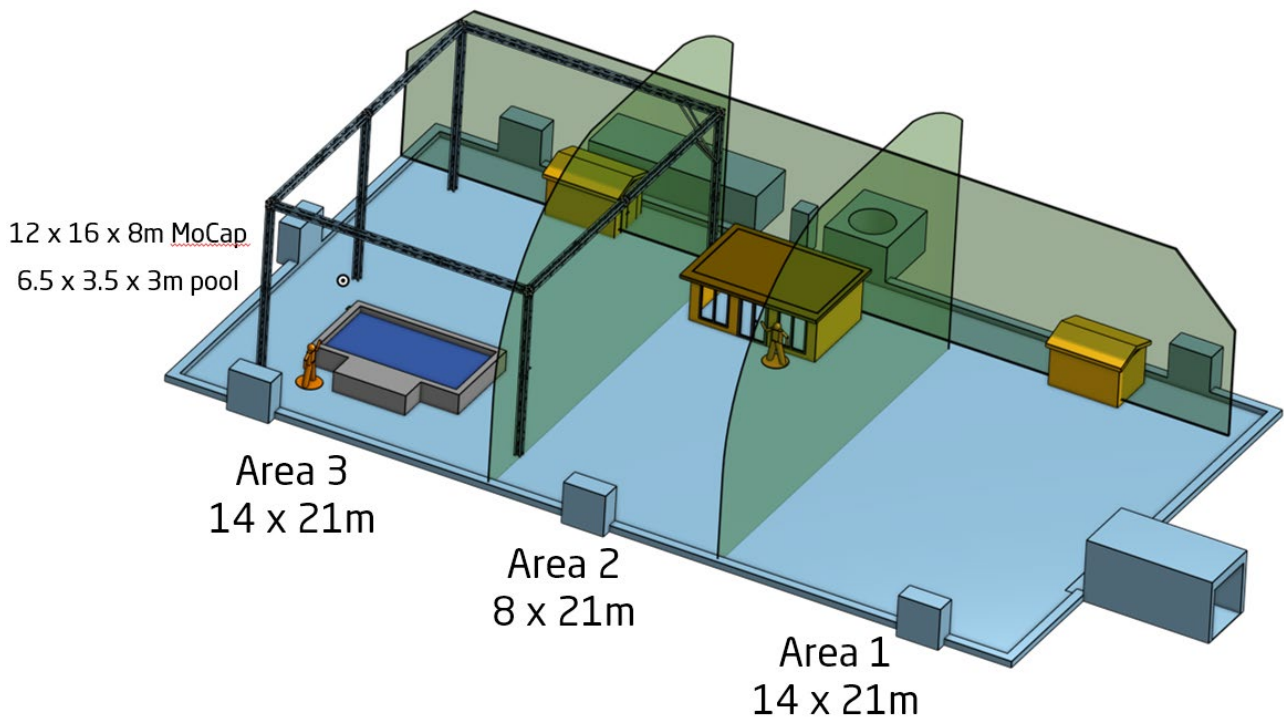


Guidelines and instructions for using DTU Autonomous Systems Test Arena

Layout

ASTA is divided in the following areas:



ASTA areas	Details
Area 1 (South)	Open space for testing land and aerial robotic systems (21 x 14m, 13m height)
Area 2 (Center)	Open space for testing land and aerial robotic systems (21 x 8m, 13m height)
Area 3 (North)	Volume equipped with 16 cameras Motion Capture system where to experiment with robotic systems on land and in air (16 x 12m, 8m height) Includes a 6.5 x 3.5 x 3m deep pool where to experiment with surface or underwater robots

Equipment

Shared equipment and tools:

- Basic mechanical tools
- Scissor lift

In Area 3 (North), the following equipment is further included:

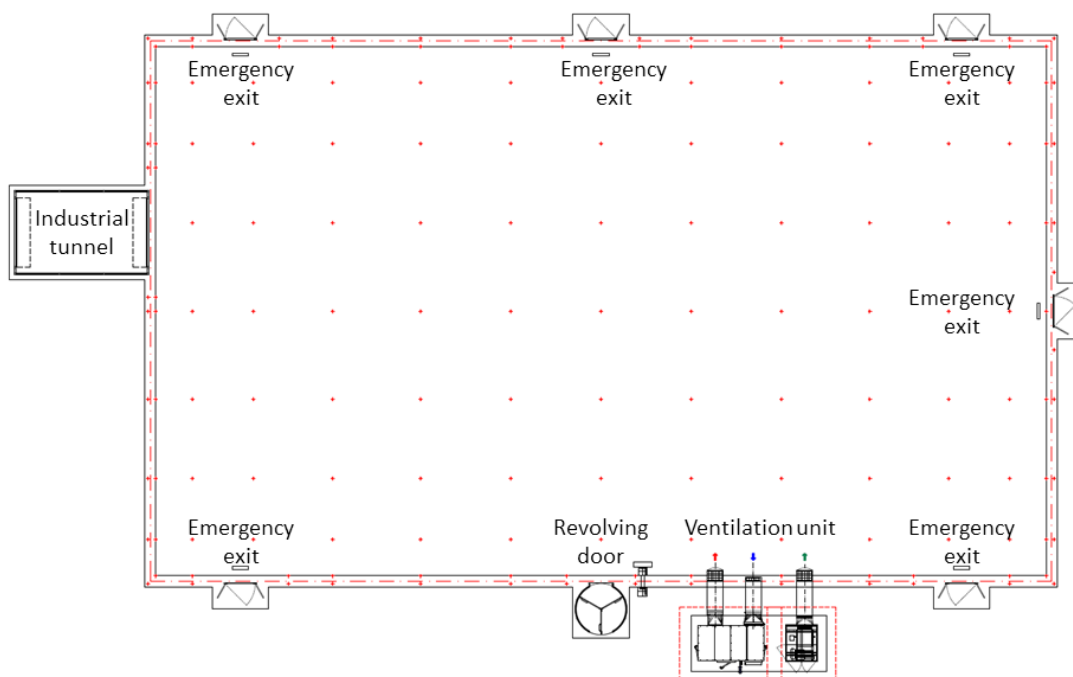
- Motion Capture system consisting of 16 OptiTrack cameras, model Prime 17W, occupying 16m x 12m x 8m
- Pool of size 6.5m x 3.5m x 3m, with counter current available.

