

Arc/Curved Welding Robot Automation

VNBC – MAKARA GROUP

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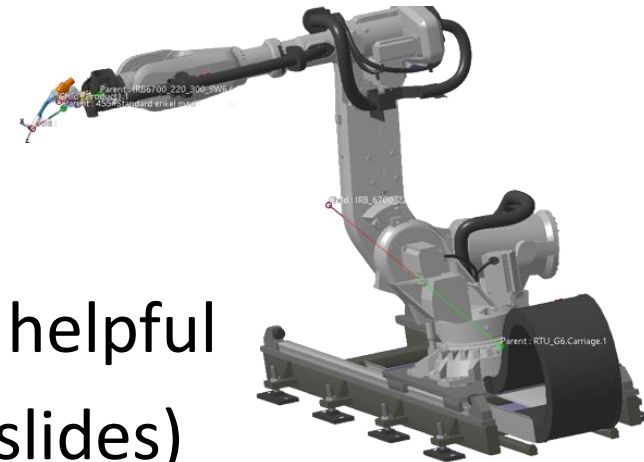
Vasanth Elangovan

What is this...


- This operation is to automate a welding task (mostly a arc/curved welding task)
- This is still a go-around to automate the welding task

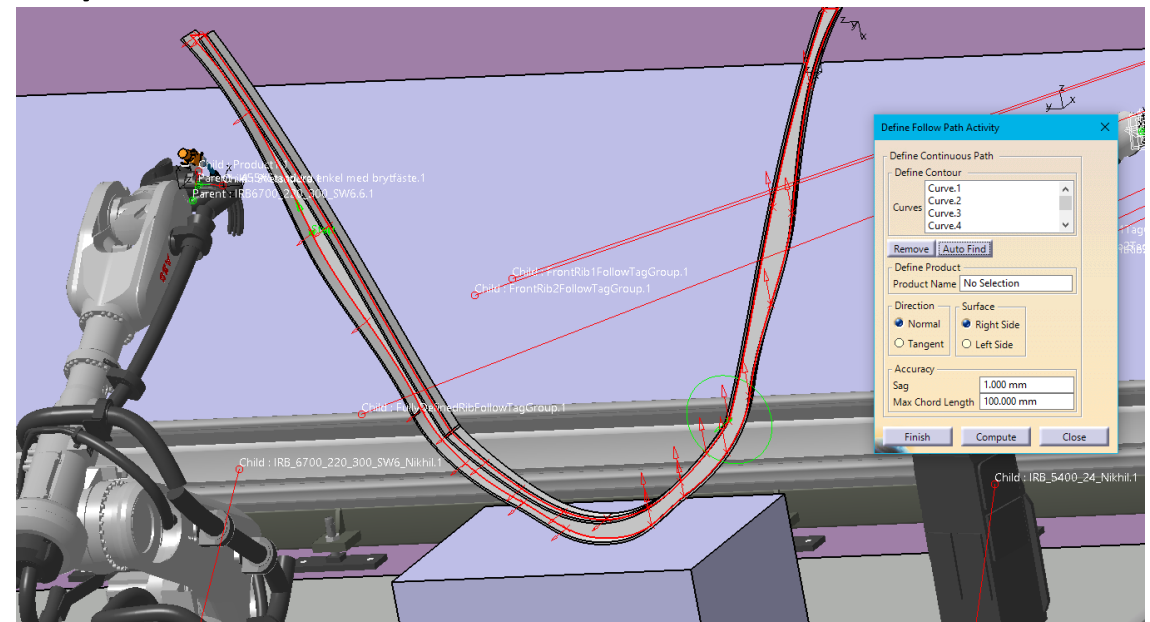
What is Needed...

- A robot with welding tool (end-effector)
- Additionally if you have a gantry/rail, its helpful
- A Reference robot (Explained in further slides)

