

How must the boats of the future be designed?

Conference Düsseldorf Boat Show

January, 23rd, 2013

Research project “standard data“:

“Age- and gender-related reference data
for the performance of activities
from watersport enthusiasts
on motor- and sailing-yachts“

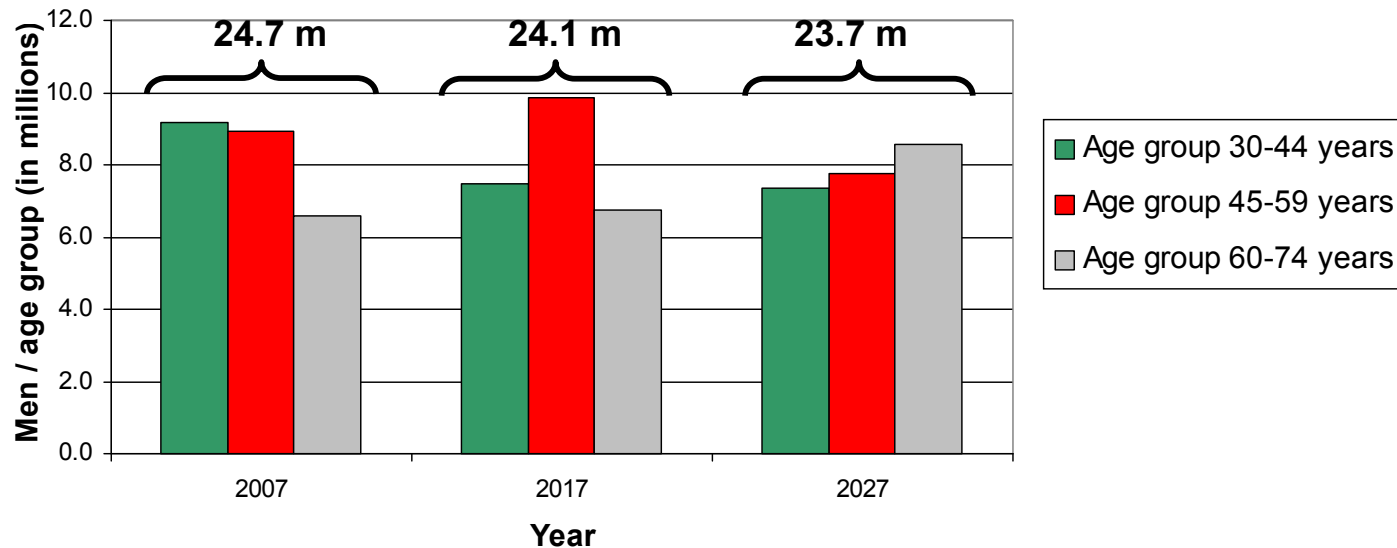
Study performed by the Research Institute for the Recreational Boating Industry

- **Founded in 2007 by the marine industry companies**
- **Non-profit organisation**
- **Performing joint industrial research projects in collaboration with qualified research centres (i.e. universities)**
- **Research projects financed by industry or government**

Research project “Age and gender-related reference data (standard data)”

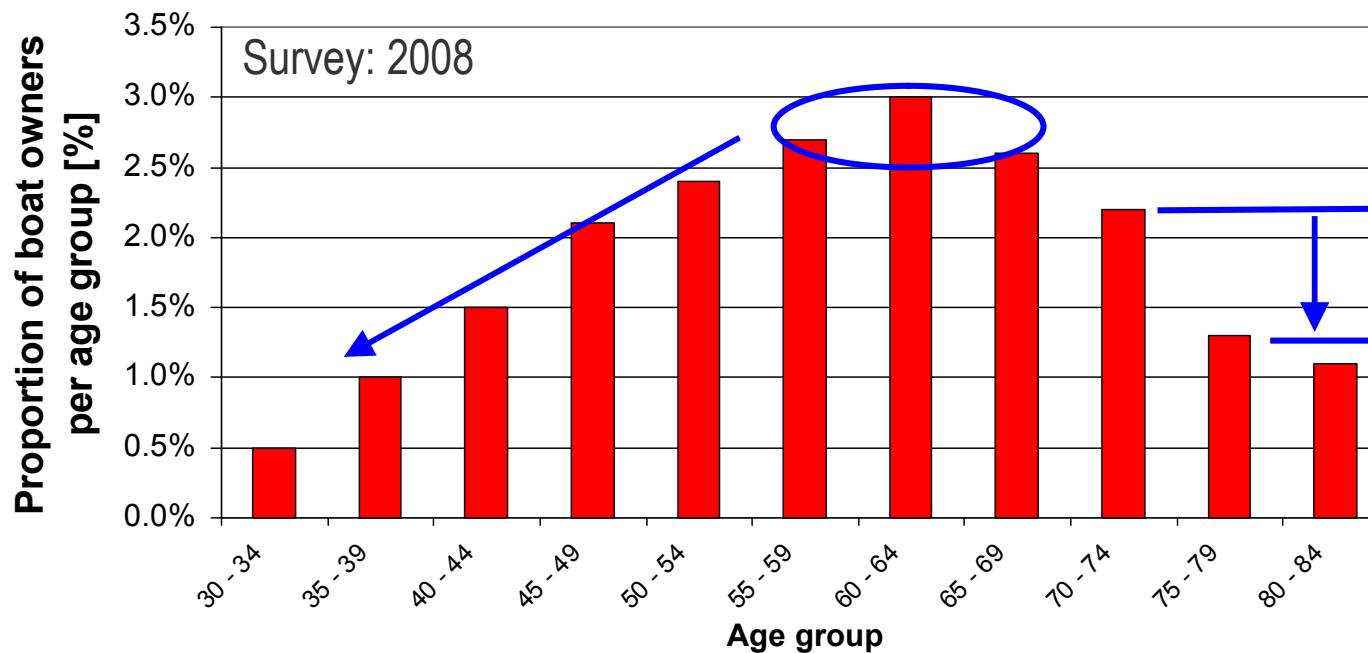
- Boating population is getting older
- Different age (and gender) groups have different needs
- Using “standard data” enables boat manufacturers to design boats according the needs of a special age target group
- Elderly people have both time and money
- 5 more years on board means 13 billion Euro additional turnover for the German marine industry

