Forschungsvereinigung für die
Sport- und Freizeitschifffahrt e.V. (FVSF)

Research Project "Normdaten"

Age- and gender-related reference data for the performance of activities from watersports enthusiasts on motor- and sailing-yachts - Implications for boat building

Summary

The research project entailed taking systematic measurements regarding target group-oriented "reasonableness" of loads on board yachts.

Sports medicine screening tests were carried out on altogether 510 test persons to provide data with age- and gender-related capability ranges for the following types of load encountered on board.

- Balancing capability related to the requirements for handrails
  (reference: measuring grabbing ranges, anthropometric data for grabbing radii, information regarding the problem of "railing height")
- Maximum climbing height (no-hands/with handle) onto high steps or e.g. from the gangway when coming on board
  (reference: measuring the foot height with maximum hip flexion, strength of the leg extensor and of the bodyweight, calculation of the strength geometry on climbing onto a step),
- Hauling a rope when standing: optimum tensile force (setting the sails, hauling the sheets, operating the hawsers, handling anchor lines)
  (reference: measurements at the rope pull measuring station, evaluating the time series for pulling behaviour, correlating the measurements for maximum strength of the arm flexor),
- Hauling a rope with a winch: rope strength and endurance capability, hand strength at the winch crank
  (reference: measurements at the rope pull measuring station, evaluating the time series for pulling behaviour, correlating the measurements for maximum strength of the arm flexor and bicycle ergometer results),
- Arm and hand strength for lifting and pulling in confined spaces and for turning screw caps and valves
  (reference: measuring the maximum strengths of arm flexor and hand strength),
- Maximum step widths also for stepping over from on board to the gangway
  (reference: anthropometric measurements),

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- Tolerated step heights and step depths for companion ways and stairs on board
  (reference: studies at a special measuring station for stair geometry),
- Optimum sitting heights with regard to designing sitting surfaces on board
  (reference: studies at a special measuring station for sitting height),
- Maximum endurance capability at the anaerobic limit as general parameter for gender- and age-dependence of capability parameters
  (reference: bicycle ergometer measurements),
- Subjective perception of the effort required including capability at the anaerobic limit using the "Borg Scale" as parameter for tolerated maximum capability
  (reference: bicycle ergometer measurements).

Supplementary data were obtained from third-party studies and used in the following contexts:

- Anthropometric measurements for statements about appropriate grabbing radii,
- Studies on the speed of reaction and on multi-tasking with regard to stress-related problems on board,
- Data about the field of vision and movement angle of head and upper body in the context of the necessary radius of attention of the helmsman.

The scope and quality of data permit a definition of the ranges and average means for the age- and gender-dependent expectancy values with adequately high probability so that these results can be qualified as "standard data".

This project report intends to process and summarise the comprehensive results and their statistical analysis in order to facilitate concrete conclusions for target group-oriented boat building.

The depiction therefore concentrates on presenting and interpreting the statistically smoothed age- and gender-related ranges of the ascertained capability attributes. Detailed presentation of the individual studies is waived at this particular point, with reference made to the corresponding project reports from the Institute for Sport Sciences at the University of Kiel.