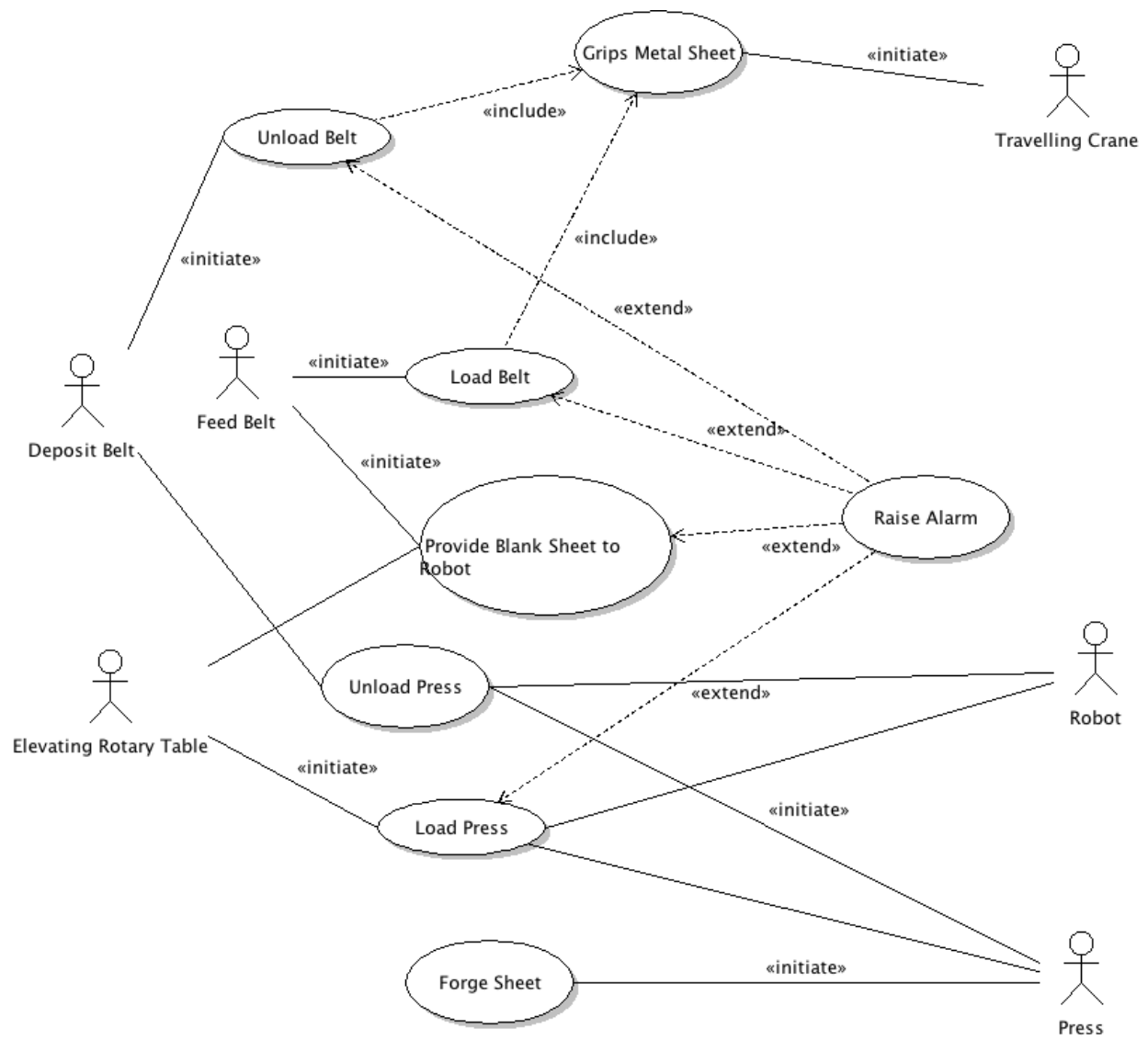


Assignment 1



ACTORS

1. Travelling Crane
The travelling crane is used to load the feed belt with the blank metal sheets and unload the forged metal sheets from the deposit belt.
2. Feed Belt
The feed belt pushes the blank metal sheets on the elevating rotary table. The belt is powered by an electric motor, which is further governed by controlling software.
3. Deposit Belt
The deposit belt receives forged metal sheets. The belt is powered by an electric motor, which is further governed by controlling software
4. Elevating Rotary Table
The Elevating rotary table takes in the blank metal sheets from the feed belt and caters it to the first arm (arm1) of the robot. The elevating table has the job of elevating the blank metal sheet and rotating it at the right height and angle so that arm1 can grip it.
5. Robot
The robot has two arms: arm1 and arm2. Arm1 of the robot grips the blank metal sheet from the elevating rotary table and loads the press at the middle position. Arm2 on the other hand, unloads the press when the press is at the lowest position for unloading. Arm2 grips the forged metal sheet from the lowest position and places it on the deposit belt.
6. Press
The press in the production cell has the purpose of forging the metal sheet. The press has three positions. The lowest position of the press is used for unloading the forged metal sheets (by arm2). The middle position is used for loading the blank metal sheets (by arm1) and in the highest position the press forges the metal sheets.

