TAMPERE UNIVERSITY OF TECHNOLOGY

ASE-9406

Robot Manipulators: Modelling, Control & Programming

ASSIGNMENT 3

Industrial Robot Programming

Group 12

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Task 1: Welding Routine

For this task we used the Robot 1520ID and used AW Gun PSF25 as the end effector for welding purpose. As a work object we used the part named 'Curve Thing' from the library. As the requirement we needed our robot to weld on the path of the curve on the work object. Then the robot will wait for 3 seconds as it assumes there is another part is placed on top of the previous one, it will weld the next part along the same path.

At first, we used the AutoPath command from the Path tab in Home Tab. Then we selected the path as circular and selected the tolerance as 1 mm. Then selecting the reference surface, we selected the sides of the curve and finished the path. We moved our robot on the target points. As the first part was done, we shifted to modify the RAPID code for the second part. As we have already defined the path, we only needed to add 3 seconds of WaitTime and some offset value along the Z axis for welding the next part placed on top of the first part. For this we defined another function called the Weld_Next, which will be called by the previous function Weld. In this function, we added the targets with some offset value using the command offs. For all the Move commands we used the zone of the target as z0 so that it will reach the exact point and we selected the velocity of joint motors as 80. The part of the code is given below:

```
! This function starts welding the work object
PROC Weld()
    MoveL Target_10,v80,z0,Weldgun\WObj:=Wobj_CurveThing;
    MoveL Target_20,v80,z0,Weldgun\WObj:=Wobj_CurveThing;
    MoveC Target_30,Target_40,v80,z0,Weldgun\WObj:=Wobj_CurveThing;
    MoveL Target_50,v80,z0,Weldgun\WObj:=Wobj_CurveThing;
    MoveC Target_60,Target_70,v80,z0,Weldgun\WObj:=Wobj_CurveThing;
    MoveL Target_80,v80,z0,Weldgun\WObj:=Wobj_CurveThing;
    MoveL Target_90,v80,z0,Weldgun\WObj:=Wobj_CurveThing;
    MoveL Target_100,v80,z0,Weldgun\WObj:=Wobj_CurveThing;
    MoveL Target_110,v80,z0,Weldgun\WObj:=Wobj_CurveThing;

    WaitTime 3; ! Waits 3 second to place another work object
    Weld_Next; ! Calls the function to weld the next workobject
ENDPROC

! This function starts welding the next work object
PROC Weld_Next()
    MoveL offs(Target_10,0,0,30),v80,z0,Weldgun\WObj:=Wobj_CurveThing;
    MoveL offs(Target_20,0,0,30),v80,z0,Weldgun\WObj:=Wobj_CurveThing;
    MoveC offs(Target_30,0,0,30), offs(Target_40,0,0,30),v80,z0,Weldgun\WObj:=Wobj_CurveThing;
    MoveL offs(Target_50,0,0,30),v80,z0,Weldgun\WObj:=Wobj_CurveThing;
    MoveC offs(Target_60,0,0,30), offs(Target_70,0,0,30),v80,z0,Weldgun\WObj:=Wobj_CurveThing;
    MoveL offs(Target_80,0,0,30),v80,z0,Weldgun\WObj:=Wobj_CurveThing;
    MoveL offs(Target_90,0,0,30),v80,z0,Weldgun\WObj:=Wobj_CurveThing;
    MoveL offs(Target_100,0,0,30),v80,z0,Weldgun\WObj:=Wobj_CurveThing;
    MoveL offs(Target_110,0,0,30),v80,z0,Weldgun\WObj:=Wobj_CurveThing;
ENDPROC
```

The work object after creating AutoPath looks like the picture below:

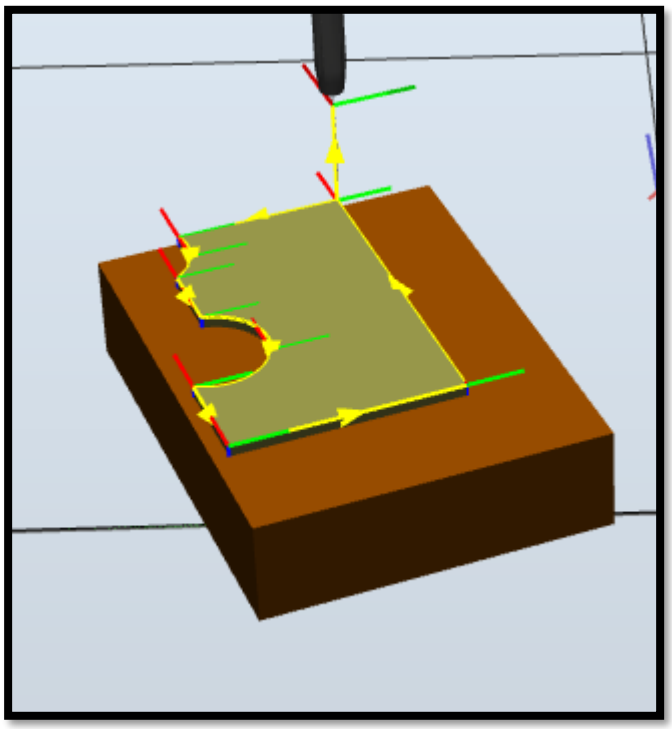

Fig 1: Work Object with the created path for welding

The Robot in working position is given below:

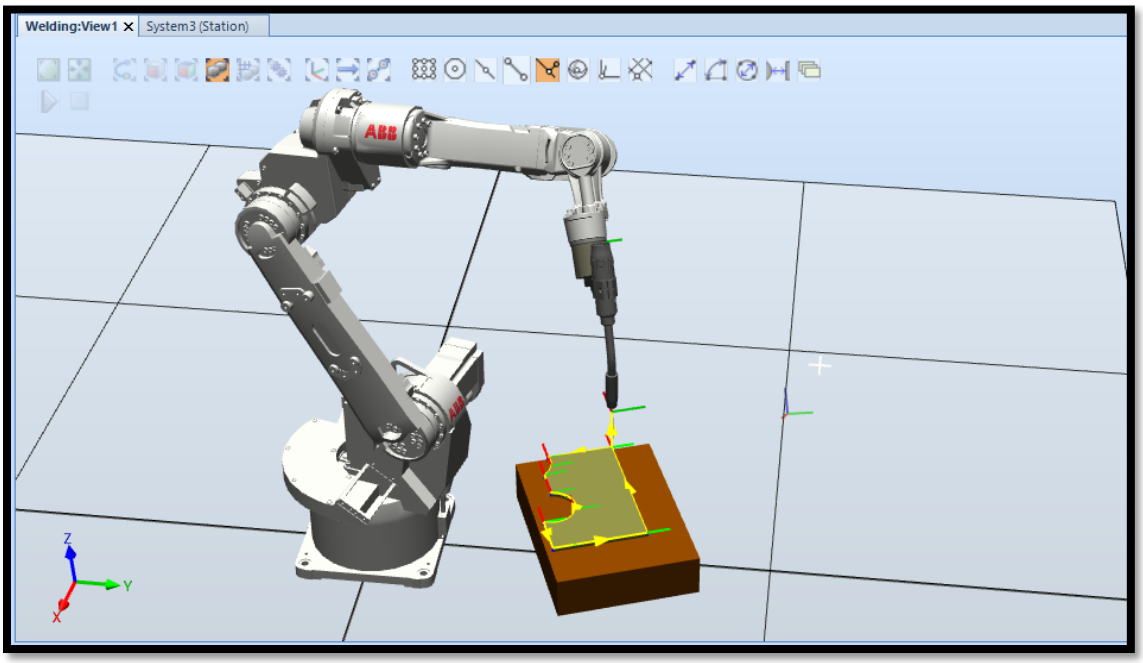

Fig 2: Robot in working position

Task 3: Profiling Letters

For this task we were given a Pack & Go file named LCFA_Profile. While unpacking the file we faced some problems regarding the RobotWare version. So, we tried and installed many versions of the Robot ware, but it was unable to open the file. It worked when we installed the RobotWare version 5.11.03. The requirement was to program the robot so that it will draw the profiles of two letters L and C. We also needed to run the code on the original Industrial ABB robot and run the program and see the Robot working according to our Code.

