

Tank Testing Objectives

3A00

Out-of-water:

1. Align laser on vehicle with camera
 - ✓ a. Ensure that camera is pointed horizontal using levels
 - b. Ensure that laser sheet is vertical using levels
 - c. Measure angle between two planes: _____
 - d. Verify that (c) is 90 deg
2. Control of laser
 - a. Measure power output of laser at 1.5 V: ~30 mW
 - b. Measure power output of laser at 5 V: ~1200 mW
 - c. Measure duration of laser power before beam is stable _____
3. Control of vortex generator/dye injector
 - a. Test L/D ~2
 - b. Test L/D ~4
 - c. Test L/D ~8
 - d. Reverse piston direction to refill/reset generator
 - e. Does dye bag actuation work
- ✓ 4. Control of camera alignment
 - a. Ensure that camera is pointed horizontal using levels
 - b. Move camera to opposite ends of the position spectrum
 - c. Home the camera and verify it's in correct location
- ✓ 5. Align sizing lasers
 - a. With object of known size, place in center of camera FOV with sizing lasers on
 - b. Step away from camera at 1 ft/m intervals, recording video the whole time
 - c. Zoom in on object, keeping its size consistent with each interval
 - d. Verify spacing between lasers consistent at all distances
- ✓ 6. Ensure that Giancarlo's sensor is logging
- ✓ 7. Control of recorder
 - a. Record
 - b. Rewind and playback
 - c. Export

~~8. Camera calibration (can't do out of water)~~

In-water:

1. Verify alignment of laser
 - ✓ a. Turn on camera and laser; zoom in camera such that entire FOV is illuminated by laser; manually focus to ensure that particles are crisp
 - b. Record; stop; rewind; look at individual frames
 - c. Look closely at particles on edges of frame; if particles are blurry on the right or left side, correct laser housing in yaw; if particles are blurry on the top or bottom edges, correct laser housing in roll
2. Verify camera settings at 1080p 60
 - a. Adjust shutter speed, setting where laser too dim: _____
 - b. Adjust iris, setting where laser too dim: _____

✓ focused on target @ laser sheet position

- c. With laser sheet and sizing lasers on, camera recording and zoomed in until entire FOV is illuminated by laser
- d. Zoom all the way to find minimum FOV: _____

3. Measure laser sheet spread angle

- a. With laser sheet and sizing lasers on, camera recording and zoomed out, and hovering near object in FOV of camera
- b. Measure spread angle
 - i. 60 deg line optic: 45°
 - ii. 90 deg line optic: _____

c. Estimate largest FOV that can be illuminated using optic

- i. 60 deg line optic: _____
- ii. 90 deg line optic: _____

4. DPIV measurements with ~~HID~~/LED lighting

- a. With laser sheet on, camera recording and zoomed in to illuminate FOV, ~~HID~~ HID lights off, and vehicle hovering in space
- b. With laser sheet on, camera recording and zoomed in to illuminate FOV, ~~HID~~ LED lights off, and vehicle hovering with object in laser sheet
- c. With laser sheet on, camera recording and zoomed in to illuminate FOV, ~~HID~~ LED lights on, and vehicle hovering in space
- d. With laser sheet on, camera recording and zoomed in to illuminate FOV, ~~HID~~ LED lights on, and vehicle hovering with object in laser sheet
- e. Can pilot see laser sheet to align with object?
- f. Separate color channels
 - i. Can you see particles?
 - ii. How does average laser intensity change with separated color channels?

5. Measure vortex generator flow

$D = 1.25"$

- a. With laser sheet on, camera recording and zoomed in to illuminate FOV, HID lights off, and vehicle hovering in space
- b. PIV vortex ring with $L/D \sim 2$ $1 \Rightarrow$ reset
- c. PIV vortex ring with $L/D \sim 4$ $4 \Rightarrow$ reset
- d. PIV vortex ring with $L/D \sim 8$ $5 \Rightarrow$ reset
- e. Adjust camera settings to optimize PIV results
 - i. Iris: _____
 - ii. Shutter speed: _____

6. Test dye injector settings

- a. Attach dye pouch
- b. With camera recording and zoomed out, laser off, HID lights on, vehicle hovering near object in FOV
- c. Adjust speed and distance piston travels
- d. Settings for small vortex rings: _____
- e. Settings for large rings: _____
- f. Settings for continuous stream: _____
- g. Estimate number of dye visualizations before refill is needed: _____

7. Accelerometer tests on vehicle and laser arm

- a. Ensure that Giancarlo's sensor is logging (CTD, DVL, accelerometer)

- b. Prescribe motion with sensor on vehicle
 - c. Prescribe same motion with sensor on laser arm/housing
- 8. Verify DVL speed with separate camera
 - a. Vary speed
 - b. Vary distance of water mass DVL is referencing
 - c. Compare with bottom lock
 - d. Fixed camera video used as direct comparison
- 9. Hover near objects
 - a. Practice communication
 - b. Practice approach
 - c. Practice 3D reconstruction
 - d. Practice DeepPIV
- 10. Jellyfish from aquarium?

Camera calibration

- print out

~~tilt control~~

humidity sensor in laser housing

paint arm black

~~make frame~~

CTD good font