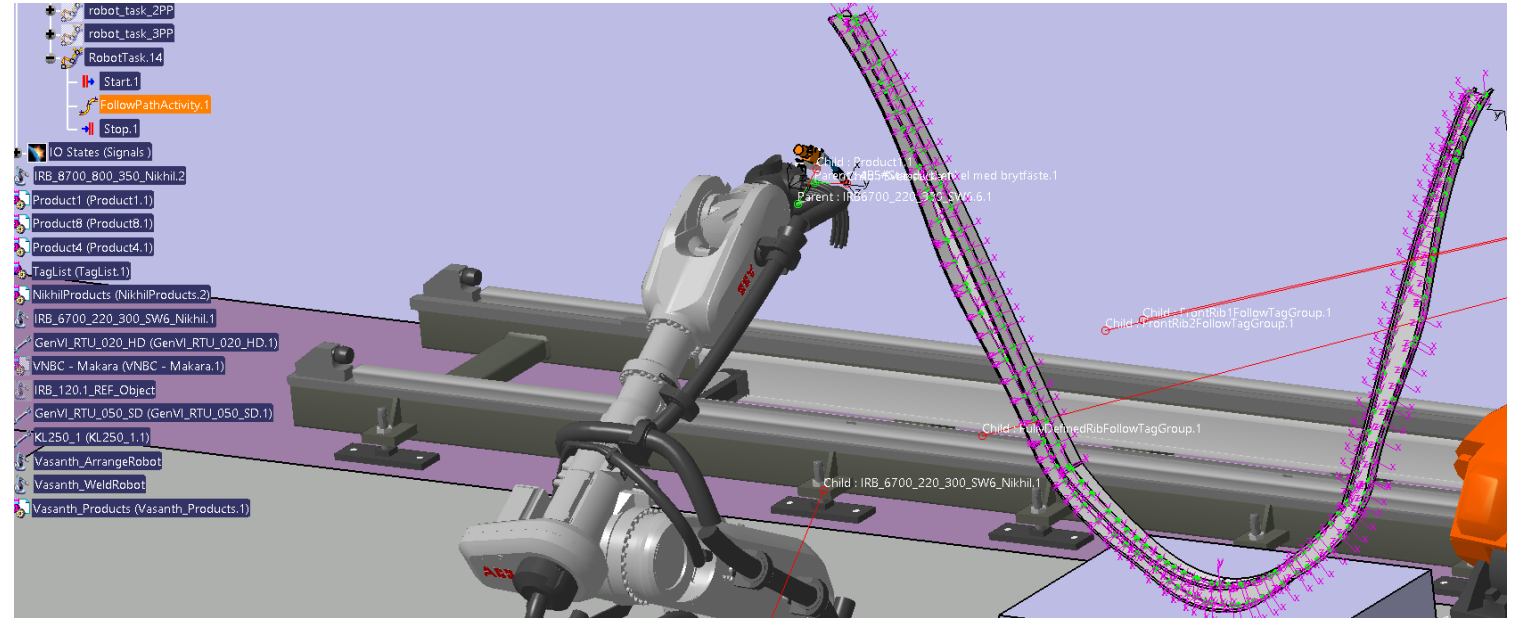
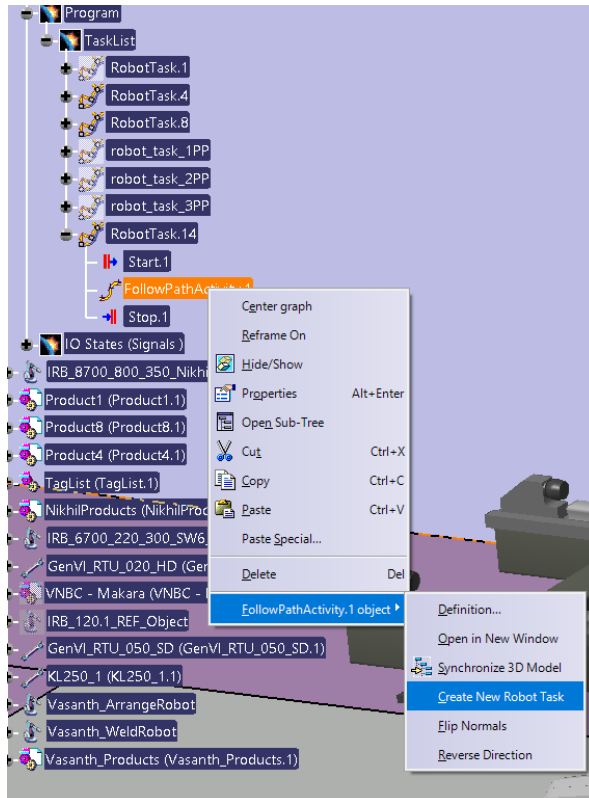