Future problem: Demographic Trend



- **Next 20 years: The male population (30-75 years) will remain stable at about 24 million persons**
- **Decreasing number of younger people**
- **increasing number of elderly people**

Future problem: Boat owners as a proportion of the male population



- In the age group 55 - 70 years: More than 2.5% of males have their own boat
- In the age group < 40 years: The proportion of the boat owners has decreased to 1%
- In the age group 70 - 75 years: Around 50 % quit boating (see project *Fit & Sail*)

Changes in the target group marketing Example – Automobile industry:

- **Top categories 1960:**
 - Engine performance, maximum speed, handling characteristics
 - Image of the brand
 - Technical reliability

⇒ Target groups: "Standard customer", "Social class"

- **Top categories 2012:**
 - Comfort in the interior, flexible use
 - Simple operation, assistance systems
 - Favourable costs

⇒ additional target groups: "Women", "Elderly people", "Lifestyle"

Similar changes are also to be expected in boatbuilding

In boatbuilding:

Target group categories:

Gender (Men / Women)

Age group (20-29 / 30-39 / 40-49 / 50-59 / 60-69 / 70-79)

Survey in the “standard data“ project:

**Which ranges of
physical and mental performances
can be expected on board from these groups**

Measurements made on 510 test persons in cooperation with
the Institute for Sports Sciences University of Kiel

