

2016 MATE ROV Competition Technical Documentation Rubric

Judge: _____

Class (circle one): **RANGER** **EXPLORER** Team#: _____ School Name and #: _____

Technical Documentation Summary					Team #:
Category	Scoring Criteria				Points
Overall Presentation	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
Basic requirements	Technical documentation is 25 pages or less; includes a table of contents; all measurements are in SI units (exceptions include ½ PVC, etc.); excellent attention to grammar; title page includes all elements as specified in the guidelines: Company name, school, club or organization name, city and state, members and roles, name of mentor	Technical documentation is 25 pages or less; includes a table of contents; most measurements are in SI units (exceptions include ½ PVC, etc.); very good attention to grammar; title page includes most elements as specified in the guidelines: Company name, school, club or organization name, city and state, members and roles, name of mentor	Technical documentation is over or less than 25 pages; includes an inaccurate table of contents; some measurements are in SI units; good attention to grammar, some issues; title page includes some elements as specified in the guidelines: Company name, school, club or organization name, city and state, members and roles, name of mentor	Technical documentation is over or significantly under 25 pages; table of contents missing or inaccurate; measurements not SI units; poor attention to grammar, many typos, etc.; many specified elements of the title page missing	
Abstract	250 words or less and provides an excellent, clear and concise summary of work	250 words or less and provides a concise summary of work	250 words or less and provides an adequate summary of work	250 words or less but is not clear nor concise	
Understanding of ROV	Clearly describes how the vehicle was designed, clear understanding of the technical and scientific concepts behind designing and building the vehicle	Describes how the vehicle was designed, demonstrates an understanding of the technical and scientific concepts behind designing and building the vehicle	Issues with the description of how the vehicle was designed, demonstrates some understanding of the technical and scientific concepts behind designing and building the vehicle	Poorly written, information missing, does not demonstrate or capture in any way an understanding of the technical and scientific concepts behind the vehicle	
Photos of ROV	Photo of complete vehicle included, includes additional photos which fully capture vehicle design, excellent captions accompany photos, also includes an excellent mechanical drawing or sketch	Photo of complete vehicle included, includes additional photos which somewhat capture vehicle design, captions accompany photos, also includes a mechanical drawing or sketch	Photo of complete vehicle included, no additional photos or additional photos which do not capture vehicle design, captions accompany photos, also includes an adequate mechanical drawing or sketch	Photos missing or not of high quality, captions missing and mechanical drawing or sketch missing or of very poor quality	
	5 - Excellent	3 - Very Good	1 - Good	0 - Poor	
Technical documentation design, professionalism, and attention to detail	Technical documentation is extremely well thought through, logically organized and concise; demonstrates an excellent professional view of the company, team clearly spent a great deal of time working through details	Technical documentation is well thought through, logically organized and concise; demonstrates a good professional view of the company, some details missing or pieces which could have used more attention	Technical documentation is acceptable, issues with flow, logic, and/or concision; demonstrates an adequate professional view of the company, many pieces require more attention to detail	Technical documentation is not well written, many issues, not logical, not enough information; completely unprofessional, clearly very little time spent preparing the report	
Budget	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
Cost projection	Thorough description of budget planning and following, math is accurate, travel estimates to competition seem very reasonable	Description of budget planning and following, math is accurate, travel estimates to competition are reasonable	Loose description of budget planning and following, math has some inaccuracies, travel estimates have issues	Poor description, poor use of funds, many math errors, travel unreasonable	
Project Costing	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
Accounting of parts, materials, time and services	A clear distinction is made between items purchased, re-used and donated, time and services either paid or donated	A good distinction is made between items purchased, re-used and donated, time and services either paid or donated	Questions remain between items purchased, re-used and donated, time and services either paid or donated	Muddled or no distinction between items purchased, re-used and donated, time and services either paid or donated	
Income, donations and use of funds	Acknowledgement of all income sources, donations, includes fair market value of donations (if applicable), overall excellent use of funds	Acknowledgement of all income sources, donations, includes fair market value of donations (if applicable), good use of funds	Acknowledgement of donations, does not include fair market value of donations (if applicable), mediocre use of funds and/ or not all income sources documented clearly	No acknowledgement of donations, poor accounting of all income sources, poor use of funds, several overall issues with budget	
System Integration Diagram	(3 points max)				
SID Checklist: Created using CAD; Makes a clear distinction between surface controls and the ROV; Discloses presence of fuse/circuit breaker; System level/connection diagram (nota board or component-level schematic; Uses ANSI, NEMA or IEC recognized electrical, hydraulic, and/or pneumatic symbols; Software block diagram or flow chart; If fluid power is used, includes a fluid power SID					
	3 points	2 points	1 point	0 points	
	All components on checklist satisfied with excellent level of care	All components on checklist satisfied	Most components on checklist included	Some components address with several critical issues	

