

2016 MATE ROV Competition Product Presentation Rubric

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

Category	Scoring Criteria				Points
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 nor philosophy	
Safety checklist/ Passed safety check	High emphasis on development and use of a safety checklist and protocol, vehicle built in accordance with safety specifications and inspection sheet handed to judges	Shared a copy of checklist and protocol, vehicle built in accordance with safety specifications and inspection sheet handed to judges	Vehicle built in accordance with safety specifications and inspection sheet handed to judges	Did not pass safety inspection	
Warning labels and safeguards on potentially hazardous parts, other vehicle specific safety precautions	Clearly marked warning labels, safeguards clearly in place, fuses in place, thoroughly described other safety precautions	Some warning labels, safeguards in place, not as well marked as could be, fuses in place, mentioned safety precautions	Some safeguards in place, fuses in place, no mention of safety precautions or warning labels	No warning labels, safeguards or safety precautions	

Comments:

Team Presentation					
Category	Scoring Criteria				Points
Teamwork	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
Preparation of presentation and required documentation	Strong whole team effort, exceptionally prepared, documentation very strong	Clearly prepared, organized, articulate, each team member contributed, documentation in order	Prepared, fairly organized, partial team effort, good documentation	Underprepared, not well organized, lack of whole team effort, poor or missing documentation	
Originality/Salesmanship	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
Style of presentation, effective salesmanship, addresses theme	Dynamic presentation, team went above and beyond expectations, tied presentation well into theme/mission	Good presentation, satisfied expectations, make links to theme	Lackluster presentation, below expectations, vague mention of theme	Poor presentation, lacked any salesmanship or connection to theme	
Insight/Creativity	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
Innovations, challenges faced, determination to resolve challenges	Innovative/creative solutions presented to well described challenges, tenacity quite evident	Interesting solutions, not necessarily novel, described challenges faced, demonstrated tenacity	Solutions demonstrated for challenges faced, but not particularly creative, did not demonstrate tenacity	Did not face challenges well, did not understand challenges or solutions well enough to describe	

Understanding	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
Demonstration of ROV systems, science, operation and mission theme	Strong understanding of ROV systems, provided much detail of underlying science, and application to theme	Good understanding of ROV systems, provided some detail of underlying science, and application to theme	Some understanding of ROV systems, underlying science, and application to theme	Little understanding of ROV systems, underlying science, and application to theme	
Explanation of technical specifications of vehicle elements	Either as part of presentation or during Q&A, team was able to provide and explain the tech specs of each component (built and/or COTS), demonstrating thorough understanding of all elements of the vehicle	Either as part of presentation or during Q&A, team was able to provide and explain the tech specs of some components (built and/or COTS), demonstrating understanding of all of the vehicle	Either as part of presentation or during Q&A, one team member was able to provide an explanation of components (built and/or COTS), demonstrating some understanding of the vehicle	No one on the team was able to provide reasonable knowledge of the components of the vehicle	
Resources/Budget	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
How was budget developed and adhered to during competition phases, cost analysis, overall cost of vehicle	Thorough description of budget planning and following, acknowledgement of donations, fundraising strategies, excellent use of funds	A description of budget planning with good use of funds but missing one of the following components: - acknowledgement of donations, - fundraising strategies, - justified re-use of components	Loose description of budget planning with mediocre use of funds and missing 2 or more of the following components: - acknowledgement of donations, - fundraising strategies, - non-justified re-use of components	Poor description, poor use of funds, no acknowledgement of donations	
Corporate team memory	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
Team	Described how the team evolved to improve capabilities and meet challenges, either an established team with new members or new team and how people found a best fit	Described influences from past or new team members within an established team or how a new team started to gel	Little corporate team memory demonstrated, or if new team, little description of why and how team formed	It is clear this is not a cohesive team	
Design/Workmanship	3 - Excellent	2 - Very Good	1 – Good	0 – Poor or missing	
Strengths of the overall design, aesthetically pleasing	Excellent overall design, well conceived, elegant design, aesthetically pleasing in addition to excellent functionality	Very good overall design, nice features to make the vehicle aesthetically pleasing as well as functional	Good overall design, functional, but some better design choices could have been made, as well as a bit more effort to make the vehicle aesthetically pleasing as well as functional	Poor overall design, many better decisions could have been made, very clunky, aesthetically displeasing design	
How is design important/tied into mission, ease of maintenance	Components well designed and very easy to access, design specific to mission	Components easy to access, design specific to mission, but a few issues	Components not easy to access, design not specific to mission	Components inaccessible, design not specific to mission	
Robustness, craftsmanship, water ready	Tested vehicle prior to event, durable, strong attention to craftsmanship and marketability	Tested vehicle prior to event, attention to craftsmanship and marketability	Tested components prior to event, mediocre craftsmanship, some attention to marketability	Did not test before event, vehicle does not appear to be robust, no attention to mission or marketability	
Meets design & build specs	All specifications met, electrical systems neatly contained and well designed	All specifications met, electrical system contained	Most specifications met, electrical system contained	Not all specifications met, issues with electrical system	

