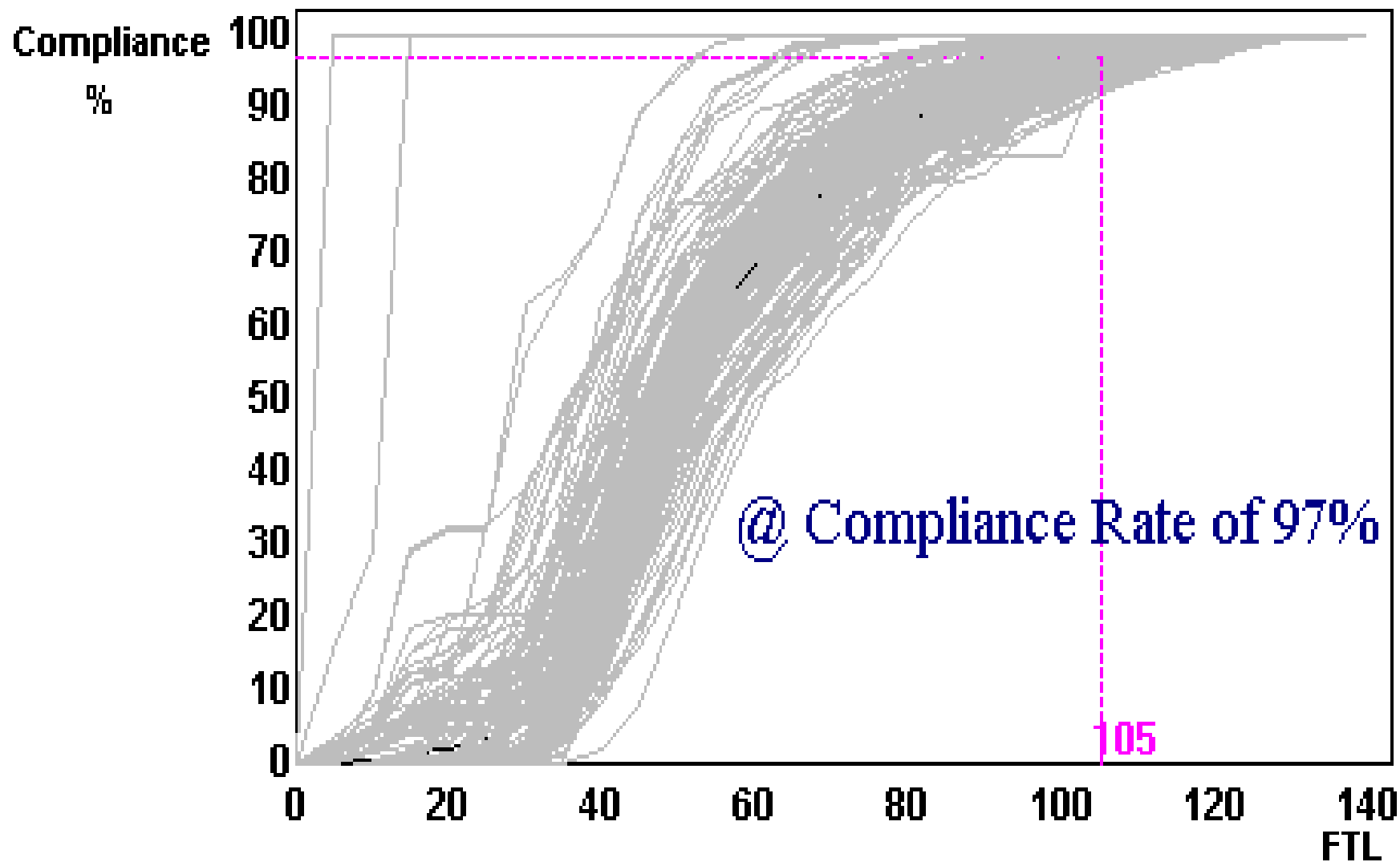
### Legend

— FTL

— FTL - 10

■ FAID®  
Score

## Individuals and Overall Compliance



Individuals



Overall



Highlight





## 4. Industry Experience

# Multi-faceted use of FAID®

- Risk assessment of historical planned and actual hours of work
- Risk assessment of current and future planned hours of work
- Assist in “what-if” risk analysis for new roster design
- Analyse for hours of work fatigue influence on safety occurrences
- Provide routine hours of work risk monitoring for various stakeholders including operations, senior management, safety regulators, insurers  
... and unions

# FAID® Use in Industry

- QANTAS – Integrated Fatigue Risk Management Program – across whole group.
- QANTAS – FRMS (trans-meridian) research project.
  - Current version of FAID® is considered valid for up to 4 time zone changes i.e. Continental USA / North America / Australia.
  - Research project intended to provide complete *non-localized* time zone coverage.

# FAID® Use in Industry

- CASA has approved in excess of 25 FRMS applications in the Australian General Aviation market where FAID® is installed.
- Class I Rail operators in North America, such as Union Pacific, BNSF and Canadian Pacific Railroads – Enterprise Wide Monitoring and “Board” game / roster planning tool

# FAID® Use in Industry

- Marine pilots in major Australian & New Zealand ports, including one installation in the UK (Harwich Haven)
- BP in the UK / Europe for Road Transport
- BAA Airports in the UK for security guards at London Airports (LHR, LGW & STN)
- Mining industry in Australia
- Police Service in Melbourne, Australia

# FAID® Use in Industry

- MAF Quarantine Service in NZ
- Sydney Harbour Ferry Services
- Sydney Public Bus Transport
- Dutch Transport Inspectorate
- [transavia.com](http://transavia.com)
- Hydro Ottawa - linesman
- Columbia River Bar Marine pilots



- FAID® is designed to be used as an integral part of a Fatigue Risk Management System.
- Used by itself, FAID® is not a Fatigue Risk Management System.

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