

Mechanical Handling Requirements

The current requirements for mechanical handling are laid out in the project documents on Learn.

At the time of this document they are:

Disarming a variety of triggers and devices including (as a minimum)

- Disconnecting wires
- Rotation of dials through 400 degrees (as a minimum)

Lifting items

- Each item will weigh no more than 200g
- Maximum dimensions of these items: 150mm (h/w/d)

Retrieving Items

- Releasing Items for retrieval where item may be connected to a fixed position.

Careful Handling

- During lifting, retrieval and transportation
- Orientation of items should be maintained (tilting <30 degrees from horizontal)
- Items should not be shaken, dropped etc – avoid sudden shocks

Transferring items from one sub system to another.

It should be noted that it is not currently possible to meet these requirements with the current equipment, or that a more efficient solution might be possible through the use of additional equipment.

It is suggested that the main method for mechanical handling is the supplied servo controlled arm, this however will require modification as the maximum load is below the maximum possible weight given in the requirements. The gripper may also require modification so that it can pick up the item whilst still being able to manipulate valves and wiring.

The wrist of the robot cannot rotate continuously, this means that the gripper will have to disengage the valve before rotating back to its start position and then re engaging the valve. If a continuous rotation motor can be used in the wrist joint then this could greatly reduce the time required to complete the task. Once operational it will be necessary to test the arm to ensure that it is able to perform the more delicate movements such as lifting the item and disconnecting wires.

The use of a camera system located on the arm would be greatly recommended, to aid the user in operating the system, this will help lining up the gripper with the target. It may prove necessary to use anti vibration mounts for the camera so that it can be used during travel.

To ensure that the load is not tilted more than 30 degrees, tilt switches or possibly a control based method should be implemented whilst the load is attached to the arm. Whilst on the second sub-system a gimbal or Stewart's Platform could be installed to keep the container level. The latter would require its own control system, however it should still be considered as a technical challenge.

Adam Peers 23/10/14