Comments:

System Design and Vehicle Inspection					
Category	Scoring Criteria				Points
Engineering design rationale	3 - Excellent	2 - Very Good	1 - Good	0 - Poor or missing	
Description of how functionality increased with design or component selection	Excellent description in a clear, logical manner. Rationale included all of these aspects: - How vehicle was built to perform specific tasks - Decisions on shape, size, weight - Decision on materials used	Good description in a logical manner. Rationale included most of these aspects: - How vehicle was built to perform specific tasks, - Decisions on shape, size, weight - Decision on materials used	Minimal description of how vehicle was built to perform specific tasks. Little to no discussion on shape, size or weight or materials.	Poor description or understanding of vehicle design	
Materials decisions for components	Described exactly how and why materials decisions were made and which materials were used and why (plastic v. metal, machining, 3D printing)	Described some materials decisions and which materials were used and why (plastic v. metal, machining, 3D printing)	Unable to thoroughly describe materials decisions	It was clear that no one on the team or only one team member understood any materials decisions	
Systems approach	Excellent balance, the design of the vehicle is extremely well integrated with the onboard tools and sensors, a holistic systems design approach	Good balance, the design of the vehicle is integrated with the onboard tools and sensors, a holistic systems design approach	Reliant on technology, not engineering design, tools "strapped" on to a platform approach, but functional	Over-reliance on technology over design, not a functional design	
Vehicle Structure	3 - Excellent	2 - Very Good	1 - Good	0 - Poor or missing	
Waterproofing, pressure housings, how was it tested	Description of design of pressure housings, o-rings, etc, design decisions and cost, total weight of vehicle	Description of design decisions and cost, total weight of vehicle	Design decisions and cost described, much more detail needed to fully understand	Poor description or understanding of vehicle design	
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 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 or understanding of incurred costs verses vehicle design	
Vehicle – how design evolved from research and mission requirements	Described how the vehicle and mission contributed to the design decisions, excellent description of research conducted to begin decision process	Described influences from past vehicle design or if new vehicle, good description of research conducted to begin decision process	Little description of research conducted to begin decision process, basically just got lucky	It was clear that the team or only one team member understood the vehicle	
	5 - Excellent	3 - Very Good	1 - Good	0 - Poor or missing	
Original vs. commercial components explanation	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 and decisions for use of components	Majority of components are new this year and for those that were reused, the team provided an exact and reasonable/logical new v. reused	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 no one on the team or only one team member understood any decisions	

Comments:

System Design and Vehicle Inspection					
Category	Scoring Criteria				Points
Control/Electrical System	3 - Excellent	2 - Very Good	1 - Good	0 - Poor or missing	
Control scheme	Well conceived, well organized, designed logically, efficient, able to describe system (how many conductors, waterproofing, etc) and any unique features	Organized, designed logically, efficient, able to describe well, nothing novel or unique	Organized, bit inefficient and/or design flaws	Poorly conceived, inefficient	
Computer/manual controller*	*score one set depending if the team had a computer, manual or hybrid (3 points max)				
Computer	Code efficient and logical, clearly designed and understood by team	Code logical, designed well and understood by the team	Code a bit inefficient, not fully understood by all team members	Major code issues, only understood by one team member	
	*** OR ***				
Manual	Intuitive, thoughtful design, clearly designed by team, all team members able to drive	Design logical, well understood and all team able to drive	Controller/switch location inefficient, not all team members able to drive	Major design issues, only one team member can drive	
	*** OR ***				
Hybrid	Intuitive, thoughtful design, clearly designed by team, all team members able to drive	Design logical, well understood and by team	Design inefficient, not all team members	Major design issues only understood by one team member	

Comments:

Propulsion	3 - Excellent	2 - Very Good	1 - Good	0 - Poor or missing	
Thruster location and rationale	Thrusters securely attached, do not obstruct water flow, optimal number of thrusters, optimal power consumption/thrust ratio for mission needs	Thrusters securely attached, some issues with location, optimal number of thrusters, power consumption/thrust ratio bit questionable	Thrusters securely attached, not well place number of thrusters and understanding of power requirements questionable	Thrusters very insecure, not well placed, poor decision making on number of thrusters, power requirements for mission needs	
Buoyancy and Ballast	3 - Excellent	2 - Very Good	1 - Good	0 - Poor or missing	
Description of system and rationale	Accurately describes how the system works and application and importance to mission, full demonstration of knowledge of selection and use of system, can explain stability well	Provides a description of the system and importance to vehicle, demonstration of knowledge of selection and use of system, can explain stability	Provides a description of the system, demonstration of knowledge of system	Cannot provide a substantive description of the system, cannot provide a substantive demonstration of knowledge of the system	