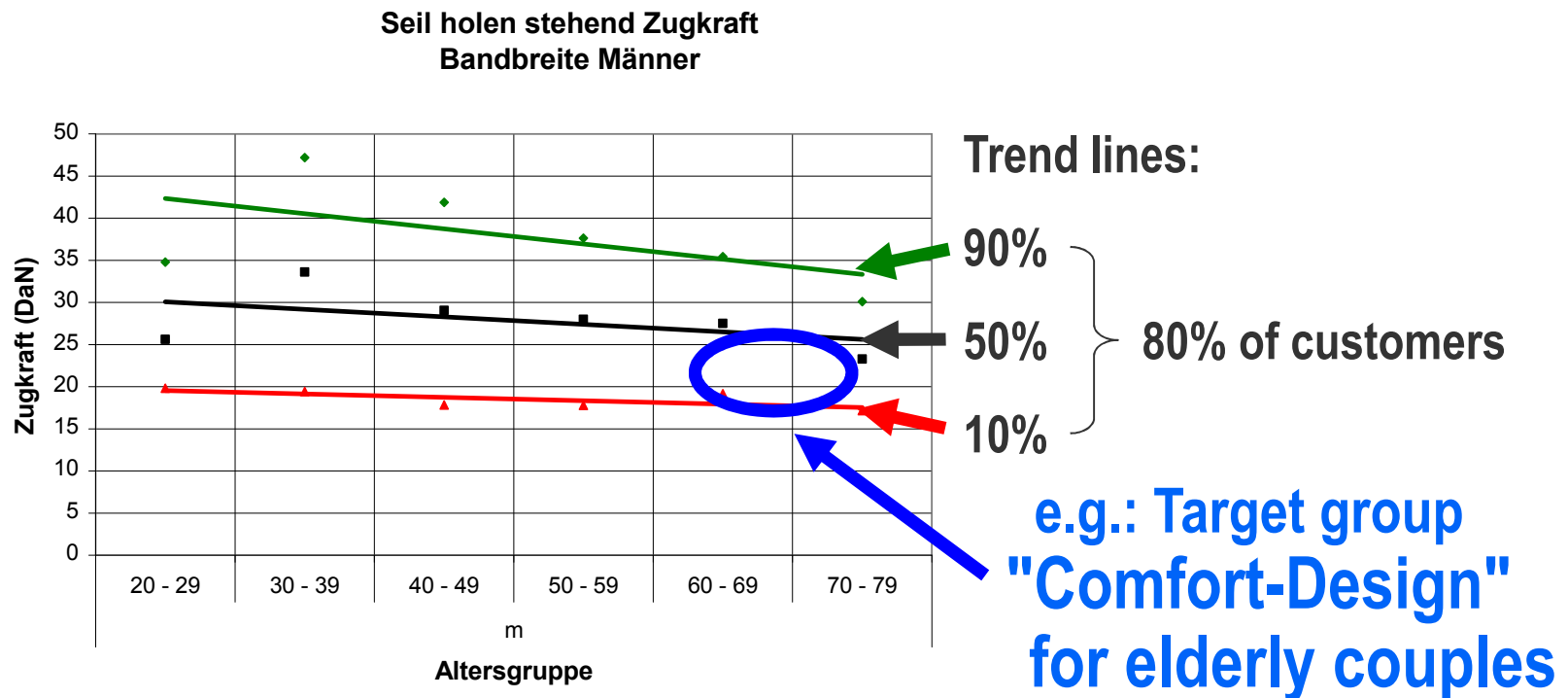
Activities investigated:

- Safe walking and working on board
- Climbing heights
- Step length
- Stairs
- Optimal seating heights
- Strengths and performances when hauling ropes (by hand / by winch)
- Arm and hand strength when lifting and turning
- Field of view and mobility
- Reaction times, stress

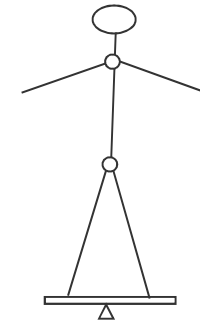
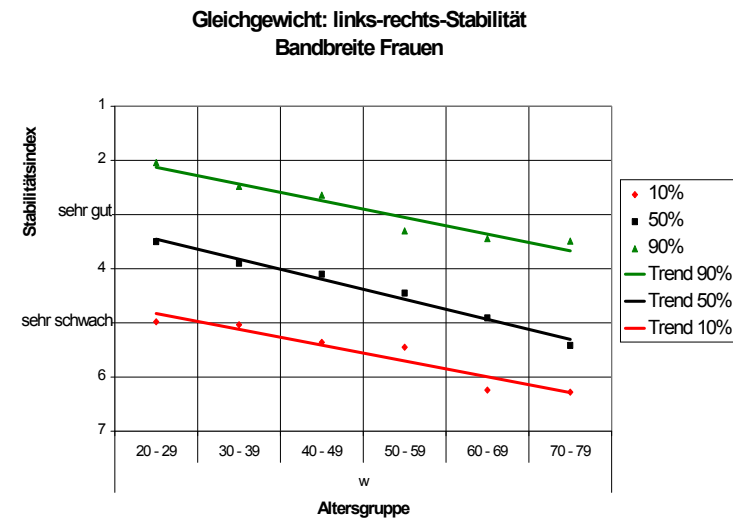
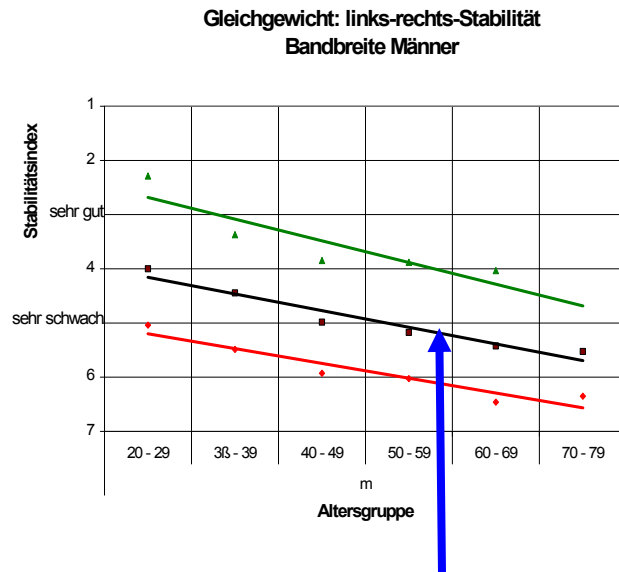
Evaluation, Presentation, Interpretation

