Koninklijke Marine

# MITIGATION OF PHYSICAL LOADS ON FRISC HSC BOATS

*AVOIDANCE*

*"Man is the limiting and therefore the deciding factor"*

INTRODUCTIE COMMISSIE FRISC
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# INTRODUCTION

FRISC runs from 2004 and is a “compromise project”

- FRISC (Fast Raiding and Interception Ship Craft)is a “collection project” concerning:
  - *Replacement small landing craft LCRM / Boston Whaler*
  - *Acquisition small craft for SF-marines*
  - *“SuperRhib” for project OPV (Holland class)*
  - *projecten concerning harbour safety RNlN Naval base*
- Delivery of 50 craft in the period 2011 – 2013

# INTRODUCTION

- FRISC is an important weapon system for CZSK
- FRISC is an potential risky vessel
  - *much power: 2 x 375 pk*
  - *high speed: 45 kts*
  - ***physical loads of sailors and passengers***
- Research on Physical Loads already took place 2013-2014
- NlMoD as an employer is concerned about already registered physical complaints

# INTRODUCTION

- FRISCs makes a hard ride at sea during operations
- Loads are dependant in speed, seastate and navigational skills of the crew
- Physical Loads on the body are experienced by crew and passenger
- This leads eventually to medical complaints
- These are originating from:

  - *Whole Body Vibration (WBV)*
  - *Repeated Shocks (RS)*

# INTRODUCTION

- Observations on what to do:
  - Physical (medical) complaints
  - FRISC navigators sail more than passengers (marines): distinction between secundary vs Primary exposure!
  - Requirements for age and/or gender?
  - Medical or physical testing for competance……..
  - Deck-cycle? Reduced operational availability?
    - Resting times? What is actually known?
    - Strict sailing schedules?
- Current situation:
  - Existing requirements in education
  - FRISC training

# FRISC CHARACTERERISTICS – TESTS – 2014

## ARE YOU AWARE OF THESE CHARACTERISTICS?!

**Speed**

0 – 10 = 10%
10 – 20 = 25%
20 – 30 = 55%
30 – max = 15%

**Seastate**

1 – 2 = 20%
2 – 3 = 50%
3 – 4 = 20%
> 4 = 10%

**Is this your sailing-envelope?**

# VIBRATIONS AND SHOCK ON THE BODY

- What do vibrations and shock actually mean?
- Determinating vibration loads (law and standard)
- What is already researched? (seats, measuring campaign NL and CARIB)
- Limitations in measuring and interpretation of the campaign
- Mitigation and control in the working environment

# MITIGATION&CONTROL (WORK ENVIRONMENT)

- Selection of the right type of craft for the specific task (improvement of ride control, other navigational practices)
- Reduction of speed as required
- Selection of better or the right compensating seats
- Awareness and instruction
- Shortening of exposure (limiting operations)

# EXPERIENCED EFFECTS ON HUMAN BODY

**Nerve-Muscle-Sceleton-system and internal organs**

Head/neck/shoulder, back, knee, foot, nerve system, internal organs, hearing

- Direct effects (like immediately)
- Indirect effect (like showing up later in time)
- chronical effecten (not really understood yet)

# INTERVENTION RS / WBV MITIGATION

On FRISC:
Mitigating measures and Cockpit Management Systems?

- Suspension Jockey Seats
- Suspension hull systems
- Hull Design (RNlLBA - KNRM project NH 1816)

# INTERVENTION HEALTHMONITORING (constant monitoring)

- 0-measurement through physical loading test (in development and possibly liaised to the Physical Profile NL Marines?)
- Personal Medical Scan 1x/jr, during functioning or commission (PMSc)
- End-measurement after finalization of commission on FRISC
- Legal obligation for employer to offer this !!
- On basis of free choice; **NO** selection or exclosure criterium

# CONCLUSION ON MEDICAL ISSUES

- Problems with RS/WBV of FRISC are an international issue!
- Specific training and continuous health monitoring are for now essential in prevention of effects from RS/WBV
- New guidelines for the maritime environment, as opposed to land, will have to be developed
- We and our partners are still learning every day
- Necessity to combine information, experience, knowledge, to share and contain it until solutions have been found!!

# WAY AHEAD

## SHORT TERM

- Campaigning to get awareness and cultural change on the issue of physical loads
  - *Public relations*
  - *Guidelines*
  - *Routines and procedures*
  - *Physical training programme*
  - *Navigational envolope for FRISC operations*

- Intensive measuring campaign by NL TNO in 2015

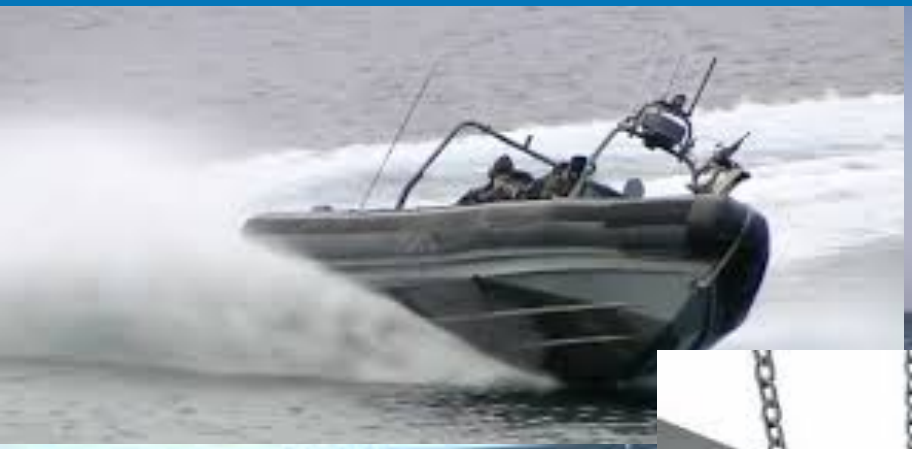
LESSON: *human* is the limitating factor, not the *machine*!

