Risk Matrix

ID	Risk Type	Risk Item	Cause	Effect	Likelihood (1-5)	Severity (1-5)	Importance	Mitigations
1	Technical	Testing Damage	Given that the engine is damaged during testing	There is a chance that repairs are outside of the project budget and a working engine is not delivered	4	4	16	Test all components at a subsystem level; allow for manual aborts during static fires
2	Technical	Valve failure	Given that a control valve fails open	There is a chance that we are not able to throttle the oxidizer flow	2	3	6	Test control valve under different loads, maintain cleanliness of components
3	Technical	Fuel Grain Burning	Given that the fuel grain may burn unevenly	There is a chance that the chamber walls heat up and rupture	3	5	15	Fuel grain regression analysis, thermal control of engine chamber
4	Technical	Electronic Integration	Given that the electronics are mounted on the engine	There is a chance that they experience excess thermal and vibrational loads that impact performance	4	4	16	Thermal insulation and vibrational isolation, hardware selection
5	Technical	Lost communication with engine	Given that the hot fire burns through a wire	There is a chance that we lose communication with the engine and test stand	2	4	8	Redundant shielding of wires, redundant wires routed through different paths, wireless communication
6	Technical	Nozzle Performance	Given that we are not able to develop a fully representative model of the nozzle	There is a chance that the nozzle does not perform as expected and the engine does not achieve the desired performance	4	3	12	Validating nozzle model through cold fire
7	Safety	Human Safety	Given that we will be working with pressure vessels and propellants in close quarters	There is a chance that a team member gets injured	2	5	10	Consistent monitoring of pressures while in the bunker, fully developed test procedures before test, RIT safety training
8	Safety	Hazardous Byproducts	Given that we are igniting propellants at a high temperature	There is a chance that toxic byproducts, such as carbon monoxide, are produced in high dosages	3	5	15	Keep safe distance from bunker within 5 minutes of any hot fire, carbon monoxide sensor in bunker
9	Safety	Unplanned Reignition	Given that there is a leak in the valve	There is a chance that excess oxidizer leaks into fuel grain and reignites after test	3	5	15	Purge the system with nitrogen, allow ample time after hot fire for system to burn out, expel any excess oxidizer after the test
10	Resource	Budget	Given that the team does not raise sufficient funds for the project	There is a chance that adequate materials cannot be purchased and the engine does not meet its performance requirements	2	3	6	ROAR day, Sponsorship letters, crowdfunding
11	Resource	Design schedule	Given that the design takes too long to complete	There is a chance that a test fire never gets completed	1	4	4	Create a design freeze during iterative design process to mark the beginning of manufacturing
12	Environmental	Vegetation fire	Given that the test bunker is located in a wooded area	There is a chance that some vegetation catches on fire	3	4	12	Have a volunteer firefighter on site during test fire, cut back vegetation, redirect engine plume