Design Rationale	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
Overall vehicle design presented in clear and logical manner	Excellent description in a clear, logical manner of how vehicle was built to perform specific tasks, decisions on shape, size, weight and materials used	Good description in a logical manner of how vehicle was built to perform specific tasks, decisions on shape, size, weight and materials used	Adequate description of how vehicle was built to perform specific tasks, decisions on materials used	Poor description or understanding of vehicle design	
Demonstrates step-by-step planning and design process	Described exactly, step-by-step the planning and design process, why design decisions were made, which materials were used and why (plastic vs. metal, machining, 3D printing)	Described some design decisions and the planning process and which materials were used and why (plastic vs. metal, machining, 3D printing)	Unable to thoroughly describe design and planning process and materials decisions	Lack of any thorough explanation of the planning and design process	
Describes problem solving	Thoroughly describes how the company brainstormed ideas to solve the mission tasks and evaluated those ideas against competing alternatives	Describes how the company brainstormed ideas to solve the mission tasks and evaluated those ideas against competing alternatives	Somewhat describes how the company brainstormed ideas to solve the mission tasks and evaluated those ideas against competing alternatives, information missing	Lacking description of any problem solving initiatives	
Effective use of imagery	Extremely effective use of imagery, schematics, and data to communicate the design evolution	Effective use of imagery, schematics, and data to communicate the design evolution	Somewhat effective use of imagery, schematics, and data to communicate the design evolution	Ineffective use or non-use of imagery, schematics, and data to communicate the design evolution	
Flowchart	Effectively descriptive flowchart of the software flow or rationale describing why hardware-only approach	Descriptive flowchart of the software flow or rationale describing why hardware-only approach	Lacking or ineffective flowchart of the software flow or rationale describing why hardware-only approach	No flowchart or rationale provided	
System Design					
	Scoring Criteria				Points
Vehicle Systems	4 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
Original vs. commercial components	The majority of the components were designed and built by the team and for the commercial components used, team provided a reasonable/believable/logical make v buy explanation	Many of the components were designed and built by the team and for the commercial components used the team provided a make v buy rationale	A few of the components were designed and built by the team and a weak make v buy rationale provided	None of the components were designed by the team no make v buy rationale provided	
New vs. re-used, decisions for use of components	Majority of components are new this year, and for those that were reused, described exactly the decision making process to re-use any components	Some components are new this year, described decisions, not completely clearly, to re-use any components	A few components are new this year, unable to thoroughly describe decisions to re-use any components	Same vehicle as last year, it was clear that the team or only one team member understood any decisions	
Vehicle Systems	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
Cost analysis	Excellent description in a clear, logical manner of how materials were selected to perform specific tasks in a cost effective manner	Good description in a clear logical manner of how materials were selected to perform specific tasks in a cost effective manner	Description of how materials were selected to perform specific tasks in a cost effective manner	Poor description of understanding of incurred costs versus vehicle design	
Corporate team memory/ and/or vehicle evolution from research and mission requirements	Described how the team and vehicle evolution and year's mission contributed to the design decisions or if new team, excellent description of research conducted to begin decision process	Described influences from past team members or vehicle design or if new team, good description of research conducted to begin decision process	Little corporate team memory demonstrated or if new team, little description of research conducted to begin decision process, basically just got lucky	It was clear that the team did not understand the decision process or only one team member understood the vehicle	
Troubleshooting Techniques	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
	Explains troubleshooting techniques employed, describes how whole vehicle was tested	Explains troubleshooting techniques employed, describes how components of vehicle were tested	Somewhat explains troubleshooting techniques employed, inadequately describes how whole vehicle or components of vehicle were tested	Does not explain troubleshooting techniques employed and/or how whole vehicle or components of vehicle were tested	
Safety	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
Safety features and philosophy highlighted	Thoroughly describes safety philosophy and specific safety features of vehicle	Describes safety philosophy and safety features of vehicle	Describes safety features of vehicle	Does not describe safety features	
Safety checklist	Developed and provided a copy of a very detailed checklist and protocol, vehicle built in accordance with safety specifications	Provided a copy of checklist and protocol, vehicle built in accordance with safety specifications, some detail missing, possibly adapted from another source	A checklist provided, but missing detail, unsure if vehicle built safely without inspection	No safety information provided	
Challenges	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
Technical	Excellent descriptions of at least one technical challenge and method provided to overcome the challenge	Good description of technical challenge and method provided to overcome the challenge	Adequate descriptions of technical challenges	Poor or missing descriptions	
Non-technical	Excellent descriptions of at least one non-technical challenge and method provided to overcome the challenge	Good description of at least one non-technical challenge and method provided to overcome the challenge	Adequate description non-technical challenges or method provided	Poor or missing descriptions	
Lessons Learned	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
Technical	Excellent description of technical lesson(s) learned or skills gained	Good description of technical lesson(s) learned or skills gained	Adequate descriptions of technical lesson(s) learned or skills gained	Poor or missing descriptions	