Grouping:

- By Gender, Age Group
- Range of measurement results per age group:

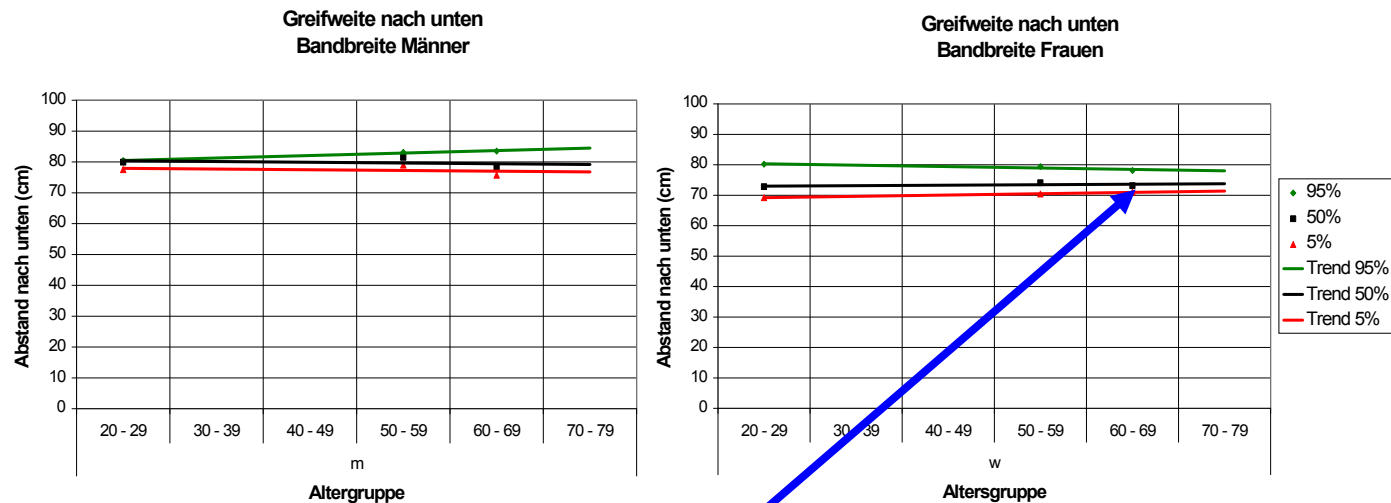


Example "Comfort-Design" Balance:



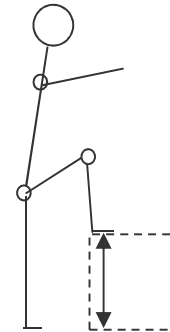
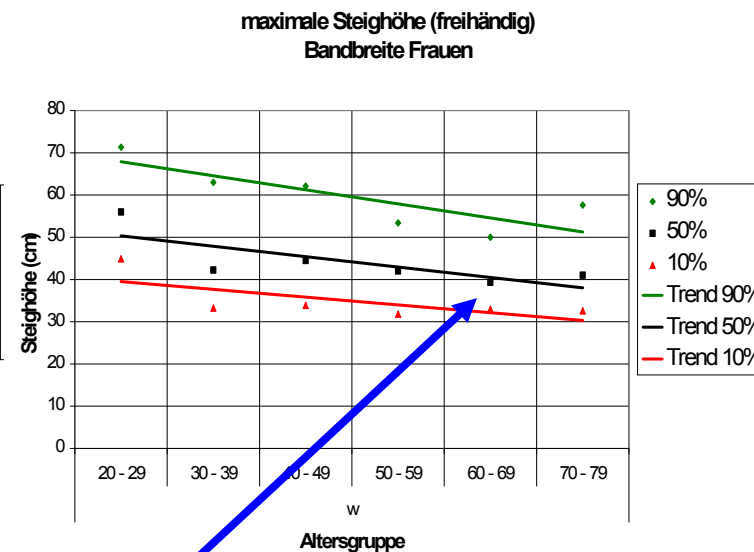
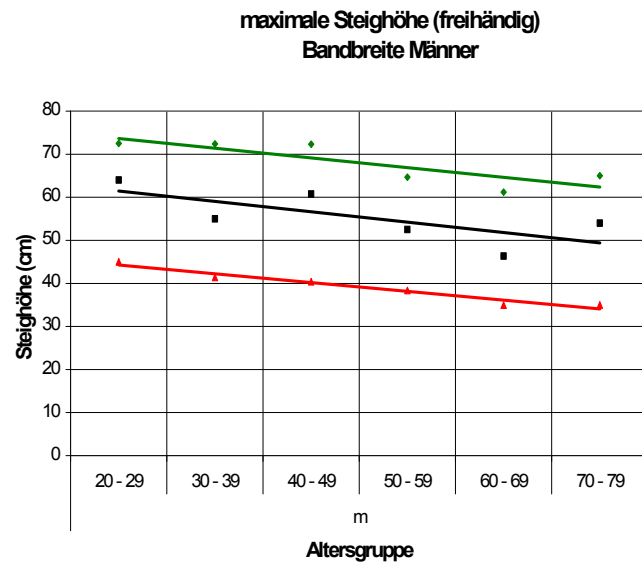
- Elderly persons have increasing problems with their sense of balance and require handrails on board
 - on deck, in the saloon & pantry
 - on stairs, in wet areas

