



Keel Design & Technology

Do we need a safer approach?

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International Sailing Federation - ISAF



Current ISAF Rule Framework

Yacht structure:

- Offshore Special Regulations (OSR)
- Rule 3.03 and Appendix M
 - OSR Categories 0,1 & 2
 - Oceanic to extended offshore (e.g. Fastnet)
- ISAF Plan Review Scheme
 - <24m ISO 12215 – Notified Bodies
 - >24m Classification Societies (e.g. GL Yacht Rules)



2012-2013
OFFSHORE SPECIAL REGULATIONS



Since 1984 from a review of 72 reported incidents:

- Of the known cause of failure:
 - More than 33% are welded fin failures
 - Only 25% from grounding or collision
 - 25% from hull internal structure failure
- 24 fatalities



ACCIONA
VIRBAC-PAPREC 3
SAFRAN
RAMBLER
TIME TO BURN
HOOLIGAN V
SHOCKAZULU
ECOVER
SKANDIA
EXCALIBUR
DRUM
RIO
SURLEJ
POLBREAM
PRB
CIMENT SAINT LAURENT
OCEAN
ARTECH - CAEN LA MER
CREALINE
CASTAWAY FIJI
SKILAGALEE
BOUNDER
AUTO ATLANTIC
THUNDERCHILD
MOQUINI
BAVARIA MATCH 38
RISING FARRSTER
MARINE MARINE
STREWTH
VOTRE NOM AUTOUR DU
MONDE
MARTELL A



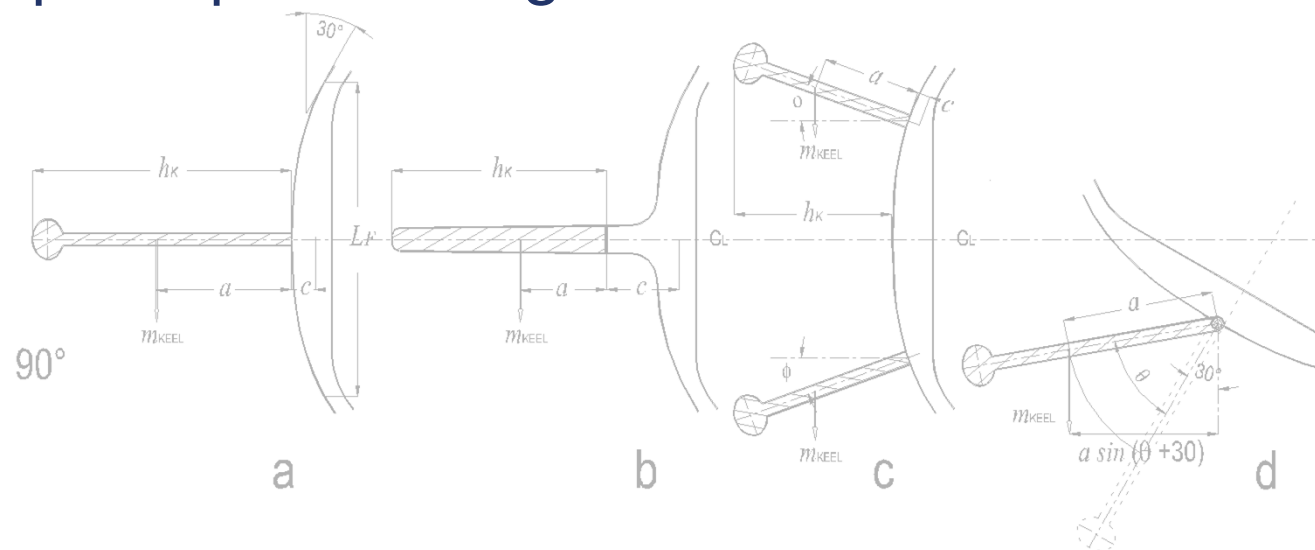
Is there a class problem?

