



14. Sheet Metal Worker Manual

General Overview:

Standing experience.

- In the sheet metal worker experience, users will have to first assemble and then install metal ducts.
- The user will have to learn about manipulating sheet metal using Guillotines and bending brakes to cut and bend sheet metal into the required sizes.
- The user will use common tools like Hammers and drills in order to assemble the duct out of sheet metal.
- The user will need to install the ducts in an unfinished basement based off of a blueprint that they will need to set up.

Macros / Shortcut keys:

T = turn teleportation on or off

Wrist Watch: The wrist watch is always on the user's left wrist. When a call is coming in for the user, the icon on the watch will be an orange vibrating phone (Image 1 below). They must place their right hand on top of the watch and a blue circular progress bar will fill up (Image 2 below). Once it is filled, the call will be answered and the watch icon will become a green chat bubble (Image 3 below). When the call is finished, the watch icon will become a yellow question mark (Image 4 below). When the yellow question mark is visible, the user can place their right hand on top of the watch and the narrator will repeat the last set of instructions.



Image 1



Image 2

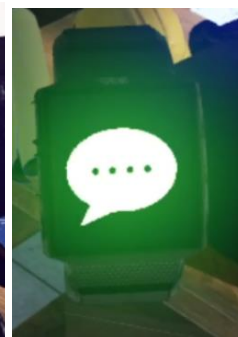


Image 3

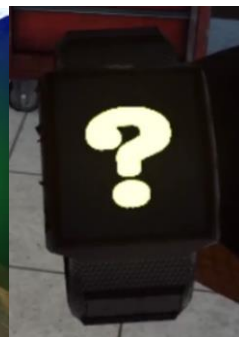


Image 4

Facilitator Panel: The facilitator panel is an options menu that allows a simulation facilitator to adjust gameplay and accessibility options while a user is inside the experience. To access the facilitator panel during the simulation, press the TAB key.



There are five core options from this menu:

Hint Task: When pressed, the in-game narrator will repeat their most recent instruction, which is helpful if the user misses something or is distracted while in the simulation.

Print Screen: This button will save a screenshot of the current view that the user sees.

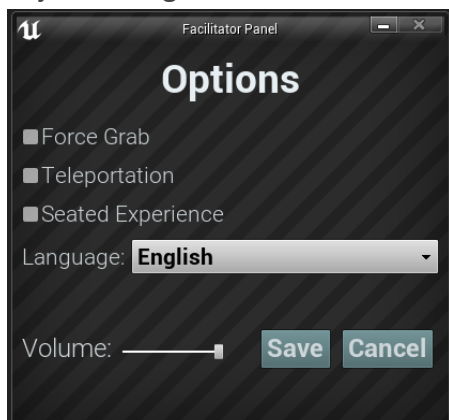
Settings: This will bring the facilitator into a separate menu screen where they have multiple options to change the experience. This is detailed below.

Restart: This will restart the simulation from the very beginning.

Quit: This will exit the experience.

Greyed out buttons: Finish Task & Restart Task - These functions are not currently working but will be implemented in the near future.

Settings: The gameplay settings have an additional set of toggles and sliders the facilitator can adjust during the simulation.



Force Grab: If someone is unable to reach something or is running the experience while seated, this option allows the user to grab objects without being directly next to them. The user can point their hands at objects that are far away and pulling the trigger will bring the object into their hand, grabbing it

Teleportation: This will turn on the granular teleportation around the game world. To use teleportation 1) hold down the center thumbpad button (Vive Pro) or push forward on the thumb joystick (Oculus Rift S) to create a blue teleportation arc 2) select a location to go by moving the controller until the blue circle at the end of the arc is in the desired location (A red line means that location is not valid or blocked) and 3) release the center thumbpad button (Vive and Vive Pro) or thumb joystick (Oculus Rift S) which will cause the screen will quickly fade to black and when it fades back in, the user will be in a new location.

Seated Experience: When turned on, this option will move the user's location in the game world to be higher up, so that if they are sitting down, their view will be similar to a standing position.

Language: This drop-down menu will allow the facilitator to change the language of the experience. When changing language, the simulation will need to restart.

Volume: This slider will adjust the master volume of the game. If the sliding bar is on the right side, the volume will be at 100% and on the left side, the volume will be set to 0%.