Example "Comfort-Design" Reach:



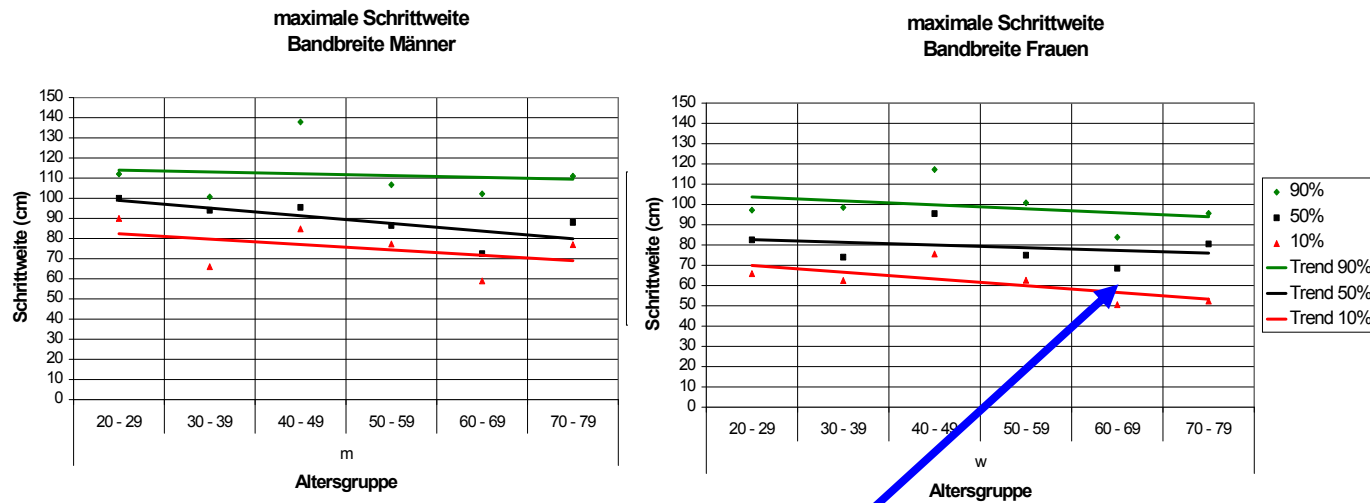
- Downwards: 70-80 cm (e.g. railing)
 - Laterally: 50-60 cm
 - Upwards: 180 cm (e.g. handrail in the saloon)
- ➔ Problem with railing: Standard 60-66 cm is too low

Example "Comfort-Design" climbing height:



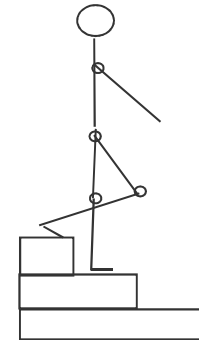
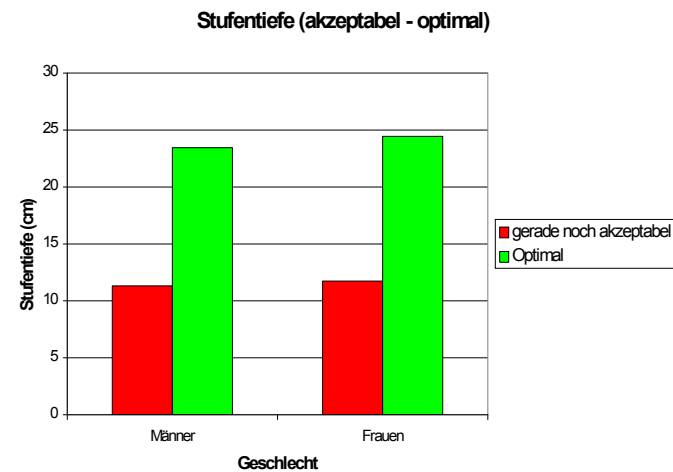
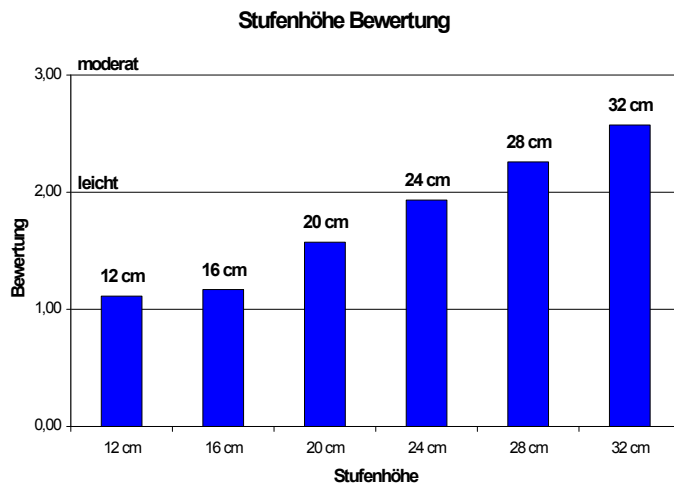
- Free-hand: 30-50 cm (e.g. cockpit ↗ deck)
- With hand-grip: 50-60 cm (e.g. jetty ↗ on board)

