



User Guide

Running SPEE3DCraft

In order to run SPEE3DCraft you will require a Windows PC with the following minimum specifications:

- **Operating system:** Windows 7/8/10 64-bit
- **CPU:** Quad-core Intel or AMD processor, 2.5 GHz or faster
- **RAM:** 8GB RAM
- **GPU:** NVIDIA GeForce 470 GTX or AMD Radeon 6870 HD series card or higher
- **Video Card/DirectX Version:** DirectX 11 or DirectX 12 compatible graphics card

Download SPEE3DCraft. Unzip the downloaded file to a convenient location of your choice on your computer. This should create a folder called SPEE3DCraft. To run SPEE3DCraft, open the SPEE3DCraft folder, and double-click SPEE3DCraft.exe - and now you can start metal manufacturing parts!

Introduction

SPEE3DCraft is an additive manufacturing simulator that allows you to experience true expeditionary, cutting edge 3D printing technology. You will be designing, printing, heat-treating, machining, testing and delivering a variety of different parts in varied environments.

Objective

Throughout the game you will be assigned a variety of different parts you must manufacture. It is your job to manufacture as many of these parts as possible, within the available time frame. There are a variety of different stations and processes you must follow in order to correctly manufacture a given part. The more parts you manufacture and deliver the higher your score will be. Be warned! If you attempt to deliver a faulty part then the game will instantly end.

You will have 24hrs to print as many parts as possible, since this is a simulation these 24hrs are experienced at an accelerated speed. Keep an eye on the timer at the top-left of the screen to see how much time you have remaining.

Starting SPEE3DCraft

Once you have started the SPEE3DCraft application you should see the main menu. From this menu you can adjust options such as mouse sensitivity and graphics settings. Click the Start button to begin.

SPEE3DCraft begins in a tradeshow environment where you can explore the SPEE3D tradeshow stand. In the centre of the stand is a portal which allows you to enter a range of different virtual environments. Select the desired environment from the control panel and the portal door will open to allow you enter the environment. As you walk through the portal the environment will load. Wait for the loading to complete and then you will be ready to start crafting metal parts.



Stations

Just as in real-life, manufacturing a part requires many different steps and processes. Each of these steps takes the form of a different station within SPEE3DCraft. These stations are listed below, in the order in which they appear in the manufacturing process:

Kanban Board

The first station you should look to is the kanban board. It is here that you will be presented with a set of 6 parts to manufacture. Take careful note of not just the name of a given part, but also the material you must print the part in.



After a part has been delivered it will disappear from the kanban board with another, random, part taking its place.