Tether	Total = 3 points			
Tether management system and strain relief	Tether is securely attached	Yes (1 point)	No (0 points)	
	Tether is neatly bundled	Yes (1 point)	No (0 points)	
	Tether management protocol developed	Yes (1 point)	No (0 points)	

Comments:

System Design and Vehicle Inspection					
Category	Scoring Criteria				Points
Payload Tools and Sensors	3 - Excellent	2 - Very Good	1 - Good	0 – Poor or missing	
Cameras	Thorough explanation of camera(s) selected, number and placement, waterproofing	Good explanation of camera(s) selected, placement, waterproofing	Adequate explanation of camera(s) selected, placement, waterproofing	Poor understanding of camera(s) system or no camera	
Payload tools used	Payload tools are original, designed, built by team or unique modifications	Some payload tools are original	COTS tools used (commercially-available off the shelf)	No payload tools	
Sensors used	Sensors are appropriate for the mission task or enhance the vehicle's operation, team provides excellent explanation of why original or COTS and, if COTS, demonstrates a thorough understanding of how the sensor works.	Sensors are appropriate for the mission task or the vehicle's operation, team provides good explanation of why original or COTS and, if COTS, demonstrates an understanding of how the sensor works.	Sensors are somewhat appropriate for the mission task and vehicle operation, team provides some explanation of why original or COTS and, if COTS, demonstrates some understanding of how the sensor works	No sensors used or they are not appropriate for the mission and do not contribute to the vehicle's operation, team does not explain why original or COTS and, if COTS, does not demonstrate an understanding of how the sensor works.	
Application to mission	Clearly understands and explains the design and purpose of appropriate tools selected for mission	Somewhat understands the design and purpose of appropriate tools selected for mission	Additional tools do not strongly correlate to the mission or was not explicitly explained	No payload tools	
Design Elegance	3 - Excellent	2 – Very Good	1 - Good	0 - Poor	
Simplistic design	Excellent design, simplistic, well conceived, easily repairable or interchangeable components, demonstrates excellent systems thinking skills	Very good design, simplistic, well conceived, easily repairable, demonstrates good systems thinking skills	Good design, well conceived, could have been simpler, fairly easy to repair, demonstrates systems thinking skills	Overly complicated design, repairable with effort, demonstrates some systems thinking skills	
Score Sub-Total (100 points max)					
Discretionary Points (15 points max)					
Originality	3 - Excellent	2 - Very Good	1 - Good	Points	
Vehicle and/or systems exhibit unique concepts or innovations	Exceptional innovation demonstrated 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		
Innovations or modifications resulting in higher functionality at reduced costs	Exceptional cost/benefit ratio of innovation demonstrated in vehicle design, tools or other feature	Very good cost/benefit ratio of innovation in vehicle design, tools or other feature	Good cost/benefit ratio of innovation in vehicle design, tools or other feature		
Software	Team developed exceptional original software or made exceptional adaptation of software to create a unique solution	Team developed very good software or made some adaptations to create a unique solution	Team developed or made a very good, yet unsuccessful effort (did not work in the moment) effort to develop a unique software solution		
Vehicle design and manufacture	Team demonstrated remarkable effort to design and manufacture every component of the vehicle	Team demonstrated effort to design and manufacture every component, not all components durable	Team demonstrated effort to design and manufacture all vehicle components however experienced component failure		

Other Judge's Discretion – please provide written comments/explanation in the appropriate cell to the right				
Deductions (-15 points max)				
Deductions	- 5 Extreme	- 3 Moderate	- 1 Minor	
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 interference by coaches, mentors, parents providing assistance during presentation and/or design process (with exception of language barriers)	Some interference by coaches, mentors, parents providing assistance during presentation and/or design process (with exception of language barriers)	Minor prompting by coaches, mentors, parents providing assistance during presentation and/or design process (exception of language barriers)	
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 PRODUCT PRESENTATION SCORE				

Sample Questions:

- Why should we buy your ROV?
- What was your company's "work breakdown structure" (tasks, time, and people)?
- What were the greatest constraints (schedule, budget, equipment, labor, logistics, etc.) on your design process?
- How did the product demonstration tasks and rules influence your design and decisions?
- What systematic process, such as a tradeoff matrix, did you use to evaluate competing design solutions?
- What were the most important design decisions you made and why?
- How did you arrive at your final power budget? What concessions, if any, did you have to make and why?
- How did you design and calibrate your sensors?
- If your vehicle uses software, where does the code execute? Describe the flow and format of the data.
- Did you have a noteworthy troubleshooting experience?
- Explain why you built "X"? To save money, to create a bespoke solution?

Notes to Judges:

- Please do not award half points or values that are not listed (e.g. if the scale is 5, 3, 1, 0, do not award a score of 4).
- Please award points for information presented during the formal presentation and information discussed during question and answer period. Even if you can see something on the vehicle that you would like to award points for, if the team has not offered the information, please do not award points.