Industrial Robotics Category Tasks and Scoring (Draft)

World Robot Challenge

Program

Industrial Robotics Category

World Robot Challenge

〈Background〉

- Labor shortages in the "manufacturing industry" will become severe, considering the shrink of working age population (in the 2050s, the working age population of major developed countries is to be under 60%) and the concentration of workers in the service industry in recent years.
- However, since conventional industrial robots require a lot of cost for system integration, such as preparing peripheral devices and teaching robot motions, it has been difficult to meet the demands of high-mix low-volume production in recent years. Especially such high cost has been a barrier for SMEs to introduce industrial robots in their factories.
- In order to overcome this problem, it is necessary to accelerate the R&D of robot technologies that enable us to implement robots and reuse them quite easily with low cost, in the "manufacturing industry."

This category aims for the realization of future manufacturing, and to realize its core technology, variable production, which will be performed by robots.

Challenge

Assembly Challenge

Configure a robot system that can assemble model products containing technical elements required in assembling industrial products and other goods, and assemble those models quickly and accurately

●**Needs in the Manufacturing Industry:** Agile and lean manufacturing systems that can manage the high-mix low-volume production

●**Objective:** "Toward agile one-off manufacturing" ----- Construct a fully-automated robotic assembly system that can respond to variously changing orders (ultimately, even an order for one-off product) by reconfiguring the system in agile and lean manners, without manual teaching and fixtures.

●**Expected technological Element：** Full-automated teaching, recognition and grasping technologies for various parts (including flexible ones), fixtureless-assembly

* With regards to competition details in 2020, stated details are all present assumptions and the final details will be confirmed by referring to the progress of technology and the results of pre-competition which will be held in 2018.

Assembly Challenge
(WRS WRC 2017 Trial)

Task*

1. Pick up roller bolt from predefined location on the table and insert it into threaded hole of the base plate.

2. Grasp wrench from predefined location on the table and tighten bolt until fully seated.

3. Place wrench at situated place on the table.

4. Repeat for two bolts.

5. Pick up collar from predefined location on the table and insert it into each roller bolt. Repeat for two collars.

6. Pick up super gear from predefined location on the table and insert it into the roller bolt. Repeat for two gears. When inserting the second gear, mesh it with the first one.

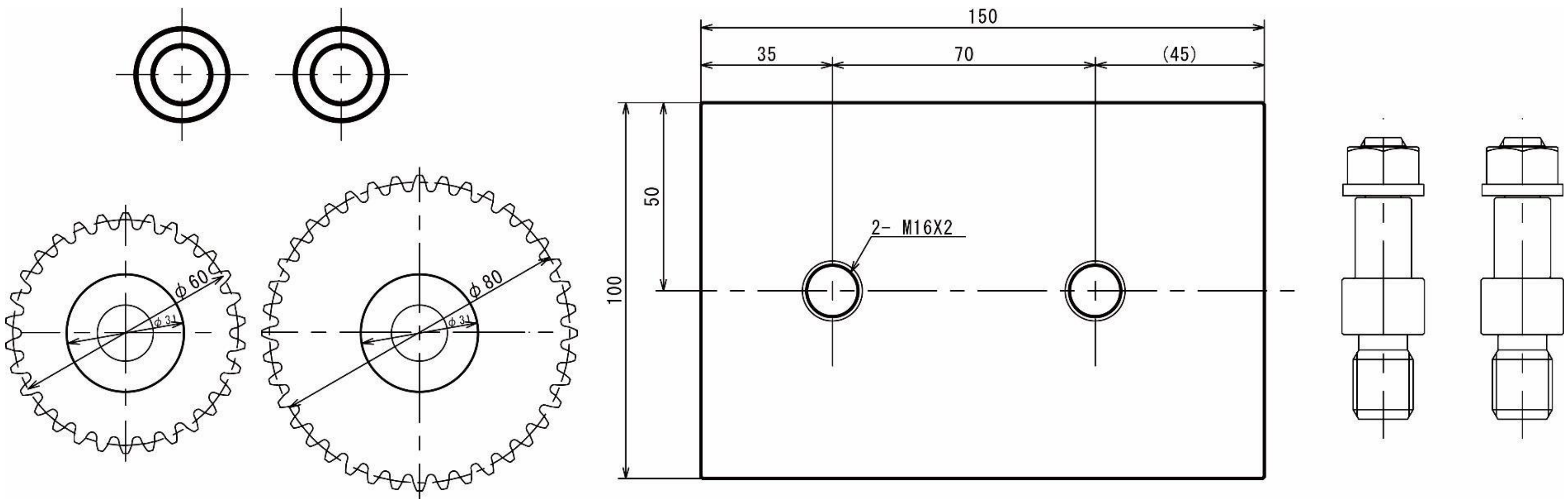
7. Pick up nut from predefined location on the table and insert it into each roller bolt.

8. Grasp nut driver from predefined location in the table and tighten nut fully seated.

9. Place nut driver at suitable place on the table.

10. Repeat for two nuts.

* This is a trial task for 2017. More difficult tasks will be provided for WRS 2018 and 2020. This trial task will be challenged as one of the tasks of the 2nd Robotic Grasping and Manipulation Competition which will be held in September at the IROS 2017 site.


φ60
φ31
φ80
φ31
150
35
70
(45)
100
50
2- M16X2

Scoring

Give points each time you carry out the following items.

1. Assemble roller bolt
2. Drive roller bolt to full depth
3. Fasten roller bolt tightly by wrench (Bonus point)
4. Assemble collar
5. Assemble 1st gear
6. Assemble 2nd gear
7. Assemble nut
8. Drive nut to full depth
9. Fasten nut with predefined torque (Bonus point)