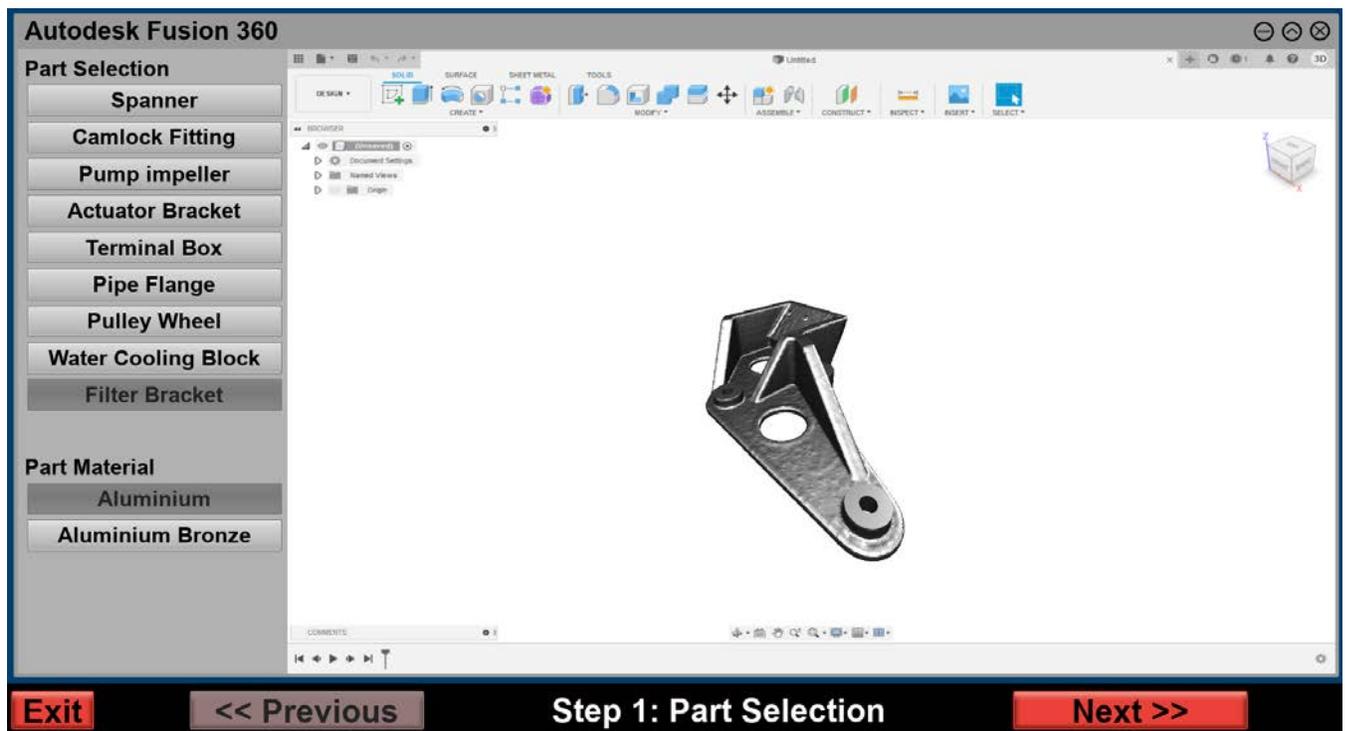
Design Station

The design station allows you to generate toolpaths for both the printer and CNC machine.



The first step is to select the specific part and the material you wish to print from. Following this you will then be asked to generate a printing toolpath, first you will need to select a suitable

orientation for the print. Once a suitable orientation is selected you can press the generate print button.



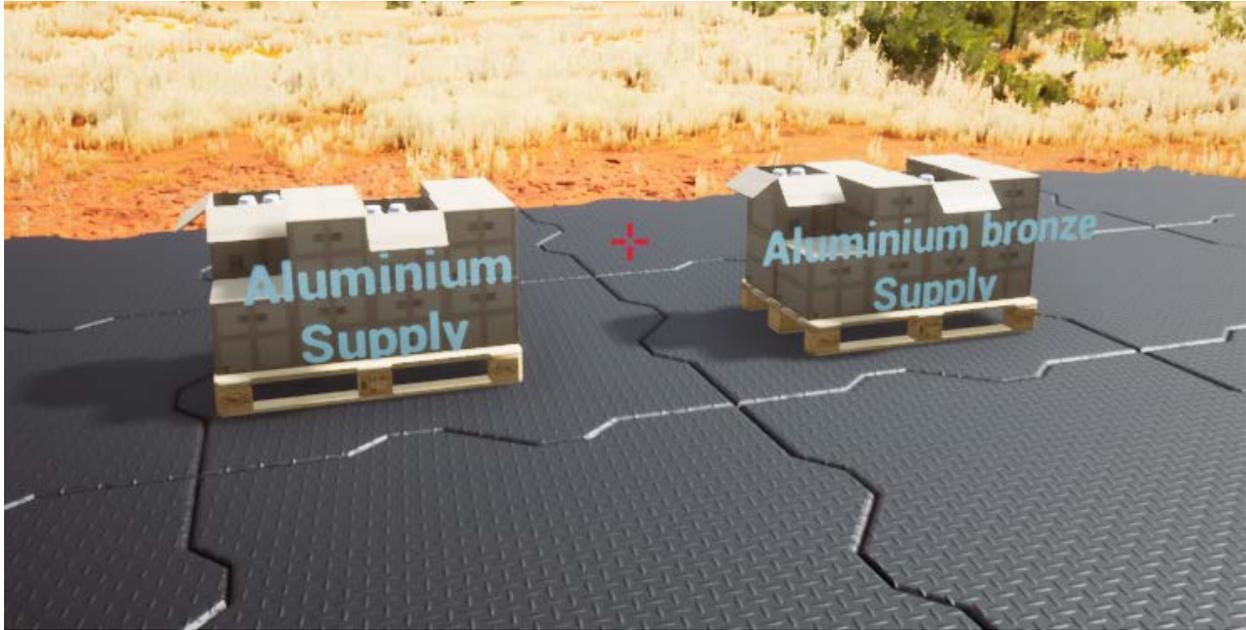
After generating your print toolpath you can then generate a corresponding CNC toolpath. Select the appropriate machine speed and then generate your toolpath. After pressing the finish button, you will see that your toolpaths are now available on the Printer and CNC control panels.