Use case name	Load Belt
Summary	The system loads the belt with a blank metal sheets
Precondition	Blank metal sheets should be available in the blank metal sheet container
Primary Actor	Feed Belt
Secondary Actor	
Dependencies	Includes use case Grips Metal Sheet
Basic Flow	<ol style="list-style-type: none"> 1. The System asks the photoelectric cell to send a signal to the travelling crane regarding the availability of a blank metal sheet 2. The System asks the crane to move to the position of the blank metal sheet container 3. The System VALIDATES THAT the crane is positioned over the container 4. INCLUDE USE CASE Grips Metal Sheet 5. The System VALIDATES THAT the crane has the blank metal sheet 6. The System asks the crane to position at the Feed belt 7. The System VALIDATES THAT the crane has positioned on the feed belt 8. The Systems asks the crane's gripper to release the sheet <p>Postcondition: The feed belt has the blank metal sheet for the rotary table</p>
Specific Alternative Flow	<p>BFS. 3</p> <ol style="list-style-type: none"> 1. The System asks the crane to position over the container 2. RESUME STEP 3 <p>Postcondition: The crane has been asked to reposition itself</p> <p>BFS 5, 7</p> <ol style="list-style-type: none"> 1. EXTENDED BY USE CASE Raise Alarm 2. Abort <p>Postcondition: Alarm has been raised to the operator</p>

Use case name	Unload Belt
Summary	The system unloads the forged metal sheet from the deposit belt
Precondition	Forged metal sheet is available at the deposit belt
Primary Actor	Deposit Belt
Secondary Actor	
Dependencies	INCLUDES use case Grips Metal Sheet EXTENDED BY Raise Alarm
Basic Flow	<ol style="list-style-type: none"> 1. The System asks the photoelectric cell to send a signal to the travelling crane regarding the availability of forged metal sheet 2. INCLUDE USE CASE Grips Metal Sheet 3. The System VALIDATES THAT the crane has the forged metal sheet 4. The System asks the crane to move to the position of the forged metal sheet container 5. The System VALIDATES THAT the crane is positioned over the container 6. The Systems asks the crane's gripper to release the sheet <p>Postcondition: The forged metal sheet container contains the forged metal sheet</p>
Specific Alternative Flow	<p>BFS 3.</p> <ol style="list-style-type: none"> 3. EXTENDED BY USE CASE Raise Alarm 4. Abort <p>Postcondition: The Alarm is raised to the operator</p> <p>BFS. 5</p> <ol style="list-style-type: none"> 3. The System asks the crane to position over the container 4. RESUME STEP 4 <p>Postcondition: The crane has been asked to reposition itself</p>

Use case name	Grips Metal Sheet
Summary	The system aligns the crane's gripper over the metal sheet
Precondition	The photoelectric cells have signaled the crane
Primary Actor	Travelling crane
Secondary Actor	
Dependencies	
Basic Flow	<ol style="list-style-type: none"> 1. The System asks the crane to move its gripper to position on the metal sheet 2. The System VALIDATES THAT the crane is in position to grip the metal sheet 3. The System asks the crane to move the electromagnetic gripper down 4. The System asks the gripper of the crane to pick the metal sheet 5. The System asks the crane to move the gripper up. <p>Postcondition: The electromagnetic gripper has the metal sheet</p>
Specific Alternative Flow	<p>BFS 2.</p> <ol style="list-style-type: none"> 5. The System asks the gripper to position over the metal sheet 6. RESUME STEP 2 <p>Postcondition: The crane has been asked to readjust its gripper</p>

Use case name	Provide Blank Sheet to robot
Summary	This use case feeds a blank sheet from the feed belt to the elevating rotary table and provides it to the robot arm-1 at right height and angle
Primary Actor	Feed Belt
Secondary Actor	Elevating Rotary Table
Precondition	A blank sheet is present at the end of the feed belt, ready to be deposited on the table
Dependencies	EXTENDED by Raise Alarm
Basic Flow	<ol style="list-style-type: none"> 1. The System asks the Rotary Table to move to a position to receive the blank sheet. 2. The System VALIDATES THAT the table is at the right position (height and angle). 3. The System asks the feed belt to place the blank metal sheet on the rotary table 4. The System asks the table to change height and angle to service arm1 of the robot <p>Postcondition: The Rotary table holds a blank metal sheet to service the robot arm-1 at a right height and angle.</p>
Specific Alternative Flows	<p>BFS – 2</p> <ol style="list-style-type: none"> 5. EXTENDED BY USE CASE Raise Alarm 6. Abort <p>Post Condition: the rotary table does not hold the blank metal sheet. The alarm is raised to the operator.</p>