For this task we placed the robot with the Jog joints command in a position which can be seen from the front. We started drawing the letters by moving the end effector of the robot to the place and using Teach Target command. The Teach target command sets a point or coordinate axis where we select. At first, we drew the C letter and then given the WaitTime command to wait for 3 seconds before it starts the L profile. After waiting it draws the L letter. The picture of the profile is given below:

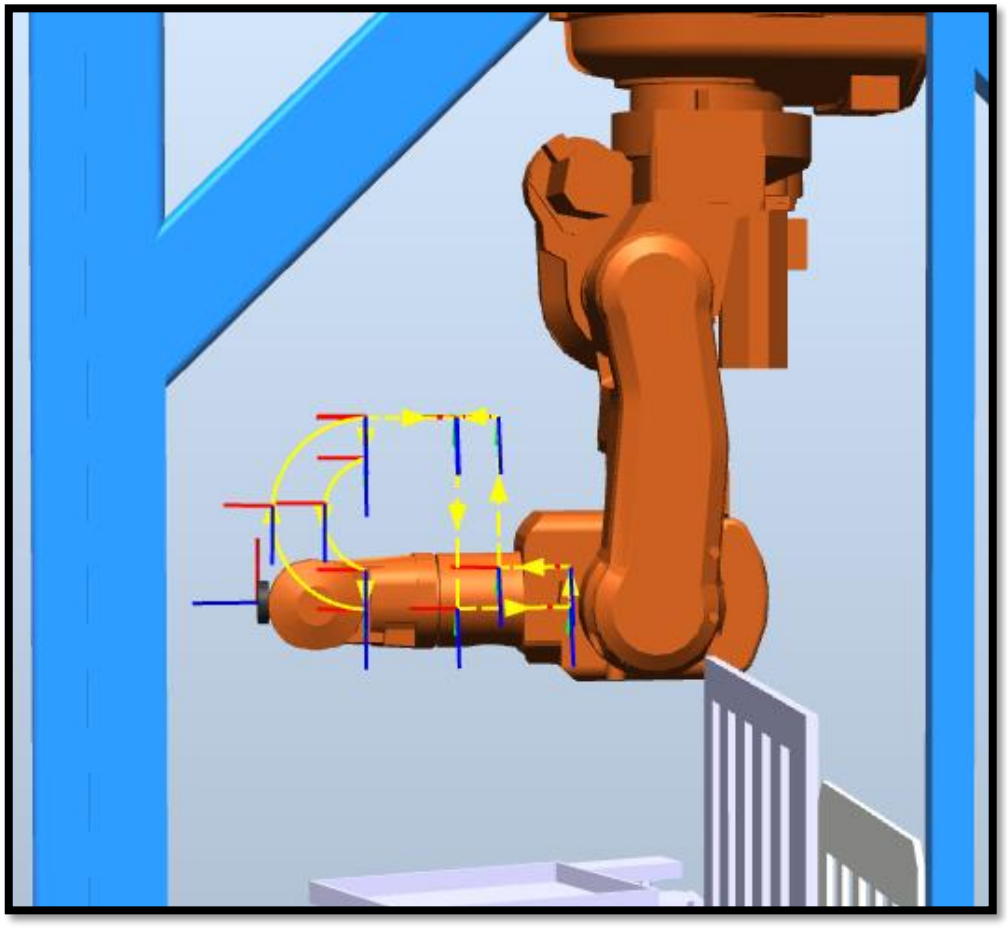

Fig 3: Path of 'L' & 'C' Profiles

After that we tested our code in the FAST Lab with Industrial ABB robot and saw the exact same result which we designed in our code. The used the FlexPendant for jogging the Robot and running our code. We were able to control the robot from the FlexPendant.