Interpersonal	Excellent description of interpersonal lesson(s) learned or skills gained	Good description of interpersonal lesson(s) learned or skills gained	Adequate descriptions of interpersonal lesson(s) learned or skills gained	Poor or missing descriptions	
Future Improvements	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
	Extremely thoughtful and logical discussion of at least one improvement	Thoughtful and logical discussion of at least one improvement	Vague discussion of at least one improvement	Poor or missing discussion of at least one improvement	
Reflections	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
	Thoughtful personal or professional accomplishments from competition participation presented as a team or as individual team members	Personal/professional accomplishments provided from competition presented as a team or as individual team members	A personal or professional accomplishments provided from competition presented as a team or as individual team members	Poor or missing reflections	
Teamwork	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
Company effort	Company clearly demonstrated the vehicle (design and component build) and report were company efforts, not mentor or working professionals	Company demonstrated the vehicle and report were company efforts, not mentor or working professionals	Somewhat described company effort, not mentor or working professionals	Poor or lacking description or clear input from mentor or working professionals	
Team assignments	Company provides an excellent description of the specific team assignments to design/build the vehicle	Company provides a good description of the specific team assignments to design/build the vehicle	Vague description of the specific team assignments to design/build the vehicle	Poor or lacking description of the specific team assignments to design/build the vehicle	
Project Management	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
Schedule	Company developed and maintained a schedule to aid in building the vehicle	Company developed and somewhat maintained a schedule to aid in building the vehicle	Company was not able to follow their schedule do to various issues	Poor or lacking schedule, or major slips due to lack of problem solving	
Description of project management	Company provided an excellent description of the process and activity of planning, organizing, motivating, and controlling resources, procedures, and protocols to achieve specific goals in scientific or daily problems	Company provided a good description of the process and activity of planning, organizing, motivating, and controlling resources, procedures, and protocols to achieve specific goals in scientific or daily problems	Company provided a vague description of the organization process, controlling resources, procedures, and protocols to achieve specific goals in scientific or daily problems	Company provided a little to no description of the organization process, and/or clearly demonstrates a lack of team effort or overall project management	
References and Acknowledgments	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
References and acknowledgments	Provided a properly documented list of books, journals, web sites, etc used as sources; documented contributions of companies, individuals who contributed funds, equipment, and/or technical/moral support	Provided a list of all books, journals, web sites, etc used as sources; documented contributions of companies, individuals who contributed funds, equipment, and/or technical/moral support	Provided a few books, journals, web sites, etc used as sources, not properly documented; poorly documented contributions of companies, individuals who contributed funds, equipment, and/or technical/moral support	No references provided; missing documentation of contributions	
Discretionary Points (9 points max)					
Originality	3 - Excellent	2 - Very Good	1 - Good		Points
Vehicle and/or systems exhibit unique concepts or innovations	Exceptional innovation described in vehicle design, tools or other feature	Very clever innovation in vehicle design, tools or other feature	Interesting innovation in vehicle design, tools or other feature		
Clever materials solutions, original safety features	Exceptionally clever materials solutions or safety features, etc	Very clever materials solutions or safety features, etc	Interesting materials solutions or safety features, etc		
Other - please add a description of the noteworth aspect under the appropriate point category					
Deductions (-9 points max)					
Deductions	- 3 Extreme	- 2 Moderate	- 1 Minor		Points
Commercial assistance	Vehicle was designed/created by a commercial company and lack of any justification	Some assistance was provided by a commercial company and some justification	Minor assistance was provided by a commercial company and with justification		
Interference	Significant contribution by coaches, mentors, or parents	Some contribution by coaches, mentors, or parents	Minor contribution from coaches, mentors, or parents		
Overuse of components	Significant overuse of commercial components without adequate justification and/or overuse of re-used components without adequate justification	Overuse of commercial components without adequate justification and/or overuse of re-used components without adequate justification	Some use of commercial components without adequate justification and/or overuse of re-used components without adequate justification		
TOTAL TECHNICAL DOCUMENTATION SCORE					0