Step 1

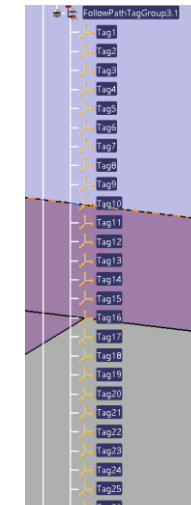
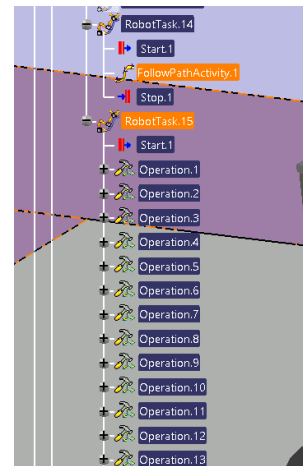
- Have a object which needs to be welded and the welding robot in desired position.
- Create a new Robot task
- Click on the "Create FollowPathActivity" , then click on the newly created robot task. Then click on the curve you want the weld to be done (Tip1: You can also click on the "Auto Find" after one curve is selected) (Tip2: Also make point to look at the directions of the curve is finding, change it according to your needs)



- It would look something like this

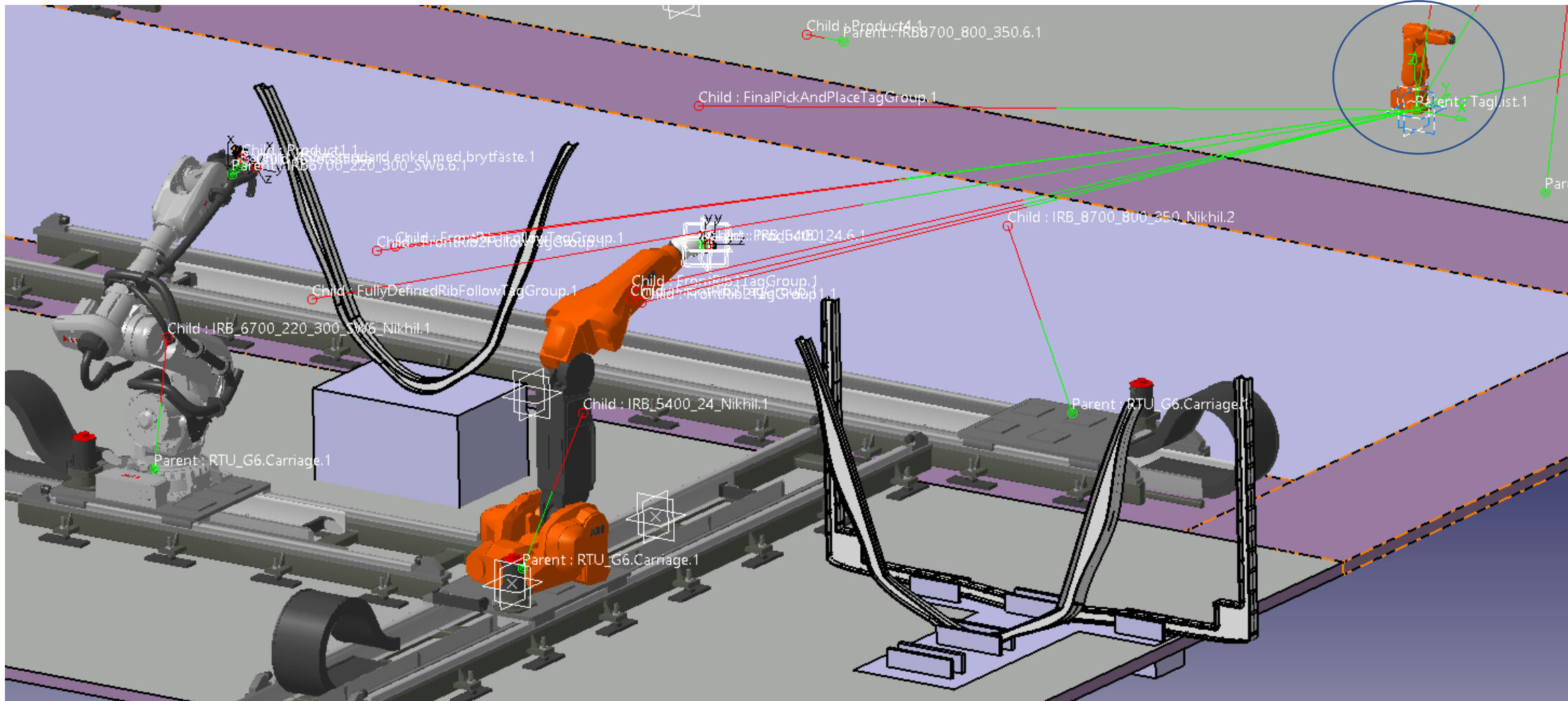


- Right Click on the FollowPathActivity and click on "Create New Robot Task"
- This will create a robot motion and tags for the curve we have defined, this can be seen in the photo below



