

Risk Analysis

Risk Number	Risk	Cause (why it happens)	Effects	Severity	Probability	Hazard Score	Actions to reduce failure mode
1	User impacts bulkhead during transfer	Inadequate/dysfunctional braking mechanism	User uncomfortably jostled	2	1	2	Extensive testing of braking mechanism
2	Customer does not like some parts of the design	Mis-interpreted customer requirements	Device is not used by the customer	1	1	1	Keep customer informed during the design process, seeking feedback and checking the design with customer.
3	System damages boat	Device has sharp edges	Possible Injury	2	1	2	Break edges of all components
4	System damages boat floor	Unreliable stress analysis	Potential injury	3	1	3	Double check stress analysis & increase factor of safety
5	Seat scuffs bench	Unwanted seat deflection	Seat hits top of bench	2	1	2	Design robust vertical support(s)
6	Team becomes unproductive	Incompatible personalities	Uncomplete/unreasonable project	3	1	3	Discuss issues with group/advisor
7	Environmental Deterioration	Weather	Device no longer useable	1	2	2	Use cover when in storage/use appropriate materials
8	Improperly secured in boat	Improperly constrained	Unsafe for user (device may fall out)	3	1	3	Properly model boat inside dimensions
		Poor install	Unsafe for user	2	2	4	Clear install instructions
9	Device is overweight	Overdesigned components Unreasonable expectations	Installation team becomes injured/frustrated Unable to use in racing	1	2	2	Select light materials Keep weight in mind while designing
10	Person does not fit in device comfortably	Device does not accommodate wide enough range of body types	User is uncomfortable and may choose to not use device	1	2	2	Ensure device is ergonomically designed
11	Device does not fit in boat	Improper initial sonar measurements	Unusable device	3	1	3	Measure twice
		Improper tolerancing	Unusable device	3	1	3	Measure several boats
12	Cannot access jib lines	Poor design	Unusable device	3	1	3	User dimensions considered
13	Boom impacts user's head	Seat is too high	Potential injury	2	3	6	Maximize distance between boom and seat
14	Poor visibility	Large vertical footprint	Unsafe for user	2	1	2	Small vertical profile
15	Does not comply with ISAF/IFDS regulations	Distance between bench and device seat is more than 200mm	Device cannot be used for racing	2	2	4	Distance between bench and device seat is less than 200mm
		Device is permanently fastened or requires modification of the boat	Device cannot be used for racing	2	1	2	Device does not modify boat and is not permanently installed
		Device contains non-mechanical components	Device cannot be used for racing	2	1	2	Purely mechanical solution
16	Complicated construction	Lots of manufacturing time	Decreased reproducibility	1	1	1	Minimize parts
		Lots of custom parts	High cost	1	1	1	COTS parts
17	Complicated to install	Lots of components	Unhappy installers	1	2	2	Minimize subsystem breakdown
		Poor instructions	Unhappy installers	1	1	1	Clear install instructions
18	ANSYS model inaccurate	Incomplete published data for material properties	Boat deck failure	3	1	3	Obtain boat floor sample to test

Severity Key	Probability Key
1-not ideal	1-unlikely
2-damage potential	2-50% chance
3-system/project failure	3-Probable