Full written walkthrough:

Quest	Task	Description
1	call	Answer your watch by holding your right hand above the watch icon on your left wrist
1	info	Explanation of the job and what the user will be doing
1	infoBP	Explanation of the blueprints and how the user will place pieces to complete them and what each piece is used for
1	grabBP1	Grab the first piece to go into the blueprint, a round to square duct
1	placeBP1	Place the first piece blueprint onto the basement blueprint
1	placeBP2	Grab and place the second blueprint, a straight vertical duct
1	completeBP	Completing the blueprint with the rest of the pieces. This will require an elbow bent duct and some straight horizontal ducts
1	outroBP	Final notes about the basement blueprint
2	grabWhite	Grab the white board and check for information
2	infoSheetMetal	Get information about different types of sheet metal and then specifically about the type we are using for ducts from the narrator

2	grabCut	Grab the proper type of sheet metal to use for bending, which will be 26 gauge and galvanized from the shelf to the left of the workbench
2	infoGuillotine	The narrator will explain about the guillotine and how its used to cut sheet metal to size
2	placeCut	Place the sheet metal onto the guillotine
2	cutSheetMetal	Move the sheet metal by grabbing the large black metal bar to the right. Adjust its location to either 40cm or 50cm and then cut it by grabbing the handle of the guillotine and pulling it all the way down
2	completeCut	Complete another cut of the sheet metal so that the final dimensions are 40 x 50 cm. The user will need to remove the sheet metal from the guillotine and rotate it by 90 degrees, place it back onto the guillotine then cut it at the 40 or 50 cm mark depending on what cut they did earlier
2	cutInspection	Place the sheet metal into the inspection station to the right of the workbench
2	repeatCut	Complete another piece of the sheet metal with the same measurements and place into the inspection station
2	teleport1	Teleport to the bending station by pressing the area 2 button on the workbench
3	infoMarking	The narrator will explain how to use the ruler and marker to mark the sheet metal
3	grabMarkSheetMetal	Grab the sheet metal from the inspection station to the left of the drafting table and put it onto the drafting table
3	infoRuler	The narrator will explain how to use the ruler and mark the sheet metal
3	moveMarkingRuler	Grab the ruler and move it halfway on the sheet metal at the 20 cm mark and let go
3	grabMarker	Grab the marker from the bottom right side of the drafting table
3	drawMarker	Draw a line down the left side of the ruler from top to bottom
3	completeMarking	Mark it again at the 38cm mark by moving the ruler to the left and then drawing a line down from the top to bottom of the sheet metal
3	infoBendingBrake	The narrator will explain how to use bending brake
3	placeBendSheet	Place the marked sheet metal into the bending brake and it will snap to the correct location
3	placeClamps	Place a C-clamp onto both sides of the sheet metal on the bending brake, securing it in place

3	bendSheet	Grab the bending brake handle, either the left or right one and bend the sheet metal to 90 degrees
3	adjustBendSheet	Remove the C-clamps and take the sheet metal out and then back into the bending brake where it snaps to the correct position
3	bendSheetMetalEnd	Place the C-clamps back onto the bending brake
3	completeBend	Bend the sheet metal to 90 degrees again
3	bendInspection	Place the bent sheet metal into the inspection station
3	repeatBending	Complete another piece of sheet metal with the same marking and bends at the 20cm and 38cm marks then put into the inspection station
3	teleport2	Teleport to the duct fitting station by pressing the area 3 button on the workbench.
4	infoPittsburgh	The narrator will give the user some information about the Pittsburgh lock maker machine
4	pittsburghOn	Turn on the pittsburgh machine by pressing the button on the top of the machine.
4	pittsburghUse1	Place the sheet metal onto the right side of the Pittsburgh machine to add a female Pittsburgh seam to the metal
4	pittsburghUse2	Remove the first piece of sheet metal and then place another piece onto the Pittsburgh machine to add a seam.
4	connectSheet	Pick up both pieces of bent sheet metal and attach them together.
4	hammerInfo	The narrator will give the user some information about the hammer
4	hammerSheet	Hammer the flaps of the Pittsburgh seams over where they are highlighted.
4	tapeInfo	The narrator will give the user some information about foil tape
4	grabTape	Grab the foil tape from the workbench
4	tapeDuct	Tape over both corners of the sheet metal where they were just hammered.
4	infoFlange	The narrator will give the user some about the flanges
4	flangeScrew	Hammer on the flanges to the duct then screw in the two sheet metal screws of each flange for a total of four screws.
4	ductInspection	Put the complete duct into the inspection station
4	teleport3	Teleport to the basement area by pressing area 4 or keep making ducts by pressing restart
5	infoDuct	The narrator will give the user some information about placing ducts in the basement