Note: Be sure to select a good printing orientation, as selecting a bad one will result in an excess amount of material added to the part. This, in turn, will mean that you will spend more time machining off the extra material.

Another thing to be careful about is the CNC machine speed setting. Although a faster machining time is desirable there is an inherent risk at machining at higher speeds that may result in a damaged part. This damage will be undetectable to the naked eye and only the testing station will reveal it.

Powder Supply

Adjacent to the design station is a set of two pallets, each holding a set of boxed powder canisters. Interacting with one of these boxes will allow you to pick up a canister of powder (aluminium or aluminium bronze, depending on the specific pallet).



Powder Feeder

The powder feeder holds the powder that can be used by the printer to print parts. You need to add powder from the powder supply to the powder feeder before starting a print.

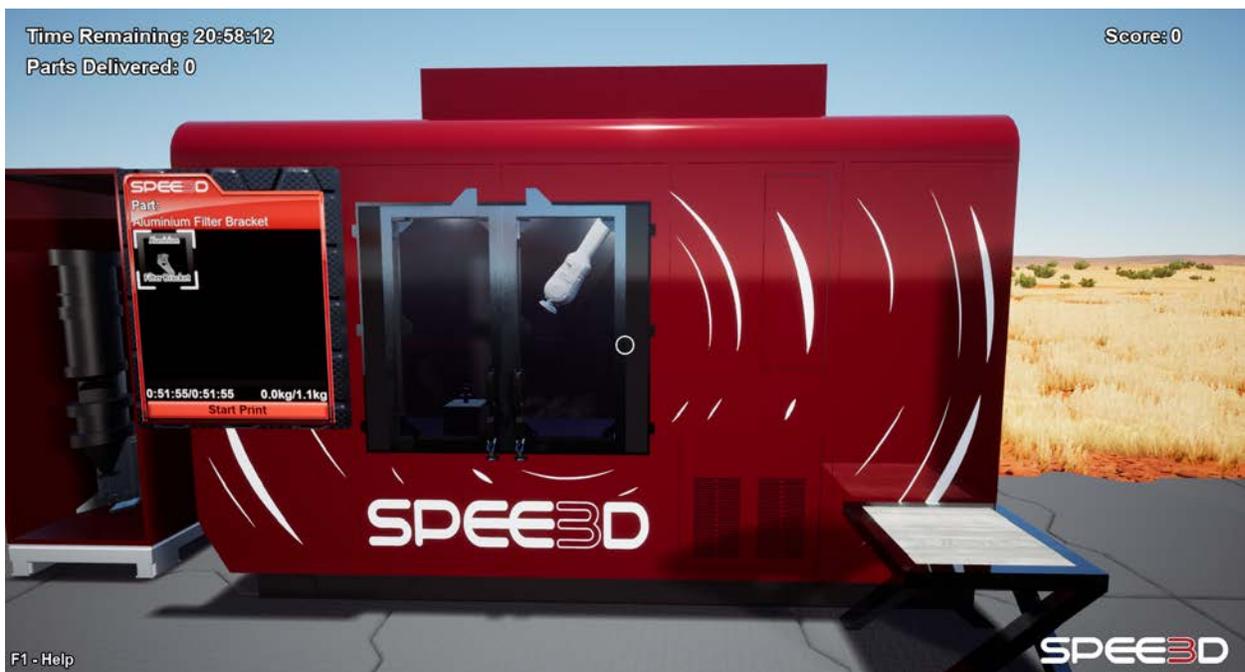


The amount of powder in the powder feeder is displayed on the printer control panel. The currently loaded powder type is displayed on the powder feeder control panel.