# WAY AHEAD

## LONG TERM

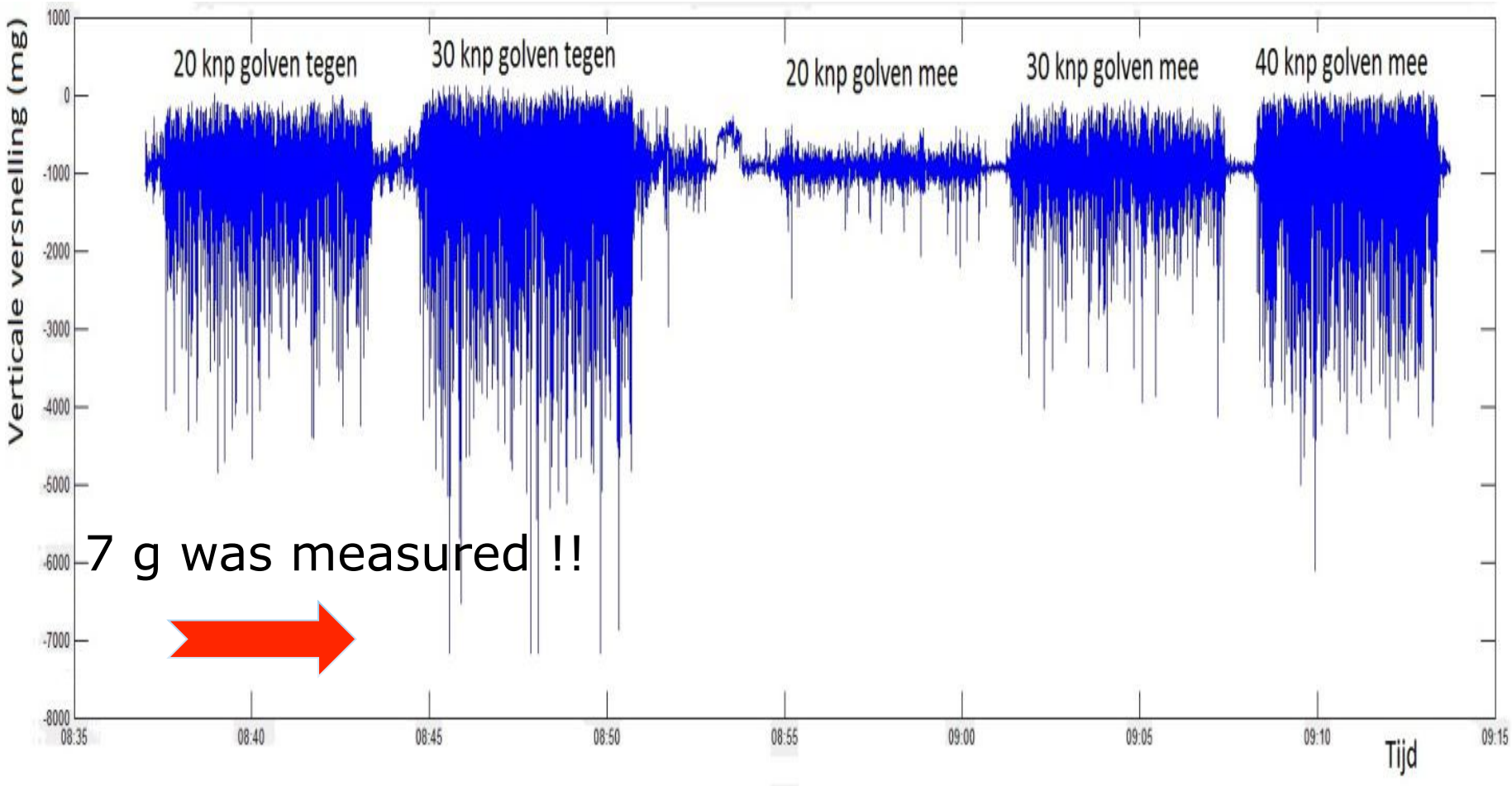
Knowledge build-up in the technical and medical area:

- ❖ research/advise TNO (2014-2016)
- ❖ collaboration with international academic world/organzations
- ❖ other navies and civilian parties using FRISC-like craft
- ❖ research and standardization on (maritime) WBV / RS
- ❖ technical changes FRISC
- ❖ programme to monitor health of crew and passengers
- ❖ developing new specifications for future High Speed Craft, like our RNlN FRISC craft





# ACCELERATION VERTICAL !




7 g was measured !!