

Leg part 1

12. SUNY Leg Impact Testing

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SUNY Leg Impact Testing

Leg Impact testing was conducted at SUNY in late 1990 during the same session as the Head Impact testing.

Tyler Kress of the University of Tennessee was the lead researcher of the leg impact team. His earlier work with motorcycle leg impacts led to the SUNY testing.

Cadaver legs were suspended underwater in the SUNY circular pool, perpendicular to the oncoming propeller guard. The large rotating arm swung the outboard motor around and the leading edge of the propeller guard struck the lower leg. See color image in right column.

The IRCOBI Paper

In 1996, Kress presented the final version of the leg impact paper at the International Research Council on the Biomechanics of Injury in Dublin, Ireland.

A quote from the abstract: *“it was concluded that for the loading condition and population studied in this series of tests, the specific prop-guard cage would not be an effective device for preventing severe leg injury at boat velocities greater than or equal to about 13 mph (21 km/h).”*

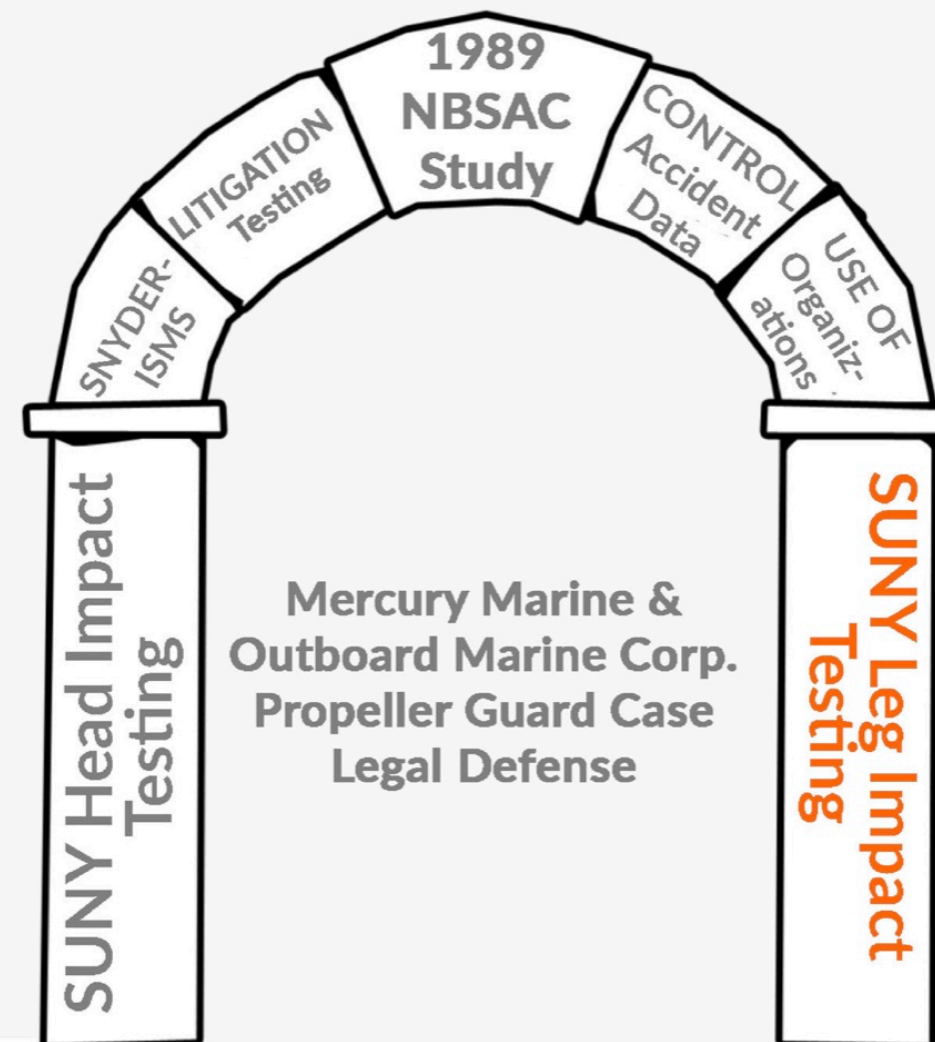
The loading condition: the lower legs of cadavers were tied across the tank as if a swimmer was swimming across in front of the boat. While this can happen, most propeller strikes occur in other scenarios.

The population: The **average age of the cadavers was approximately 75 years and the legs had been embalmed for 1 to 11 years.** Researchers described the soft tissue of the legs as leather like, a result of long time storage and fixation.

From the paper’s content, it is obvious the boating industry and their lawyers wrote or helped write the section on the development of propeller guards and the debate surrounding their use.

While earlier versions of the paper noted the leg impact research was contracted by Mercury and OMC any mention of Mercury Marine and OMC was removed from the IRCOBI paper making it look like independent research.

The paper does mention one study that said manufacturers were reluctant to study guards. The current authors dispute that claim with, *“This is interesting because a couple of U.S. outboard manufacturers have been the primary organizations involved in a significant amount of the research and development that has been completed with regard to the design and feasibility of propeller guards.”* They were obviously referring to Mercury and OMC’s litigation testing of propeller guards.