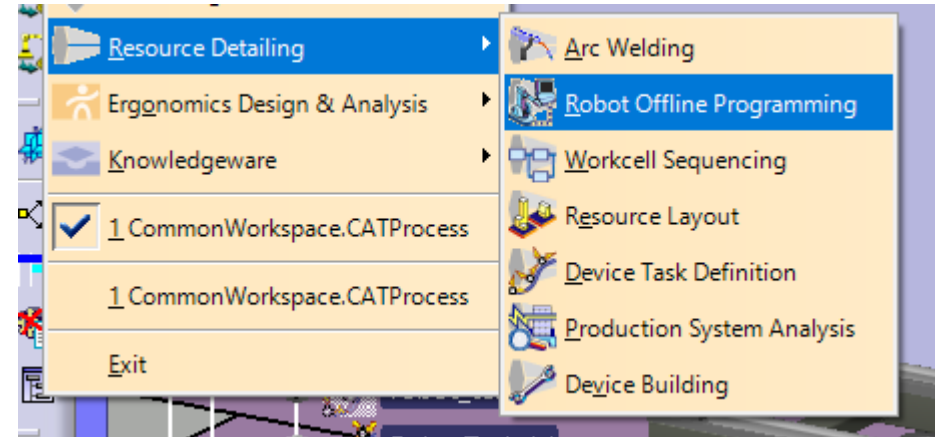
There are around 180 Robot operation and tags are extracted

- Now Place a Reference robot in the origin (x=0, y=0 , z=0), like shown below,



Now extracting the tag which was created

- Go to Robot Offline Programming



- Click on Export Tag Group Info



- Then Select the reference robot you previously placed and then select the taggroup which has the follow tags, save it in .xls format
- Open the .xls file and resave it to .csv

(.csv files are easy to access in vb.net)

Coding in VB to access the .csv and creating operation

```
'Reading CSV file
Dim Xcoord
Dim Ycoord
Dim Zcoord
Dim rotX
Dim rotY
Dim rotZ
Dim FrontRib1tag(500)
Dim tfp As New TextFieldParser("X:\DACP_Project\Nikhil\VS\FrontRib1CurveTag.csv")
tfp.Delimiters = New String() {","}
tfp.TextFieldType = FieldType.Delimited
Dim i = 0
tfp.ReadLine() ' skip header
While tfp.EndOfData = False
    Dim fields = tfp.ReadFields()
    Xcoord = fields(2)
    Ycoord = fields(3)
    Zcoord = fields(4)
    rotX = fields(5)
    rotY = fields(6)
    rotZ = fields(7)
    'Console.WriteLine(String.Format("{0} - {1} - {2} - {3} - {4} - {5}", Xcoord, Ycoord, Zcoord, rotX, rotY, rotZ))
    Dim FrontRib1tagSTD = Class1.create_tag(objTagFactory, Xcoord, Ycoord, Zcoord, (rotX + Pi / 2), (rotY - 0.447), (rotZ - Pi / 2), "FrontRib1tag" & i)
    FrontRib1tag(i) = FrontRib1tagSTD
    'Console.WriteLine(String.Format("{0}", FrontRib1tag(i)))
    i += 1
End While
```

Tag position and orientation

This is a loop to access the tags and create operation

```
'Robot Task, Operation, Motion for 1st Welding (1W)
objRobotTaskFactory1W.CreateRobotTask("robot_task_1W", objRobotTask)
Dim objRobotTask1W As DNBigpTagPath.RobotTask = Class1.create_task(objRobotTask)
Dim objOperation1W(500) As DNBigpTagPath.Operation
Dim robotm1W(500) As DNBigpTagPath.RobotMotion
Dim ii
Dim j = 0
For ii = 1 To 179
    If ii = 1 Then
        objOperation1W(ii - 1) = Class1.create_operation(objRobotTask1W)
    Else
        objOperation1W(ii - 1) = Class1.create_aftoperation(objRobotTask, objOperation1W(ii - 2))
    End If
    robotm1W(ii - 1) = Class1.create_robotmotion(objOperation1W(ii - 1), FrontRib1tag(j))
    j += 1
Next
```


- With this, the arc/curved welding can be automated,
- in case you decide to change the place of the welding robot and its following operation, then it would be just a correction factor which you should include while saving a tag in the array in slide7 (the one which is circled in slide7)