

# TBM 1: Prepare Assembly Aid Tray for Force Fitting

Team name: \_\_\_\_\_

Referee I: \_\_\_\_\_, Referee II: \_\_\_\_\_

Date and time: \_\_\_\_\_

Duration: \_\_\_\_\_ ☐ Timeout

## Achievements

	yes	no
The robot correctly grasp the assembly aid tray: Comment: _____	<input type="checkbox"/>	<input type="checkbox"/>
The robot correctly grasp the first bearing box: Comment: _____	<input type="checkbox"/>	<input type="checkbox"/>
The robot correctly grasp the second bearing box: Comment: _____	<input type="checkbox"/>	<input type="checkbox"/>
The robot insert the first bearing box into the aid tray: Comment: _____	<input type="checkbox"/>	<input type="checkbox"/>
The robot insert the second bearing box into the aid tray: Comment: _____	<input type="checkbox"/>	<input type="checkbox"/>
The robot correctly deliver the tray to the force fitting station: Comment: _____	<input type="checkbox"/>	<input type="checkbox"/>

## Penalized Behaviors

The robot bumps into obstacles in the test bed:	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
The robot drops an object (the object touches the ground):	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
The robot stops working:	<input type="checkbox"/>

## Disqualifying Behaviors

The robot damages or destroys the objects requested to manipulate:	<input type="checkbox"/>
The The robot damages the test bed:	<input type="checkbox"/>

Benchmarking data delivered appropriately: ☐ yes / ☐ no

Team leader signature: \_\_\_\_\_

Referee signature: \_\_\_\_\_

# TBM 2: Plate Drilling

Team name: \_\_\_\_\_

Referee I: \_\_\_\_\_, Referee II: \_\_\_\_\_

Date and time: \_\_\_\_\_

Duration: \_\_\_\_\_ ☐ Timeout

Notes on TBM 2 to teams/referee/organizer:

1. The cover plates are organized in the conveyor belt with the order of **unusable-unusable-faulty-faulty** (yes, specifically in this order). The reasoning is because processing unusable cover plate is “simpler” than processing faulty ones. As such the only way to ensure fairness is to have a specific ordering of the cover plates.

2. **Each cover plates needs to be processed entirely before the robot move on to processing the next cover plate.** Unusable cover plate should be delivered to the trash container box and faulty cover plate should be fixed with the drilling machine. Please note that processing of each cover plates doesn't have to be succesful, yet the robot need to show the expected behavior to complete the process. This is to prevent any achievement mining (e.g. repeatedly only picking a cover plate from the conveyor belt's exit ramp).

## Achievements

Cooperate with CFH and Networked Devices throughtout the task

☐

Comment: \_\_\_\_\_

This is marked when the robot is, at the least, receive its task from CFH AND operate quality control camera.

~~The robot collect the cover plate box from the shelves~~

~~The robot correctly grasp the plates~~

The robot pick up a cover plate from the conveyor belt exit ramp

☐ ☐ ☐ ☐

Comment: \_\_\_\_\_

Lifting up the cover plate is considered a success.

~~The robot place the cover plate box to the correct workspace~~

~~The robot correctly sort the plates~~

The robot place the unusable cover plate inside the trash box container

☐ ☐

Comment: \_\_\_\_\_

~~The robot perform the drilling process for faulty plates~~

The robot place a cover plate in the drilling machine

☐ ☐

Comment: \_\_\_\_\_

The robot pick up a cover plate in the drilling machine

☐ ☐

Comment: \_\_\_\_\_

Again, lifting up the cover plate is considered a success.

The robot place a cover plate inside the cover plate box

☐ ☐

Comment: \_\_\_\_\_

## Penalized Behaviors

The robot bumps into obstacles in the test bed: ☐ ☐ ☐ ☐ ☐

~~The robot drops a plate:~~

The robot collide with a networked device: ☐ ☐ ☐ ☐ ☐

## Disqualifying Behaviors

~~The robot damages or destroys the objects requested to manipulate:~~

~~The robot damages the test bed:~~

The robot damages the test bed: ☐

Comment: \_\_\_\_\_

WARNING: A disqualifying behaviors discard all other achievement in the current task. Use it only when it is really necessary (e.g. cheating).