- 50% failures from 3 classes:
- 18 IMOCA
- 10 Mini Transat
- 6 Maxis



Is OSR Plan Review Working?

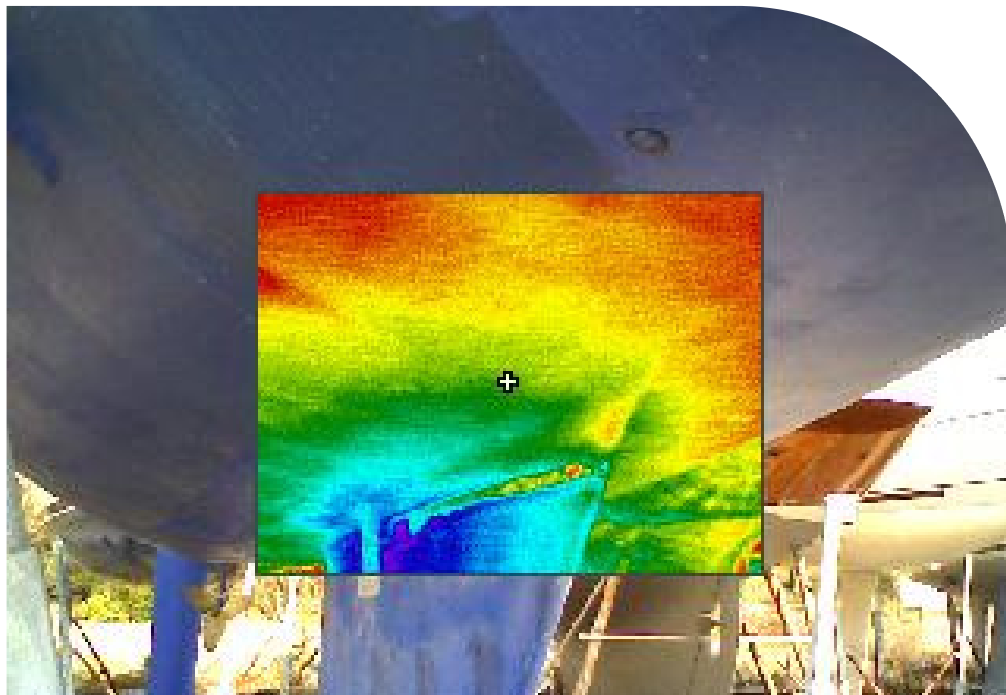
- ISO 12215-9 and Germanischer Lloyd >24m rules have a more thorough review of keel design, particularly in the fatigue area.
- Tendency for designers to avoid welded connections perpendicular to main load.
- Minimizing fin weights using fully machined keels, perhaps avoiding welded connections at all?



New OSR Recommendation

- 2014-2016 Offshore Special Regulations
Recommendation:-

Regular inspections of the keel and keel/hull attachment structures are strongly recommended.



What are ISAF doing now?

- ISAF Keel Structure Working Party:

- Stan Honey (chairman)
- David Lyons (designer)
- Adrienne Cahalan (legal)
- Alp Doguoglu (owner representative)
- Jason Smithwick (ISAF staff)

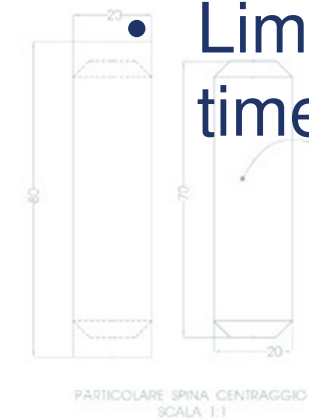
- “...rather than adding features to be safe when a monohull is inverted following the loss of the keel, attention should be devoted to ensuring that the keel remains attached.” – Stan Honey

- We also need input from you...