Information on air domes

The ASTA facility is an air supported structure (air dome) formed by Polyester fabric PVC coated on both sides. The different parts are welded together and anchored into the foundation base. A centrifugal fan blows air inside the dome through a ventilation sleeve. The fan keeps a steady overpressure inside the dome (150-250 Pascal), which gives the necessary stability to the dome. To avoid changes in pressure, the doors allow transit with minimum air escaping.

The air dome is flexible, so it can move sideways when the wind is strong. To protect the dome membrane, all structures inside it must be placed at **a minimum distance of 100 cm** from the membrane and all sharp cornered bodies must be covered with proper material.

Entrances



Main entrance

The main entrance of ASTA is the revolving door on the side of the ventilation unit. This requires an access card to be unlocked.

Industrial tunnel

The industrial tunnel allows the entrance of transportation means and large equipment. There is a sectional door (sliding upwards) at each end of the tunnel. The size of the doors is 3m width and 2.5m height and tunnel length is ~6m.

The tunnel is designed to **never have both doors open** at the same time, as it could lead to a drastic change in the dome's air pressure.

The sectional doors can only be opened from the inside. The tunnel can be accessed through a door on its side, which also requires card access.

Emergency exits

There are 6 emergency exits, located as seen in the figure above. These are outwards opening doors, with transparent portholes and closing mechanism. Each exit is marked with an emergency light mounted above it.

The emergency exit doors should **only be used in case of an emergency**, as their opening can also lead to a drastic change in the structure's air pressure. There is a lot of air pressure on these doors, pushing them outwards. Anyone opening the doors should **prepare to be pulled forward**. If the doors are left open, the dome structure **will collapse**.

Ventilation Units

The air dome is equipped with air generators which provide necessary air delivery. The main ventilation unit is driven by an electrical engine.

Besides the main ventilation unit, there is a Diesel Engine powered emergency unit. This engine automatically starts in case of mechanical or electrical breakdown of the main unit, high winds, or when the pressure switch signals a pressure lowering inside the dome.

Entering and leaving the facility

When entering the facility, the revolving door should be used whenever possible. For taking large equipment inside ASTA, the industrial tunnel can be used. If the facility is locked, the provided access cards can be used.

The doors do not lock automatically. When leaving the premises, if no one else is inside the facility, **the doors must be locked** using the access cards (put the card next to the handle to activate it and then twist the handle).

If you find yourself locked in the facility (the revolving door is locked), you can exit through the industrial tunnel.

Cleaning

Please put all the tools and equipment back in their place and remove any waste before leaving the facility. Even if you are using the facility for several consecutive days, please keep your work area tidy. This contributes to a good working environment inside ASTA.

Motion Capture System

The Motion Capture System inside DTU ASTA consists of 16 OptiTrack cameras, model Prime 17W, which are mounted on an aluminium truss structure occupying 16m x 12m x 8m.

There are various areas of application for Motion Capture Systems. Our main area of interest is in robotics. OptiTrack provides low latency, precision 6DoF real-time tracking for ground and aerial robotics. Several robots can be tracked at the same time, allowing for experiments with collaborative robots.

The software available for using with the camera system is Motive:Tracker 3.X. This is used to track and capture the motion of small retroreflective markers attached to objects and delivers real-time motion data with high accuracy.

Additional information and instructions on how to use the OptiTrack system can be provided as part of the initial instructions.

Pool

Inside the volume occupied by the Motion Capture System, there is a pool of size 6.5m x 3.5m x 3m depth.

The pool is **unheated and does not meet the sanitary standards for human use**. It is meant for experiments using underwater robots or vessels on the water surface.

A counter current unit is available, which can pump a powerful stream of water into the swimming pool. The generated flow allows for more complex testing of water vehicles, more similar to real-life conditions.

Additional information and instructions on how to use the pool can be provided as part of the initial instructions.

Emergency evacuation

In case an emergency evacuation is needed, please follow these steps:

1. Stay calm and alert.
2. Locate the nearest emergency exit. Look for signs or lights that will guide you to the exit.
3. If the nearest exit is obstructed or unsafe, move to another exit. Be aware that the dome may have collapsed in some areas, which could obstruct exits or create hazards.
4. Once you reach the exit, unlatch it and evacuate the structure in an orderly manner. There is a lot of air pressure on these doors. **Anyone opening the doors with the lever will be pulled forward.**
5. If you **encounter smoke or fire** while attempting to evacuate, **do not unlatch** the exit. Move to a different exit.
6. If no safe exit is available or if you cannot exit the dome due to physical limitations, move to a safe area and alert security personnel immediately (**DTU Vagt: +45 45 25 33 55, dtu.vagt@securitas.dk**).
7. If you are assisting others with the evacuation, ensure that they are calm and can move safely. Assist those who require it, but do not put yourself in danger.
8. Once you have evacuated the structure, move to a safe distance from the dome and contact security personnel (**DTU Vagt: +45 45 25 33 55, dtu.vagt@securitas.dk**). Await further instructions.
9. If you hear a loud popping or hissing sound, or if you notice the dome starting to collapse or deflate, immediately evacuate the structure through the nearest exit. Do not attempt to deflate or collapse the dome on your own.