

# **Project SHARP- Power Generation and Delivery System**

## **Project Plan**

Emil Boot

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## Change record

Issue	Date	Total pages	Page(s) affected	Description of change
1.0	2/2/2026	5	0-5	Adapt Initial Template
2.0	3/2/2026	14	0-14	Create chapters and fill in rough required elements

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## 1 Background

*This chapter should contain a description of the company, who they are and why do they want to do the project. Other stakeholders should also be mentioned and what interest they have in the project. A brief overview of the report structure can also be given here.*

Talk about SSI, the development of (atmosphere breathing) propulsion systems for small satellites.

Development state of the valve and why testing it in a relevant environment is important.

Solid Flow and their CGG's which together with the valve can be a weight efficient fuel delivery system.

This would make for a nice aviation energy transition project, hence the drone.

This report is made in accordance with the guidelines in the book '*Project Management* (Grit, 2011).

## 2 Project Results

*This chapter should contain a description of the project goals and results. It should describe what the project is to achieve and why the project is to be carried out. The main and sub research questions should also be given here.*

### Goals

- Test the SSI valve in a relevant environment
- Produce flight hours of the valve in a meaningful way
- Same goes for solid flow
- Help with energy transition in aviation
- Produce research on hydrogen based electric flight
- Use this research to produce a sellable product or sell research results directly

### Results

- Test bench setup
  - Hydrogen storage system (solid flow if available)
  - Hydrogen delivery system using SSI valve
  - Fuel cell system
  - Electric load, preferably as motor and propeller system
  - Integrated control system
- Research report
  - Will answer main and sub research questions
  - "To what extent is hydrogen CGG based electric flight feasible for drones"
  - Must be in accordance with "Report writing for readers with little time" (Elling & Andeweg, 2012)
- Drone Design
  - Energy system from test bench
  - Either COTS drone or custom built drone
  - Integration of energy system into drone
- Drone Prototype
  - Prototype manufacturing
  - Flight testing of drone

### 3 Project Activities

- Orientation
  - Literature study on hydrogen storage, fuel cells, electric propulsion for drones
  - Determine mission scenario and scope of the prototype
  - Create requirements for power system from mission scenario
  - Write Project Plan
- Design of test bench setup
  - Conceptual design of test bench setup
  - Trade-off and select best concept
  - Detailed design of test bench setup
- Building of test bench setup
  - Procurement of parts
  - Manufacturing and assembly of test bench setup
  - Integration of subsystems
- Testing of test bench setup
  - Test planning
  - Execution of tests
  - Analysis of test results
- Documentation and reporting of outcomes
  - Writing of research report
  - Preparation of presentations
  - Final review and submission

Additional activities (if time and budget allow)

- Design of drone prototype
  - Conceptual design of drone prototype
  - Trade-off and select best concept
  - Detailed design of drone prototype
- Building of drone prototype
  - Procurement of parts
  - Manufacturing and assembly of drone prototype
  - Integration of power system into drone
- Testing of drone prototype
  - Test planning
  - Execution of tests
  - Analysis of test results

## 4 Scope

*Describe activities on the border and whether they are included or excluded. Begin and end dates. Maximum budget. Required resources (randvoorwaarden).*

Activities that are included (from original project assignment):

- Designing a system overview of the complete power generation and feed system.
- Selecting components for the hydrogen fuel cell, intermediate electrical storage, and drone interfaces.
- Developing the electrical design of the power generation and feed system (fuel cells, intermediate storage, and connection to the COTS drone).
- Implementing mechanical modifications to the COTS drone to ensure system compatibility.
- Performing assembly and integration of the power generation and feed system into the drone.
- Conducting ground testing of the power generation and feed system using a gaseous hydrogen source.
- Compiling a comprehensive report of all findings and results.

*Is defining the mission scenario part of the project scope? Maybe adapt COTS drone to test bench or even custom drone. Would be nice if we can specify that already. Add some activities that are explicitly excluded from the project scope?*

## 5 Deliverables

*Each deliverable is a result of one of the activities, can just be the same list In the planning chapter each deliverable will get a due date which makes the project trackable*

- Literature report on hydrogen fuel cells and storage vs batteries
- Defined mission scenario
- List of requirements for power system
- Project Plan
- Detailed design of test bench setup
- Assembled test bench setup
- Test plan for test bench setup
- Test results from test bench setup
- Final research report

*These might also be workpackages. There are some defined already (in gantt chart on onedrive) Are these applicable to internship or is that a different scope?*



## 6 Quality Control

*How do we assure the quality of each deliverable. Take the list of deliverables and describe what the quality demands are for each of them. Describe how each deliverable will be checked for quality. Describe standards that will be used. Describe software that will be used.*

- Literature report on hydrogen fuel cells and storage vs batteries
- Defined mission scenario
- List of requirements for power system
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- Test results from test bench setup
- Final research report

*idk, in 3rd year internship I said peer review everything with supervisor and maintain regular contact. I did not specify this for each deliverable*

## 7 Project Organisation

*This chapter should contain a description of the project organisation. Who are the team members and what are their roles and responsibilities. Contact details of team members and other stakeholders can also be given here. The meeting frequency and dates can also be mentioned as well as the digital workspace that will be used.*

- email, phone of me and Imre
- Contact details of Solidflow? (outside of scope maybe)
- Weekly progress meetings on Thursdays
- The onedrive space for files
- Decide on a place for CAD files?

## 8 Planning

*Put the activities in an activity table (basically gantt chart but in table form). Assign required time of each activity. Describe dependencies between activities.*

*Is the gantt chart in onedrive applicable and/or up to date?*

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  - Literature study on hydrogen storage, fuel cells, electric propulsion for drones
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## 9 Costs and Benefits

### Costs

- Labour hours
- Test bench materials
- Fuel cell system
- Hydrogen fuel
- Safety equipment/education
- Drone prototype manufacturing and testing (if applicable)

### Benefits

- Practical testing environment for SSI valve
- Sellable research results
- Practical approach to electric flight using hydrogen CGG

## 10 Risks

*Points of failure for the project should be identified here. Internal and external risks should be separated. Grit has a whole system on doing this, assigning a value for likelihood and impact to each risk.*

### Internal Risks

- Running out of time
- Running out of budget
- Underestimation of technical complexity
- Safety issues related to hydrogen handling

### External Risks

- Solid Flow backing out of collaboration
- Delays in hardware acquisition/manufacturing
- Dependence on external parties for critical components

## References

Grit, R. (2011). *Project management* (Book).