Benchmarking data delivered appropriately: ☐ yes / ☐ no

Team leader signature: \_\_\_\_\_

Referee signature: \_\_\_\_\_

RD: This is a very good first draft for TBM2

# TBM 3: Fill a Box with Parts for Manual Assembly

Team name: \_\_\_\_\_

Referee I: \_\_\_\_\_, Referee II: \_\_\_\_\_

Date and time: \_\_\_\_\_

Duration: \_\_\_\_\_ ☐ Timeout

## Achievements

The robot communicates with CFH through out the test: ☐ achieved

The team submit the benchmarking data by the end of the test: ☐

	part 1	part 2	part 3	part 4	part 5	container
The robot picks up a required object or container from its storage location:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The robot places required objects into the container:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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The robot delivers a correctly filled container at the designated workstation: ☐

Comment: \_\_\_\_\_

## Penalized Behaviors

The robot bumps into obstacles in the test bed: ☐ ☐ ☐ ☐ ☐

The robot drops an object: ☐ ☐ ☐ ☐ ☐

The robot stops working: ☐

## Disqualifying Behaviors

The robot damages or destroys the objects requested to manipulate: ☐

The robot damages the test bed: ☐

Benchmarking data delivered appropriately: ☐ yes / ☐ no

Team leader signature: \_\_\_\_\_

Referee signature: \_\_\_\_\_

# FBM 1: Object Perception

Team name: \_\_\_\_\_

Referee I: \_\_\_\_\_, Referee II: \_\_\_\_\_

Date and time: \_\_\_\_\_

Notes:

- The duration is based on the referee stop watch.
- Timeout is checked when the robot cannot detect the object within the specified test duration.
- GT is the ground truth which is the information provided by the referee box.
- Object identifier:
  - EM-01(1)=aid tray, EM-02(2)=cover plate box
  - AX-01(4)=bearing box type A, AX-16(3)=bearing box type B
  - AX-02(6)=bearing, AX-09(7)=motor, AX-03(5)=axis

Run 1 Duration: \_\_\_\_\_ ☐ Timeout

Object Detection

GT	Container		Bearing Box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)
Robot	Container		Bearing box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)

Pose

GT	x	y	$\theta$	Robot	x	y	$\theta$

Comments: \_\_\_\_\_

Run 2 Duration: \_\_\_\_\_ ☐ Timeout

Object Detection

GT	Container		Bearing Box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)
Robot	Container		Bearing box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)

Pose

GT	x	y	$\theta$	Robot	x	y	$\theta$

Comments: \_\_\_\_\_

**Run 3** Duration: \_\_\_\_\_ ☐ Timeout

Object Detection

GT	Container		Bearing Box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)
Robot	Container		Bearing box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)

Pose

GT	x	y	$\theta$	Robot	x	y	$\theta$

Comments: \_\_\_\_\_  
\_\_\_\_\_

**Run 4** Duration: \_\_\_\_\_ ☐ Timeout

Object Detection

GT	Container		Bearing Box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)
Robot	Container		Bearing box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)

Pose

GT	x	y	$\theta$	Robot	x	y	$\theta$

Comments: \_\_\_\_\_  
\_\_\_\_\_

**Run 5** Duration: \_\_\_\_\_ ☐ Timeout

Object Detection

GT	Container		Bearing Box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)
Robot	Container		Bearing box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)

Pose

GT	x	y	$\theta$	Robot	x	y	$\theta$

Comments: \_\_\_\_\_  
\_\_\_\_\_

**Run 6** Duration: \_\_\_\_\_ ☐ Timeout

Object Detection

GT	Container		Bearing Box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)
Robot	Container		Bearing box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)

Pose

GT	x	y	$\theta$	Robot	x	y	$\theta$

Comments: \_\_\_\_\_  
\_\_\_\_\_

**Run 7** Duration: \_\_\_\_\_ ☐ Timeout

Object Detection

GT	Container		Bearing Box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)
Robot	Container		Bearing box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)

Pose

GT	x	y	$\theta$	Robot	x	y	$\theta$

Comments: \_\_\_\_\_  
\_\_\_\_\_

**Run 8** Duration: \_\_\_\_\_ ☐ Timeout

Object Detection

GT	Container		Bearing Box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)
Robot	Container		Bearing box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)

Pose

GT	x	y	$\theta$	Robot	x	y	$\theta$

Comments: \_\_\_\_\_  
\_\_\_\_\_

**Run 9** Duration: \_\_\_\_\_ ☐ Timeout

Object Detection

GT	Container		Bearing Box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)
Robot	Container		Bearing box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)

Pose

GT	x	y	$\theta$	Robot	x	y	$\theta$

Comments: \_\_\_\_\_  
\_\_\_\_\_

**Run 10** Duration: \_\_\_\_\_ ☐ Timeout

Object Detection

GT	Container		Bearing Box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)
Robot	Container		Bearing box		Transmission		
	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)