5	grabDuct	Grab the first rectangular duct and put it into place on the duct hangers on the wall near the furnace.
5	drillHanger	Secure the duct to the hanger with the screw that is underneath the duct using the drill.
5	drillDuct	Secure the newly placed duct to the one that was already there using the drill
5	drillDuct2	Grab the angled duct and place it onto the duct hangers in the corner, then secure it to hanger and the previous duct with the power drill
5	completeDrill	Finish drilling all the ducts together doing the same process. First grab the required duck from the shelving unit, then place it on the duct hangers, then secure it to both the duct hanger and the previous. Using the power cell.
5	outro	Listen to some final notes from the narrator

Map

The user will be working in two different locations in this simulation. The first area will be a garage workshop and will be where they spend most of their time assembling the metal ducts. The second area is an unfinished basement where the user will install the ducts.



Location 1 - Garage Workspace 1: The user will begin at this location in both the tutorial and freeplay. The user will have access to a blueprint of the basement where they will be installing the duct, Large shelving unit with different types of sheet metal and a guillotine which can cut sheet metal. Once the user has completed this section, a button will appear on the workbench allowing the user to move to Location 2.



Location 2 - Garage Workspace 2: At this location, the user will have access to their cut sheet metal from the first workspace, the drafting table where they can measure and mark the sheet metal, and the bending brake which they can use to bend the sheet metal. Once the user has been sent two pieces of sheet metal at this location, they can move to Location 3 with a button that will appear on the workbench.



Location 3 - Garage Workspace 3: At this location, the user will have access to a Pittsburgh lock maker machine, and several common tools homemade workbench like a hammer and power drill that will be used to assemble the bent and cut sheet metal into a metal duct. Once the user has completed the ducts at this location, they can move to either the basement where they will install the ducts or they can keep making more ducts.



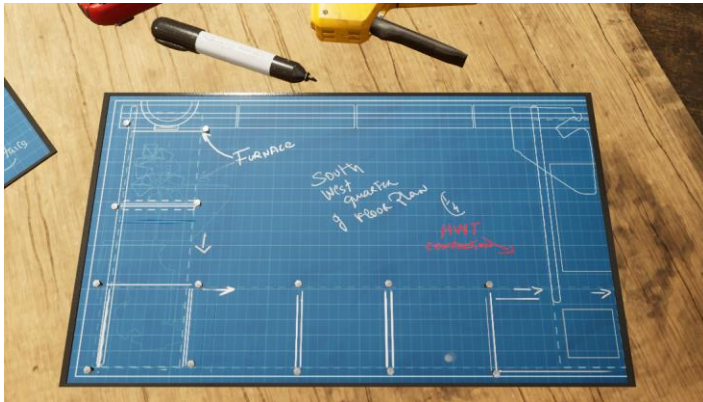
Location 4 - Unfinished Basement: Once the user has finished making at least one metal duct, they will be able to come in and install several ducts at this location. They will have access to a shelving unit with multiple types of metal ducts and the power drill which they can use to secure the ducts to the walls of the basement.



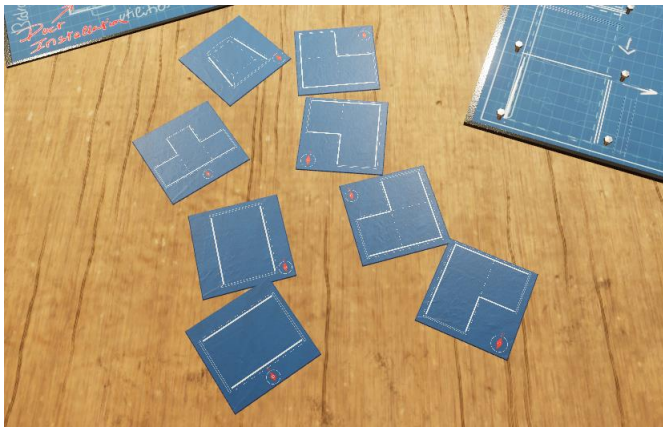
Key Objects

Note: Some objects will not be visible at the beginning of the tutorial and will only appear when they are required.