Example "Comfort-Design" Step length:



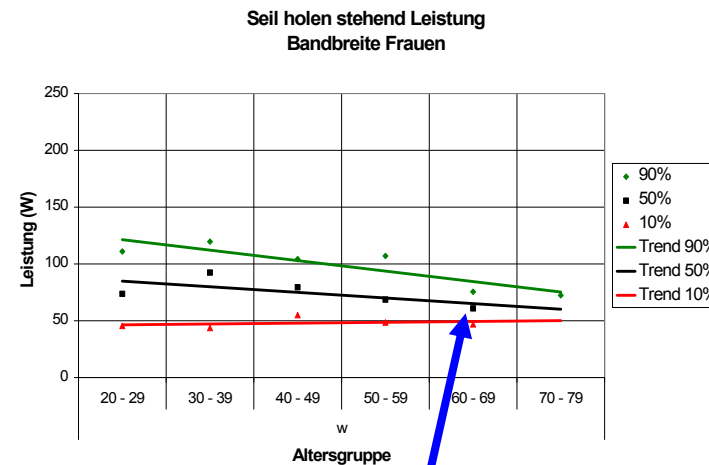
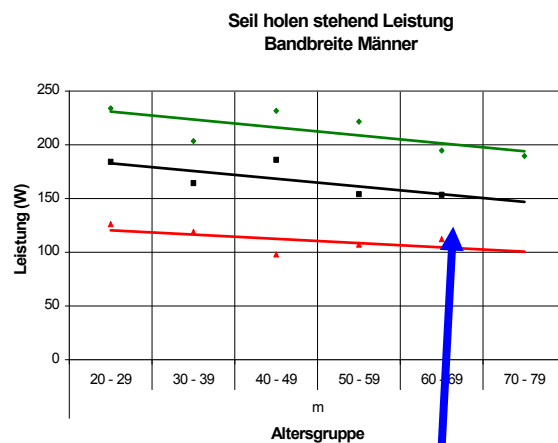
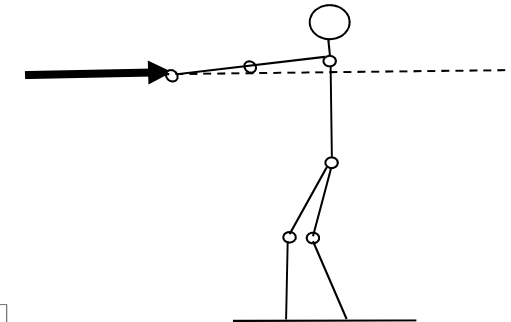
➤ Freehand: 50-70 cm (e.g. boat → jetty)

Example "Comfort-Design" Stairs:



- Step height: < 30 cm
- Step depth: acceptable: > 12 cm
optimal: > 24 cm
- Step angle: $< 50^\circ$

Example "Comfort-Design" Hauling rope by hand:



➤ **Performance:**

Men: 110-150 Watt /

Women: 50-70 Watt

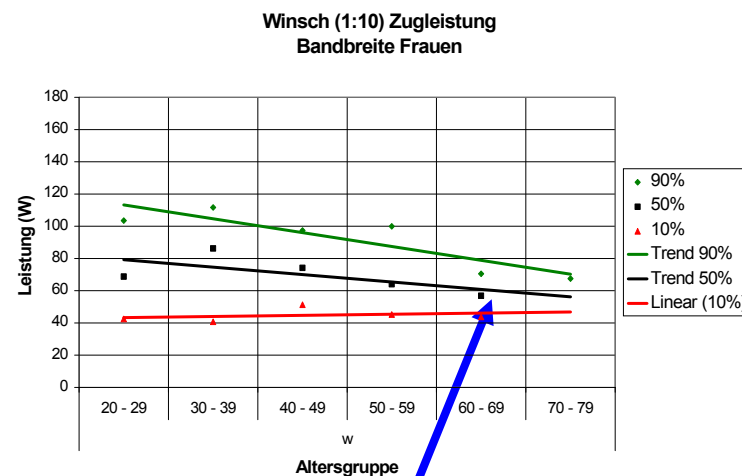
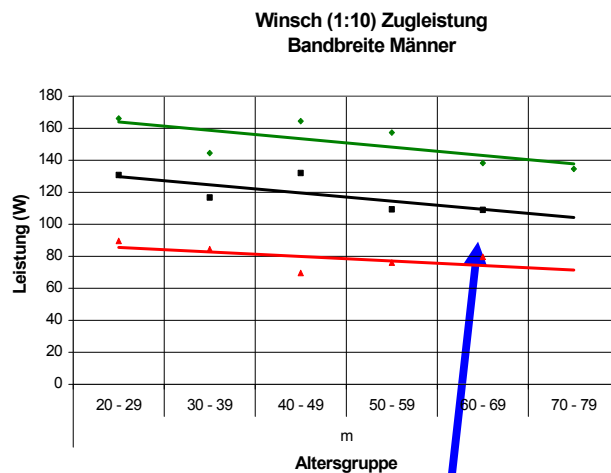
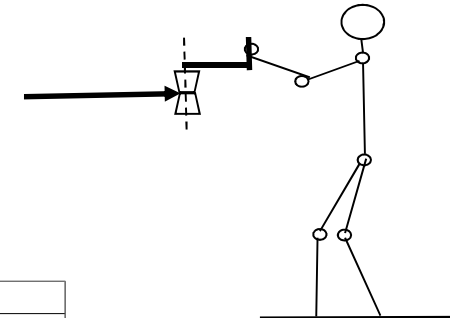
➤ **Tractive force with rope speed of 0.5 m/sec:**

Men: 25 DaN /

Women: 15 DaN

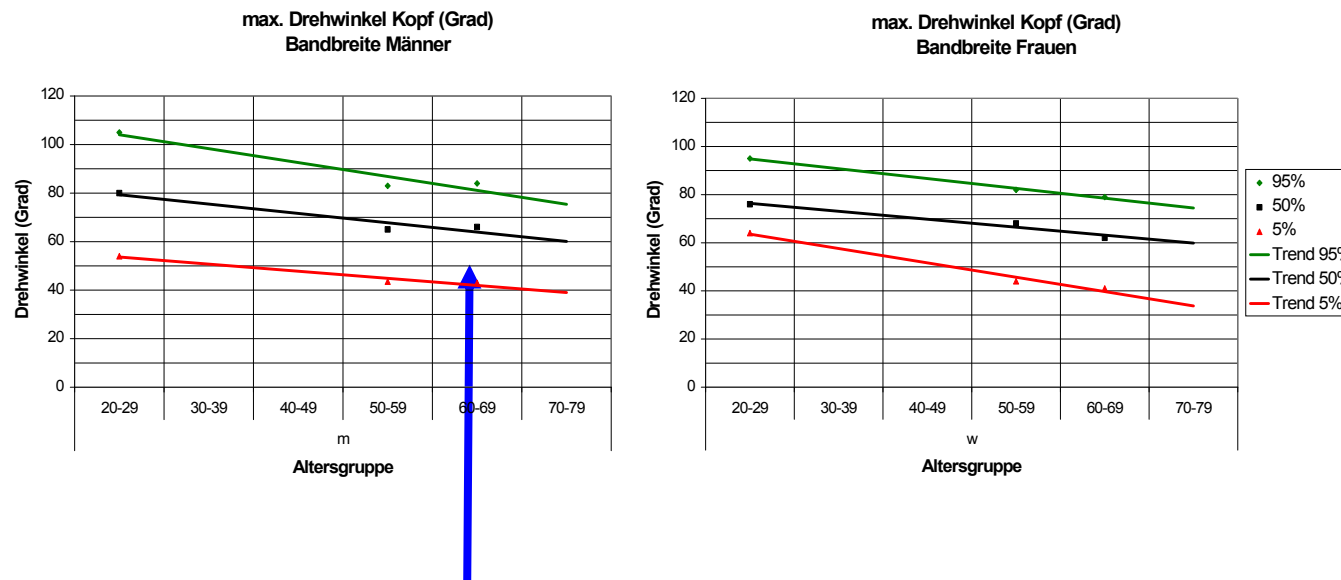
(1 DaN ≈ 1 kp)