Pose

GT	x	y	$\theta$	Robot	x	y	$\theta$

Comments: \_\_\_\_\_  
\_\_\_\_\_

**Benchmarking data delivered appropriately:** ☐ yes / ☐ no

**Team leader signature:** \_\_\_\_\_

**Referee signature:** \_\_\_\_\_



## FBM 2: Visual Servoing

Team name: \_\_\_\_\_

Referee I: \_\_\_\_\_, Referee II: \_\_\_\_\_

Date and time: \_\_\_\_\_

Notes:

- The duration for each run is based on the referee stop watch.
- Timeout is checked when the robot cannot grasp the object within the specified test duration.
- The sequence of objects which are used in each run is defined by the team.
- Objects: EM-01=aid tray orange, EM-02=cardbox black, AX-01=bearing box type A, AX-16=Bearing box type B, AX-02=bearing, AX-03=axis, AX-09=motor

**Run 1** Duration: \_\_\_\_\_ ☐ Timeout

Object id: \_\_\_\_\_, Orientation: \_\_\_\_\_, ☐ Success, ☐ Dropped, ☐ Missed

Comments: \_\_\_\_\_

**Run 2** Duration: \_\_\_\_\_ ☐ Timeout

Object id: \_\_\_\_\_, Orientation: \_\_\_\_\_, ☐ Success, ☐ Dropped, ☐ Missed

Comments: \_\_\_\_\_

**Run 3** Duration: \_\_\_\_\_ ☐ Timeout

Object id: \_\_\_\_\_, Orientation: \_\_\_\_\_, ☐ Success, ☐ Dropped, ☐ Missed

Comments: \_\_\_\_\_

**Run 4** Duration: \_\_\_\_\_ ☐ Timeout

Object id: \_\_\_\_\_, Orientation: \_\_\_\_\_, ☐ Success, ☐ Dropped, ☐ Missed

Comments: \_\_\_\_\_

**Run 5** Duration: \_\_\_\_\_ ☐ Timeout

Object id: \_\_\_\_\_, Orientation: \_\_\_\_\_, ☐ Success, ☐ Dropped, ☐ Missed

Comments: \_\_\_\_\_

**Run 6** Duration: \_\_\_\_\_ ☐ Timeout

Object id: \_\_\_\_\_, Orientation: \_\_\_\_\_, ☐ Success, ☐ Dropped, ☐ Missed

Comments: \_\_\_\_\_

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**Run 7** Duration: \_\_\_\_\_ ☐ Timeout

Object id: \_\_\_\_\_, Orientation: \_\_\_\_\_, ☐ Success, ☐ Dropped, ☐ Missed

Comments: \_\_\_\_\_

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**Benchmarking data delivered appropriately:** ☐ yes / ☐ no

**Team leader signature:** \_\_\_\_\_

**Referee signature:** \_\_\_\_\_

# FBM 3: Control

Team name: \_\_\_\_\_

Referee I: \_\_\_\_\_, Referee II: \_\_\_\_\_

Date and time: \_\_\_\_\_

Notes:

- The duration for each run is based on the referee stop watch.
- Timeout is checked when the robot cannot execute the path within the specified test duration.
- The specific path for this benchmark is defined before the competition.

**Run 1** Duration: \_\_\_\_\_ ☐ Timeout, Finished complete path: ☐ Yes ☐ No

area deviation: \_\_\_\_\_, constant deviation: \_\_\_\_\_,

Comments: \_\_\_\_\_  
\_\_\_\_\_

**Run 2** Duration: \_\_\_\_\_ ☐ Timeout, Finished complete path: ☐ Yes ☐ No

area deviation: \_\_\_\_\_, constant deviation: \_\_\_\_\_,

Comments: \_\_\_\_\_  
\_\_\_\_\_

**Run 3** Duration: \_\_\_\_\_ ☐ Timeout, Finished complete path: ☐ Yes ☐ No

area deviation: \_\_\_\_\_, constant deviation: \_\_\_\_\_,

Comments: \_\_\_\_\_  
\_\_\_\_\_

**Run 4** Duration: \_\_\_\_\_ ☐ Timeout, Finished complete path: ☐ Yes ☐ No

area deviation: \_\_\_\_\_, constant deviation: \_\_\_\_\_,

Comments: \_\_\_\_\_  
\_\_\_\_\_

**Run 5** Duration: \_\_\_\_\_ ☐ Timeout, Finished complete path: ☐ Yes ☐ No

area deviation: \_\_\_\_\_, constant deviation: \_\_\_\_\_,

Comments: \_\_\_\_\_  
\_\_\_\_\_

Benchmarking data delivered appropriately: ☐ yes / ☐ no

Team leader signature: \_\_\_\_\_

Referee signature: \_\_\_\_\_