Basement blueprint: The basement blueprint is located at the garage workspace 1 on the workbench. The user must plan what kind of ducts will be installed to get hot air from the furnace to the main floor. The blueprint shows a layout of the basement with a grid where ducts can be installed. On the blueprint, the user can see the main furnace on the bottom right side and the vent leading to the main floor on the top left side. There are several types of ducts that can be installed, each represented on individual cards next to the blueprint. The user can pick up a duct card and assign it to a location on the blueprint by tapping that location. To complete the blueprint, the user must first place a circle-to-square duct, then straight vertical duct, then an elbow duct, followed by three straight horizontal ducts. If the card is placed correctly, it will remain in place and if it is placed incorrectly, it will disappear.



Duct Cards: There are eight kinds of duct cards in the simulation and all of them are located on the workbench at the garage workspace 1. There is a circle-to-square duct, two variations of a straight duct, one vertical and one horizontal, a T intersection duct, and four variations of an elbow duct.



Sheet Metal Shelf: There is a large shelf to the left of the workbench at the garage workspace 1. There are several horizontal slots running down the front of the shelving unit, each with a different type of sheet metal inside. The user will need to grab the sheet metal labelled galvanized 26 gauge. If the user grabbed the wrong one they will be told that it is the incorrect type. If these are grabs the correct one, they can place it onto the guillotine. If they make a mistake during the cutting stage, they can grab another piece as there is an infinite supply of sheet metal inside the shelf.



Sheet Metal: Sheet metal is located inside of the Shelf at garage workspace 1. The user will be able to cut the sheet metal to the desired amount using the guillotine, measure, mark and bend the sheet metal at workspace 2 and then assemble it into a duct at the final work space station. The details of how this is done are specified below.



Guillotine: The large Blue Guillotine is located on the workbench at the garage workspace 1. The guillotine can cut sheet metal to any size based on where the user places it. First, the user

must place a piece of sheet metal onto the platform of the guillotine and it will snap into position. Then, the user can grab the large black bar to the right of the sheet metal and can adjust where the sheet metal will be cut by sliding into the left. Above the black bar, there will be text in centimetres showing the length of the sheet metal if cut at that location. Then, the user can let go of the black bar, and the sheet metal will remain in place, ready to be cut. Once the user has moved the sheet metal to the left, it will be locked in place on the guillotine. This is displayed via a red hand with a cross through it, which means it cannot be grabbed. If the user brings the black bar back to the right (value should read above 65 cm), they can grab the sheet metal. This is displayed via a blue hand without a cross, which means it is grabbable. Once the user has the sheet metal at the desired location, they can grab one of the two large handles on the top left part of the guillotine and pull them down to the right, which will cut through the sheet metal at the location they have specified. The cut sheet metal will fall off into a box to the left of the workbench.



Inspection Station: The inspection stations are located at all three garage workspaces. Once the user has finished their task at each of the three work spaces, they can place the finished sheet metal or ducts into the inspection stations which will check if things were completed properly. If a player accidentally misses the inspection station by throwing the sheet metal away or putting it outside of area 1, it will count as an inspection as well.



Teleportation Buttons: There are multiple teleportation buttons located around the garage workspaces, one at workspace 1 and 2 and two located at workspace 3. The user can tap on one of these buttons when they appear to move from one workspace to another. This will cause the player's vision to fade to black, and they will be moved to the new location then their vision will fade back in. The "Area 2" teleportation button at workspace 1 will take the user to workspace 2, the "Area 3" button at workspace 2 will take the user to workspace 3. There are two buttons at workspace 3, the "Restart" button will return the user to workspace 1 where they can start assembling another metal duct, and the "Area 4" button will take the user to the unfinished basement for the final section of the simulation.