Vertical Trim

Don Kueny of OMC said he found a way to represent propeller thrust during the SUNY testing. By trimming the outboard motor into a vertical position (zero trim), when it impacted the crash dummy or cadaver leg, the resistance to the outboard swinging upward provided by the outboard motor’s log strike system could represent the forward thrust of the propeller. While that might be true, striking a cadaver leg with the drive in a vertical position, removes the opportunity for the crash dummy’s head or a cadaver leg to slide down the slanted leading edge of the guard.

Still Perpetuating Falsehoods

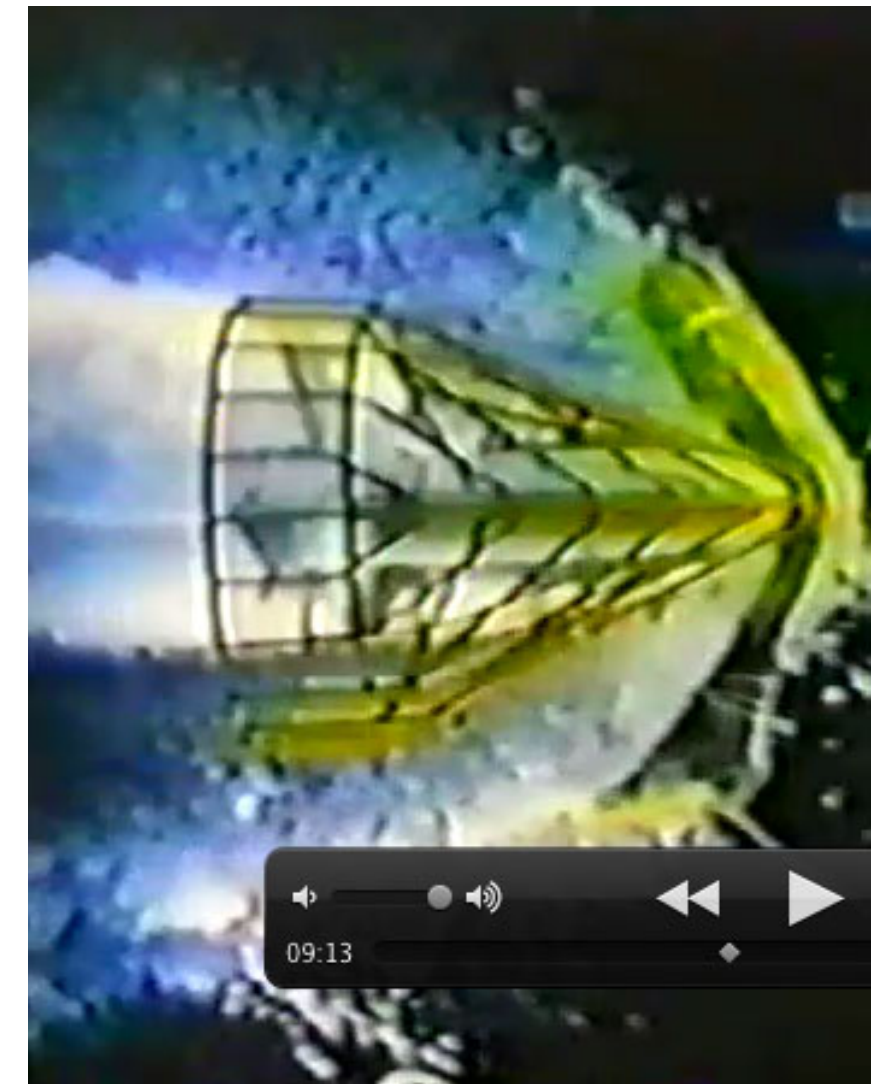
The industry used Kress’ IRCOBI paper to perpetuate their use of Event 1 BARD (U.S. Coast Guard Boating Accident Report Database) data to represent the total number of BARD reported propeller strikes when they had known for years that was not true.

For example, the 1996 IRCOBI paper stated, **“The US Coast Guard Boating Statistics Data over the past 20 years show only about 100 people are injured or killed from boat or propeller strikes.”**

They know USCG’s annual Boating Statistics Data publication only reports Event 1 data. Total reported propeller strikes can be found using BARD. During the era of the Head Impact and Leg Impact studies, many accidents failed to report Event 2 and Event 3 data. Even so, Don Kerlin of USCG found 1,304 “stuck by boat or propeller” accidents from 1983-1987 in BARD (about 260 per year).

Wrap Around

The image below is a view upwards from the bottom of the SUNY pool as the propeller guard impacts a cadaver leg at 13 mph. You can see the cadaver leg wrapping around the oncoming propeller guard.



While the image above is graphic, we have no way of knowing:

1. How much younger, un-embalmed legs would have responded.
2. How the legs would have responded to more rounded forward facing propeller guards.
3. If the guard was not present and the vertical leading edge of the drive struck the leg, would it have cut the leg into two pieces, both of which then went into the propeller? The researchers were expressly forbidden from testing without a propeller guard.
4. How the leg would have responded if the leg had been in the more natural vertical position of someone treading water, floating vertically in a life jacket, getting ready to climb the swim ladder, or fallen from skis and waiting to be picked when they were struck a glancing blow by the propeller guard.