## TBM 1: Prepare Assembly Aid Tray for Force Fitting

Team name:					
Referee I:, Referee II:					
Date and time:					
Duration: □ Timeout					
Achievements					
The robot correctly grasp the assembly aid tray:  Comment:	yes	nc			
The robot correctly grasp the first bearing box:  Comment:	_				
The robot correctly grasp the second bearing box:  Comment:	_				
The robot insert the first bearing box into the aid tray:  Comment:					
The robot insert the second bearing box into the aid tray:  Comment:	_				
The robot correctly deliver the tray to the force fitting station:  Comment:	_				
Penalized Behaviors					
The robot bumps into obstacles in the test bed: $\Box$ $\Box$ $\Box$ $\Box$					
The robot drops an object (the object touches the ground): $\Box$ $\Box$ $\Box$ $\Box$					
The robot stops working: $\Box$					
Disqualifying Behaviors					
The robot damages or destroys the objects requested to manipulate: $\qed$					
The The robot damages the test bed: $\hfill\Box$					
Benchmarking data delivered appropriately: $\square$ yes $/$ $\square$ 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 tunusable-faulty-faulty (yes, specifically in this order). The reason tunusable cover plate is "simpler" than processing faulty ones. As such fairness is to have a specific ordering of the cover plates.  2. Each cover plates needs to be processed entirely before to processing the next cover plate. Unusable cover plate should container box and faulty cover plate should be fixed with the drilling that processing of each cover plates doesn't have to be successful, yet the expected behavior to complete the process. This is to prevent any repeatedly only picking a cover plate from the conveyor belt's exit range.	ing is because processing h the only way to ensure re the robot move or be delivered to the trashing machine. Please note the robot need to show achievement mining (e.g.
Achievements	
Cooperate with CFH and Networked Devices througout the task Comment:	
This is marked when the robot is, at the least, receive its task from CFH AND operate quality control camera.	<b>√</b>
The robot collect the cover plate box from the shelves  The robot correctly green the plates.	
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 consider 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 contain Comment:	ner
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 consider a success.	
The robot place a cover plate inside the cover plate boy	ПП

Penalized Behaviors	
The robot bumps into obstacles in the test bed:	
The robot collide with a networked device:	
Disqualifying Behaviors	
The robot damages or destroys the objects requered. The robot damages the test bed:  The robot damages the test bed:  Comment:  WARNING: A disqualifying behaviors discard all other achievement only when it is really necessary (e.g. cheating).	
Benchmarking data delivered appropriately	: $\square$ yes / $\square$ no
Team leader signature:	
Referee signature:	

RD: 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 correctly grasp object:	part 1 part 2 part 3 part 4 part 5
The robot place object in the container:	
Comment:	
The robot correctly grasp the container	yes no
The robot correctly place the container (c	complete with all parts) $\Box$ $\Box$
Comment:	
Penalized Behaviors	
The robot bumps into obstacles in the tes	st bed:
The robot drops an object:	
The robot stops working:	
Disqualifying Behaviors	
The robot damages or destroys the object	ts requested to manipulate: $\Box$
The robot damages the test bed:	
Benchmarking data delivered approp	riately: $\square$ yes / $\square$ no
Team leader signature:	
Referee signature:	

# FBM 1: Object Perception

Referee	I:	, Re	feree II: _			
Date an	nd time:					
Notes:						
• Th	e duration is based on	the referee sto	p watch.			
	meout is checked when ration.	the robot ca	nnot detec	t the object	within the	specified test
• GT	is the ground truth w	which is the infe	ormation p	rovided by t	the referee b	OX.
• Ob	ject identifier:					
-	– EM-01(1)=aid tray,	EM-02(2) = cov	er plate bo	ΟX		
	- AX-01(4)=bearing b				me B	
	- AX-02(6)=bearing,	· -	` /	· ·	ров	
	1111 02(0) 50011118,	111 00(1) 11100	,01, 1111 00	(9) (1111)		
Run 1 I	Ouration:	☐ Timeout				
Object I	Detection					
CT	Container	Bearing	g Box		Transmissio	n
GT	EM-01(1) EM-02(2	( )	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)
Robot	Container	Bearin			Transmissio	
	EM-01(1)   EM-02(2	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)
Pose					T	
GT	х у	θ	Robot	X	У	θ
Commen	ts:					
Run 2 I	Ouration:	☐ Timeout				
Object I	Detection					
GT	Container		Bearing Box		Transmissio	
	EM-01(1) EM-02(2		AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)
Robot	$\begin{array}{ c c c }\hline Container\\\hline EM-01(1) & EM-02(2\\\hline \end{array}$	Bearin  AX-01(4)	$\frac{\text{g box}}{\text{AX-16(3)}}$	AX-02(6)	$\frac{\text{Transmissio}}{\text{AX-09(7)}}$	n   AX-03(5)
Pose			( )	11 (2)		1 7
GT	x y	$\theta$	Dolor	X	у	$\theta$
C = 1	H		Robot		-	+

