

Don Peters

SENIOR ENGINEER



Tom Kleindinst/WHOI

I got involved in managing the overall mechanical design of the new sub. I worked with [Alvin Operations Group leader] Barrie Walden on the initial structural scheme for the sub's frame and on interfacing it with the new sphere. Then we came up with an overall vehicle envelope—the shape and size of the syntactic flotation and getting everything to fit on the frame.

You have a lot of individual people working on things individually. Changes in one thing, you know, can throw a money wrench into the work of other things. So, it's important to have somebody who's kind of got the overall design in mind.

We developed what we called the VAP, or Vehicle Assembly Plan, talking with individual engineers and talking through the actual sequence of events: How do we put it all together? How do we put together the interior components of the sphere on the birdcage and test them, and then how do we move them into the actual sphere and test them there? We walked through all the sequences of putting the variable ballast system on the vehicle, putting the foam on the vehicle, etc.

Historically, the sub had been a known quantity. You took it apart during an overhaul and put it all back together, but it still weighed the same, and it still floated the same. This time, about two-thirds of the sub was new. With a bigger, heavier sphere, the sub balances differently. It changes the trim and

the lift point. One of our bigger challenges was that we really didn't have a handle on weight and buoyancy of the whole new system.

There's a database of all the weights, volumes, and locations of all the components that go into the vehicle. You add all that stuff up, and you end up with a total vehicle weight and the location of the center of gravity, and where it should be picked up, how it's going to hang, how it'll float and balance, how much reserve buoyancy it's got, and many other factors. All that is ultimately proved by weighing the vehicle when it's all together, and putting it in the water, and seeing how it floats.

In this photo, I suspect we were weighing the vehicle. It's always a little bit of a nail-biter, 'cause you've put a lot of work into making sure it all fits and works. Verification of that effort makes for pretty stressful days.

Here, we were actually using a scale that was old and a little out of whack, and it wasn't giving us the number we expected. So Pat [Hickey, Alvin Expedition Leader] and I might have been a little more concerned than we wanted to be. Subsequently we got the scale recalibrated and re-weighed the vehicle, and we were within half a percent on the expected weight, which is a little more how you want it to be. You want to be down there in the sub-one percent kind of error-bar region. ▲