Drafting Table: The drafting table is located at garage workspace 2. The user can use the drafting table to mark and measure the sheet metal using the ruler and marker.



Right angle Ruler: The right angle ruler is located on the left of the drafting table at garage workspace 2. The right angle ruler is attached to the drafting table, and the user can grab it and slide it to the left or right. When the ruler is on top of the sheet metal, an interface will appear that displays the distance between the right side of the sheet metal to the left side of the ruler. The user will need to use this to measure the centre point of the sheet metal (20cm) and 38cm for the bending section. When the right angle ruler is on top of the sheet metal, it is no longer grabbable, which is displayed via a red hand with a cross through it. If the user wants to grab the sheet metal after marking it, they will need to grab the ruler and slide it all the way to the left and off of the sheet metal. When it is grabbable again, a blue hand without a cross will appear.

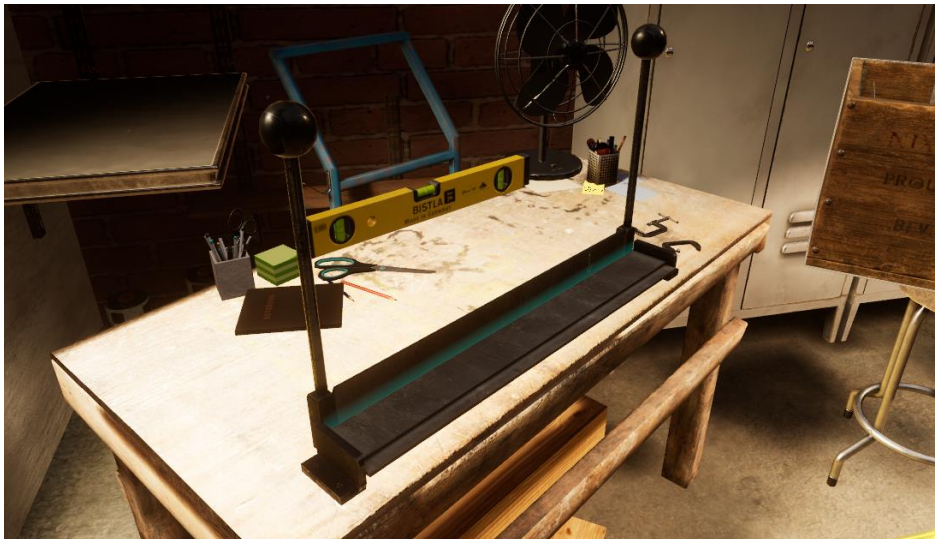


Marker: The marker is located on the bottom right part of the drafting table at garage workspace 2. The user can pick up the marker, and then draw a line on the sheet metal down

the left side of the right angle ruler from the top to the bottom. This will be required in order to bend sheet metal.



Bending Brake: The bending brake is located to the right of the drafting table at garage workspace 2. The user can place the marked sheet metal into the bending brake, and it will snap to the 20cm mark. Once the sheet metal is inside the bending brake, the user will need to secure it there by attaching two C-clamps to the left and right side of the sheet metal. Then, the user can grab the one of the two handles on the far side of the bending brake, and pull them up and towards themselves. This will result in the metal bending to a maximum of 90°. Then, the user can push the handles back flat on the table, remove the C-clamps, and then take out the bent sheet metal. To bend the sheet metal at the 38cm mark, the user has to put it back on to the bending brake after completing the first bend at the 20cm mark. They can complete the same process of attaching the C-clamps, bending the sheet metal using the handles and then removing the C-clamps.



C-Clamps: The C-clamps are located on the table to the right of the bending brake at garage workspace 2. The user can grab the C-clamps off of the table, and place them onto the bending

brake on the left or right side to secure the sheet metal in place. When the user places the C-clamp into position, they will automatically tighten on the bending brake. To remove the C-clamps, the user just has to grab them off of the bending brake and pull them away.



Pittsburgh Lock Maker: The Pittsburgh lock maker is located at garage workspace 3. This machine will add a Pittsburgh seam to one side of the bent sheet metal. To use the lock maker, press the red button on the top of it to turn it on, then place the sheet metal on to the right side of the lock maker where indicated via a blue hologram version of the event sheet metal. The lock maker will then pull the sheet metal through the centre area from right to left, adding the Pittsburgh seam to that edge of the sheet metal. The user will need to add the Pittsburgh seam to both pieces of bent sheet metal. Once both pieces of sheet metal have the Pittsburgh seam added, the user can put the two pieces of sheet metal together forming a hollow rectangular duct.