Use case name	Load Press
Summary	The robot loads the press with a blank metal sheet
Primary Actor	Elevating Rotary Table
Secondary Actor	Robot, Press
Precondition	1. A Blank sheet is available at the right angle and height on the elevating rotary table
Dependencies	Extended by use case Raise Alarm
Basic Flow	<ol style="list-style-type: none"> 1. The system VALIDATES THAT a sheet is ready at the right angle and height to be taken by arm1 of the robot 2. The system asks the Robot to rotate to a position where to get a new sheet 3. The system VALIDATES THAT the Robot is in position to catch a sheet 4. The system asks the Robot to extend its first arm(arm1) 5. The system asks the gripper of arm1 to pick up the sheet from the table 6. The system asks the Robot to retract its arm1 7. The System VALIDATES THAT the arms1 of the Robot has a sheet 8. The System VALIDATES THAT the press is in a loading position 9. The System asks the Robot to rotate to a position where to feed the Press 10. The System VALIDATES THAT the Robot is in a position to feed the press 11. The System asks the Robot to extend its first arm(arm1) 12. The System asks the gripper of arm1 to place the sheet in the press. 13. The system asks the Robot to retract arm1. 14. The System VALIDATES THAT the press has a blank sheet <p>Postcondition: The Press has been asked to forge a sheet</p>
Specific Alternative Flow	<p>BFS 8.</p> <ol style="list-style-type: none"> 1. The System asks the press to move to a loading position 2. RESUME STEP 8 <p>Postcondition: The Press has been asked to move to a loading position</p>
Bounded Alternative Flow	<p>BFS- 1, 3, 7, 10, 14</p> <ol style="list-style-type: none"> 1. EXTENDED BY Use Case Raise Alarm 2. ABORT <p>Postcondition: An Alarm is raised to the operator</p>

Use case name	Unload Press
Summary	The robot unloads the forged metal sheet from the press and places it on the deposit belt
Primary Actor	Press
Secondary Actor	Belt, Robot
Precondition	1. The metal sheet has been forged
Dependencies	EXTENDED By Use case Raise Alarm
Basic Flow	<ol style="list-style-type: none"> 1. The System VALIDATES THAT the press is in the unloading position 2. The System asks the robot to rotate to the position of press where the forged metal sheet is placed 3. The System VALIDATES THAT Robot is in the position to catch the forged metal sheet 4. The system asks the Robot to extend its second arm(arm2) 5. The system asks the gripper of arm2 to pick up the sheet from the press 6. The system asks the Robot to retract its arm2 7. The System VALIDATES THAT the arm2 of the robot has the forged metal sheet 8. The System asks the Robot to move to the position of deposit belt to drop the forged sheet 9. The System VALIDATES THAT the arm2 of the Robot is in position to drop the forged sheet 10. The System asks the Robot to extend arm2 11. The System asks the gripper of arm2 to place the forged sheet on the deposit belt. 12. The system asks the Robot to retract arm2 13. The System VALIDATES that the deposit belt has the forged metal sheet <p>Postcondition: The photoelectric cells sense the arrival of forged metal sheet</p>
Specific Alternative Flow	<p>BFS1.</p> <ol style="list-style-type: none"> 1. The System asks the press to move to the unloading position 2. RESUME STEP 2 <p>Postcondition: The Press has been asked to move to the unloading position</p>
Bounded Alternative Flow	<p>BFS 3, 7, 9, 13</p> <ol style="list-style-type: none"> 1. EXTENDED By Use case Raise Alarm 2. ABORT <p>Postcondition: An Alarm has been raised to the operator</p>

Use case name	Forge sheet
Summary	The press forges the blank metal sheet
Primary Actor	Press
Precondition	The press contains the blank metal sheet
Dependencies	
Basic Flow	<ol style="list-style-type: none"> 1. The System asks the Press to close 2. The System VALIDATES THAT the press is in the forging position 3. The System asks the press to forge the sheet 4. The System asks the press to open.
Specific Alternative Flow	BFS 1. <ol style="list-style-type: none"> 1. The System asks the press to move to the forging position 2. RESUME Step 1 Postcondition: The press has been asked to move to the forging position
Post condition	The press contains the forged metal sheet

Use case name	Raise Alarm
Summary	
Primary Actor	
Precondition	
Dependencies	
Basic Flow	<ol style="list-style-type: none"> 1. The System Raises an alarm to the operator's attention
Specific Alternative Flow	
Post condition	