Joject L	Octoction							
	Detection		·		П			
GT	Conta		Bearin		III.	Transmission		
0.1	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)	
Robot	Container		Bearin	g box		Transmission	n	
TODOU	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)	
Pose								
	X	у	$\theta$	D 1 .	X	у	$\theta$	
GT				Robot		V		
Common	its:							
Jonninen								
Run 4 I	Ouration:	Г	] Timeout					
Object L	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					-11			
	37	77	$\theta$		37	37	$\theta$	
GT	X	У	0	Robot	X	У	U	
Commen	its:							
Run 5 I	Ouration:		] Timeout					
Object I	Detection							
	Container		Bearing Box		Transmission			
GT	EM-01(1)	EM-02(2)	AX-01(4)	$\frac{AX-16(3)}{AX-16(3)}$	AX-02(6)	AX-09(7)	$\frac{1}{\text{AX-03(5)}}$	
	Conta	` ,	Bearin	. ,		Transmission		
Robot	EM-01(1)	EM-02(2)	AX-01(4)	$\frac{\text{Ig box}}{\text{AX-16(3)}}$	AX-02(6)	AX-09(7)	$\frac{1}{ AX-03(5) }$	
	DW-01(1)	DW-02(2)	1121-01(4)	7171-10(0)	1111-02(0)	1171-03(1)	1171-05(0)	
Pose			$\theta$		v	37	$\theta$	
Pose GT	X	У	0	Robot	X	У	U	

	$\frac{\text{Detection}}{\ }$	ainer	Bearing Box		Transmission			
GT	EM-01(1)		AX-01(4)	$\frac{\text{g box}}{\text{AX-16(3)}}$	AX-02(6)	AX-09(7)	AX-03(5)	
	Cont	` '	Bearin	( )	` ′	Transmissio		
Robot	EM-01(1)	$\frac{\text{EM-02}(2)}{\text{EM-02}(2)}$	AX-01(4)	$\frac{\text{AX-16}(3)}{\text{AX-16}(3)}$	AX-02(6)	AX-09(7)	AX-03(5)	
Pose		2111 02(2)	1111 01(1)	1111 10(0)	1111 02(0)	1111 00(1)	1111 00(0)	
	X	у	θ		X	у	$\theta$	
GT	A .	J J		Robot	A	J .		
 Comme	nts:							
Run 7	Duration:		] Timeout					
Object 1	Detection							
OTT.	Cont	ainer	Bearing Box			Transmission		
GT	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)	
Robot	Cont	ainer	Bearin	g 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	У	θ	Robot	X	У	$\theta$	
Comme	nts:							
Run 8	Duration:	Г	] Timeout					
			1 Imeout					
Jbject 1	Detection							
GT	Cont		Bearin			Transmissio		
O I	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)	
———	Container		Bearing box AX-01(4)   AX-16(3)		Transmission   AX-02(6)   AX-09(7)   AX-03(5)			
Robot	EM 01(1)		AA-01(4)	AX-16(3)	AA-02(0)	AA-09(1)	AX-03(5)	
Robot	EM-01(1)	EM-02(2)						
	EM-01(1)	EMI-02(2)						
Robot	EM-01(1)	у у	θ	Robot	X	у	$\theta$	

Run 9 I	Ouration:		] Timeout				
Object I	Detection						
CT	GT Container		Bearing Box		Transmission		
GI	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)
Dobot	Container		Bearing box			Transmission	
Robot	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)
Pose							
OT.	x	у	θ	Dili	X	у	$\theta$
GT				Robot			
	nts:  Duration: _		□ Timeout				
	Detection =						
C/T/	Cont	ainer	Bearin	ıg Box		Transmission	n
GT	EM-01(1)	EM-02(2)	AX-01(4)		AX-02(6)	AX-09(7)	AX-03(5)
Robot	Cont	ainer	Bearing box		Transmission		
RODOL	EM-01(1)	EM-02(2)	AX-01(4)	AX-16(3)	AX-02(6)	AX-09(7)	AX-03(5)
Pose							
GT	X	У	θ	Robot	X	у	θ
Commen	nts:						
Benchn	narking dat	a delivered	l appropria	ately: 🗆 ye	es / 🗆 no		
Team le	eader signa	ture:					
Referee	signature:						

# FBM 2: Visual Servoing

Team name:		
Referee I:	, Refere	ee II:
Date and time:		
Notes:		
• The duration for each	ch run is based on the re	eferee stop watch.
• Timeout is checked duration.	when the robot canno	t grasp the object within the specified test
• The sequence of objection	ects which are used in e	each run is defined by the team.
v	0 0 /	cardbox black, AX-01=bearing box type A, eg, AX-03=axis, AX-09=motor
Run 1 Duration:	Timeout	
		, $\square$ Success, $\square$ Dropped, $\square$ Missed
Comments:		
Run 2 Duration:	□ Timeout	
Object id:	, Orientation:	, $\square$ Success, $\square$ Dropped, $\square$ Missed
Comments:		
Run 3 Duration:	Timeout	
Object id:	, Orientation:	, $\square$ Success, $\square$ Dropped, $\square$ Missed
Comments:		
Run 4 Duration:	□ Timeout	
Object id:	, Orientation:	, $\square$ Success, $\square$ Dropped, $\square$ Missed
Comments:		
Run 5 Duration:	□ Timeout	
Object id:	, Orientation:	, $\square$ Success, $\square$ Dropped, $\square$ Missed
Comments:		

Run 6 Duration:	$\square$ Timeout						
Object id:	, Orientation:,	$\Box$ Success, $\Box$ Dropped, $\Box$ Missed					
Comments:							
Run 7 Duration:							
Object id:	, Orientation:,	$\square$ Success, $\square$ Dropped, $\square$ Missed					
Comments:							
Benchmarking data delivered appropriately: $\square$ yes $/$ $\square$ no							
Team leader signature:							
Referee signature:							