

# Marshall Problem Statement / Senior Design Topic

**Problem Title:** Slosh Baffle Stabilization

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**Indicate which discipline/s is/are most appropriate to work on this problem, e.g., aerospace, mechanical, electrical, chemical, industrial, civil, computer, physics, materials, test, nuclear, earth science, other:**  
Mechanical, Materials, Test

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## Marshall Problem Statement

**Background: The big picture with references to previous work (Why would a senior design student be excited about this work?)**

Marshall Space Flight Center (MSFC) slosh testing is performed on subscale tanks that are modeled after liquid propellant tanks, used on space crafts. This testing is conducted to obtain various slosh parameters for verifying analytical models. When utilizing multi-tier damping baffles, during slosh testing, the ideal damping baffle configuration should be as rigid as possible. This allows the analyst to closely model the test configurations. Currently, this effect is achieved with single layer damping baffles, by clamping the baffle between two sections of the tank.

**Recent/on-going research on the problem (What resources, if any, are available to the senior design team, such as equipment, software, facility utilization)**

We plan to continue to conduct slosh testing utilizing our current testing methods. In the near future, that testing will consist of slosh baffles being clamped between two tank sections, unless otherwise requested.

**Details of the problem; design constraints, requirements (if any), outcome expected (one semester Senior Design course lasts 15 weeks; two semester course lasts 30 weeks.) (What do you expect the senior design team to accomplish?)**

The desired damping effect is not achieved with the current multi-tier damping baffle configuration. During multi-tier slosh baffle testing, it is not always possible to clamp baffles between tank sections at each baffle level. The current configuration allows for baffle movement, especially at higher slosh wave amplitudes, where slosh wave force on the baffle is greater. Baffle movement changes the damping effect and it is difficult to quantify these effects during test. In an effort to mitigate baffle movement, during multi-tier slosh baffle testing, students would be responsible for determining a tank/ baffle support design that will allow for more rigid slosh baffle installation, for various baffle configurations. This would be a one semester effort.

## **Senior Design Project Rules:**

1. Weekly telecons will be scheduled to maintain proper progress and prevent dead-end ventures.
2. Deliverable/s required (e.g. one semester course – a written final report; two semester course – written final report and a prototype/model (if practical))