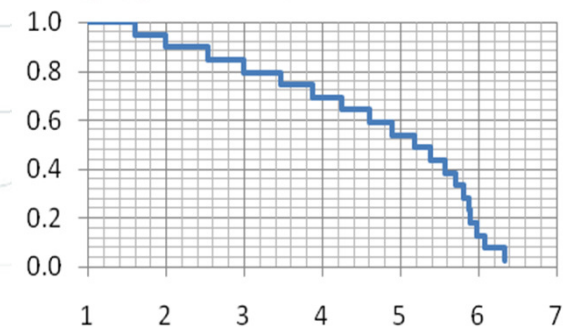
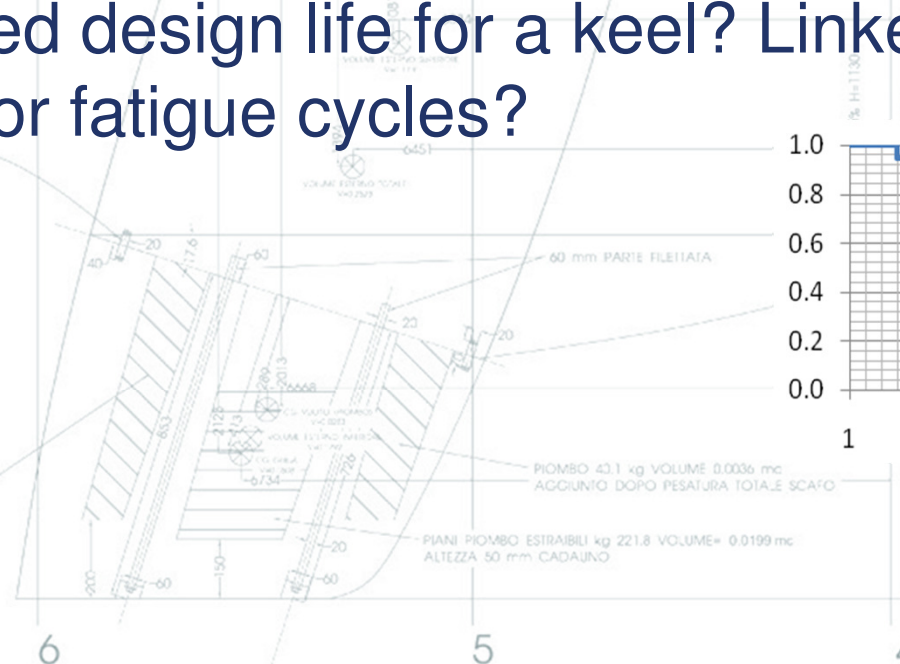


What are ISAF doing now? Future consideration...

- Increase scope of plan review to OSR Category 3?
- Look at Class Rules?
- Independent in-build inspection?
- Independent regular survey/inspection?
- Limited design life for a keel? Linked to in-service time or fatigue cycles?



PIOMBO 41 kg VOLUME = 0.040 mc
AGGIUNTO DOPO PESATURA TOTALE SCAFO



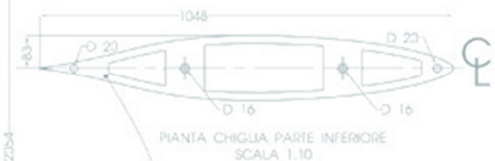
What are ISAF doing now? Future consideration...

- Promote or mandate disclosure of incident reports and investigations?
 - Through owner declaration?
 - Through OSR rules?
 - Through insurance companies?
- Mandate disclosure of design data to ISAF or race organisers?



PARTICOLARE SPINA CENTRAGGIO
SCALA 1:1

PIOMBO 41 kg VOLUME = 0.040 mc
AGGIUNTO DOPO PESATURA TOTALE SCAFO



PIANTA CHIGLIA PARTE INFERIORE
SCALA 1:10

PREPARAZIONE
CP
LUNGH.
PARTE
(SALDATURA
CIRCON
FORO RM

PREPARAZIONE
E