The powder feeder can only hold one type of powder at a time, so you will need to empty the powder feeder before changing to a different material. The powder feeder control panel has a button to empty the feeder.

Printer

The printer is where you will create parts using the powder that you have loaded into the powder feeder, and the toolpath you created at the design station. Select the toolpath you wish to print on the printer control panel, then press start.

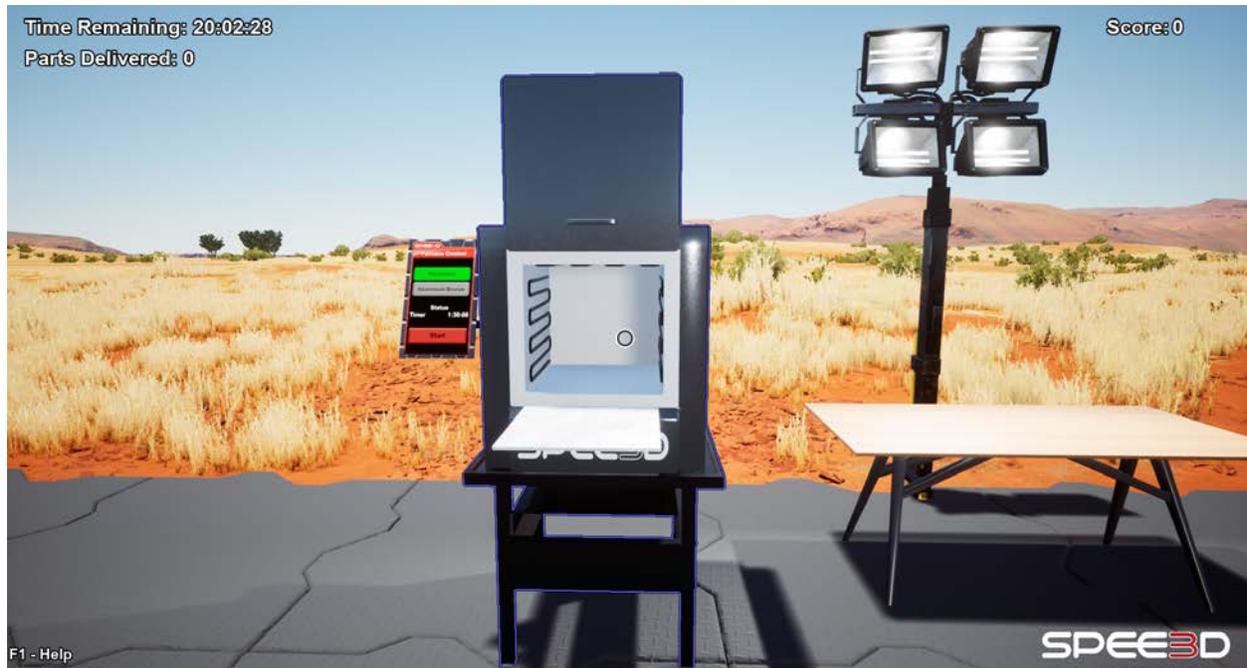


Be sure there is enough powder for your part and that the powder you have loaded is the correct powder for your toolpath. If you print with the wrong powder then the part may seem correct but will not actually be valid (and should not be delivered).

Furnace

The furnace is used to heat treat the printed part to achieve the required part material mechanical properties. To heat treat a part, place it on the corresponding tray and then select and start the desired heat treating cycle.