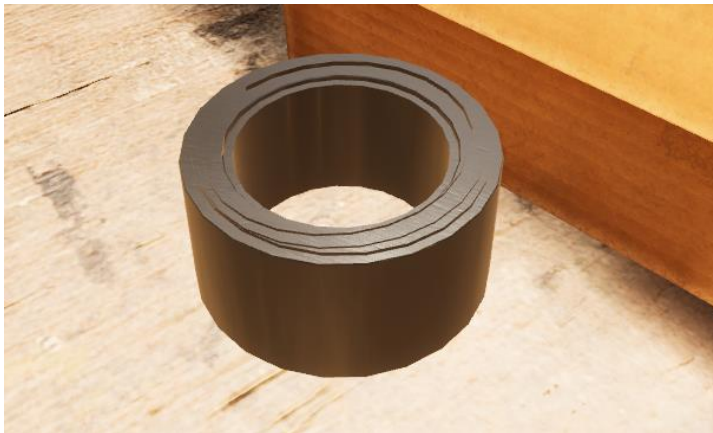


Hammer: The hammer is located on the workbench at garage workspace 3. The user will need to grab the hammer and hit the overlapping flaps on the partially assembled metal duct. There

will be blue indicators highlighting where the user will need to use the hammer. Once the user has hammered the flaps over, a burst of confetti will appear letting them know that they are finished. The user will need to use the hammer again once the flanges have been attached to both sides of the duct. To secure the flanges on to the duct, the user must hammer them on by hitting them a few times on each end, with confetti appearing letting the user know they are finished.



Foil Tape: The foil tape is located on the workbench at garage workspace 3. Once the connected edges of the partially assembled duct have been hammered together, the user will need to tape over those edges to ensure no heat is lost through the gaps. To do this, the user will need to grab the foil tape and place it one of the edges and pull it across. They will need to do this twice, along both edges of the connection points.



Flanges: The flanges are located in a box on the workbench at garage workspace 3. The user must then attach them to the two open ends of the partially assembled duct after foil tape has been applied. Once the flanges have been attached to the duct, the user must hammer them on using the hammer and then secure them to the duct using the power drill. There are duct flanges on all of the metal ducts used in the unfinished basement. Once the ducts are on the hangers, the user will need to secure the metal ducts to the adjacent ones by drilling two screws on the duct flanges.



Power Drill: The power drill is located on the workbench at garage workspace 3 and on the workbench in the unfinished basement. The user will need to use the power drill to secure the flanges onto the duct at workspace 3 and to secure the metal ducts to the duct hangers and the adjacent ducts in the unfinished basement. To use the power tool, the user must pick it up and then bring the drill bit into contact with a screw and the drill will automatically turn on and tighten the screw.



Metal Ducts: Metal ducts are located on a shelf in the unfinished basement. There are several different shapes of ducts but the user will only need to use the straight rectangular ducts they assembled in the first section of the simulation and an elbow duct. The user can pick up the metal ducts and place them into position on the duct hangers located on the walls of the unfinished basement. Once on the hangers, the user can grab the power drill and secure them there by screwing in the screw on the underside of the hangers. Then, the user can secure the duct to the adjacent ones with two screws.



Duct Hangers: There are duct hangers located along the walls of the unfinished basement. The user can place metal ducts on to these hangers, and they will snap into the correct position. Once on the hangers, the user can secure the ducts to the hangers by screwing in the screws on the underside of hangers.



Freeplay vs. Tutorial:

In the tutorial, the narrator will guide the user through the entire simulation step by step. They will begin with an explanation of how to plan out the blueprints and then walk the user through cutting and bending and assembling the sheet metal into a metal duct at the three garage workspaces. When the user is brought to the unfinished basement, the narrator will walk them through how to install the metal ducts on the walls.

In freeplay, the user will be able to move between the three work spaces and assemble the metal ducts all on their own. Once they have assembled at least one metal duct, the user will be able to move to the unfinished basement for the installation.