Example "Comfort-Design" Hauling rope by winch:



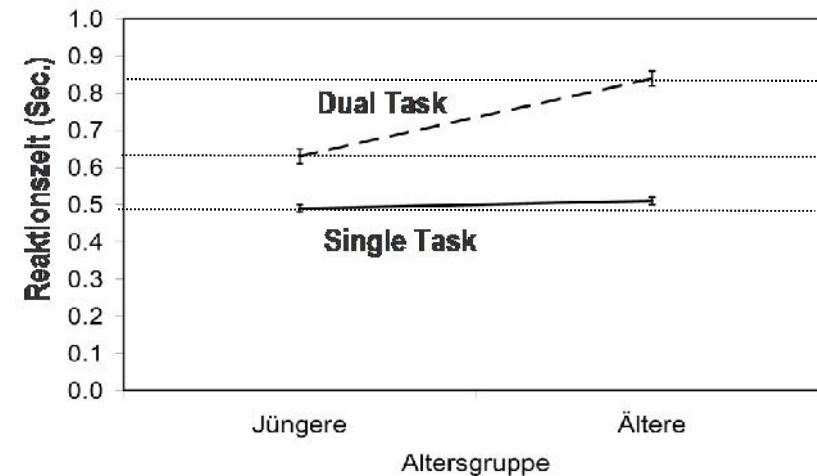
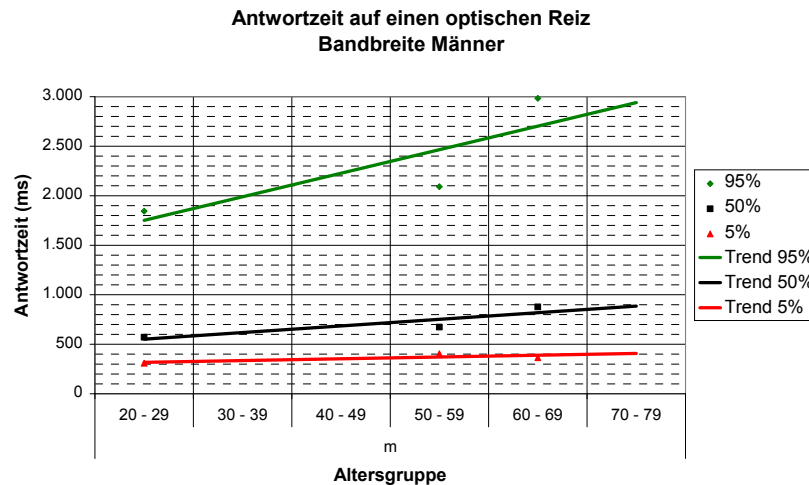
- **Performance:**
Men: 80-100 Watt / Women: 50-60 Watt
- **Hand force on the winder at 1.5 revolutions/sec:**
Men: 5 DaN / Women: 3 DaN

Example "Comfort-Design" Field of View:



- **Field of view clear vision: $\pm 80^\circ$**
(Turning the head $\pm 60^\circ$ + eye movements $\pm 20^\circ$)
- **Problem:**
 - View to the rear
 - Sprayhood, superstructures

Example Reaction Time, Multi-tasking, Stress:



- Reaction time – single task:
low age-dependence, wide range
- Reaction time multi-task: increases with age
=> Problem: Multi-tasking overload, stress
=> Option: Task-reducing assistance systems

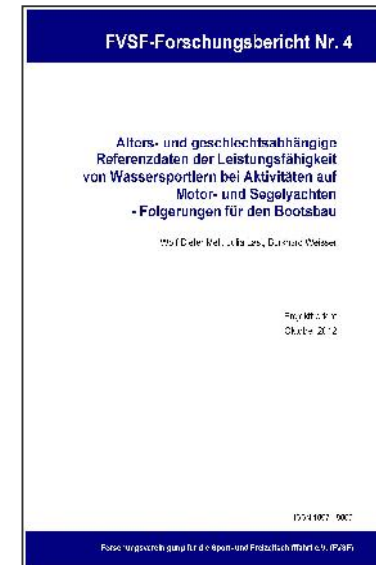
Open questions, e.g.:

Children on board

- Previously no investigations for boatbuilding
- Differing requirements of the age groups (babies, toddlers / pre-schoolers, school children, teenagers etc.)
- Low awareness of dangers
- Spontaneous activities, curiosity, spirit of adventure
- Strong urge to move
- Limited physical size (=> railing, stairs, handrails, seats etc.)
- Need for safe play areas
- Etc.

Contact & project report:

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