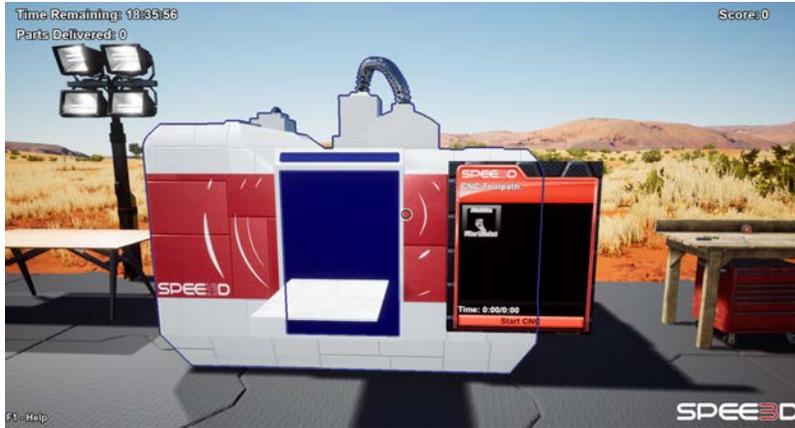
The heat treatment cycle differs depending on the printed material so the correct cycle must be selected for the type of parts loaded into the furnace. Note that you can heat treat multiple parts at the same time.



If the wrong heat treatment cycle is selected for the parts loaded into the furnace the parts will be damaged (although this may not be obvious).

CNC Machine

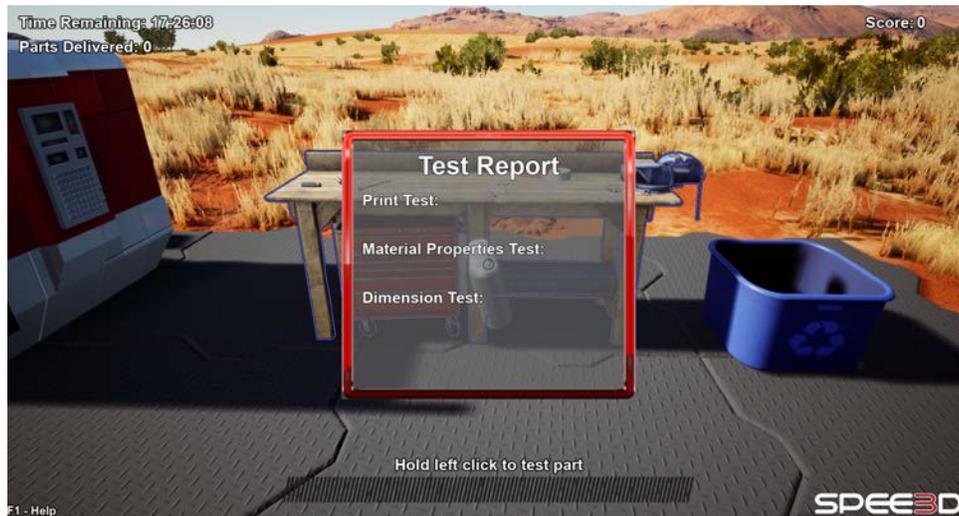
The CNC machine operates similarly to the printer. Load your part onto the CNC tray, then select the appropriate toolpath and hit start. The Machining time (how long the CNC takes to machine the part) is influenced directly by the amount of material it must machine away from the part, as well as the machining speed selected in the design station. So if you chose a bad print orientation and had to add a lot of extra material then you will be machining for a while.



Note that the machining has a chance to fail, which will result in a part that seems outwardly fine, but is in fact not valid (it will fail at the testing station). This chance is influenced by the machining speed set in the design station.

Testing Station

As all good engineers know, nothing is finished until it has been tested. The testing station will test a single part at a time, ensuring that it has been printed, heat-treated and machined correctly. This is a vital step that should always be carried out before delivering a part, as if a faulty part is delivered the game will instantly end. To test a part simply walk over to the testing bench and, with your desired part in hand, hold down the left mouse button until all testing reports have been completed.



Delivery Drone

The final station is the delivery drone (deliverator for short). After completing your part, take it to this drone to have it deliver the part to its intended destination. Be warned, delivering a faulty or incomplete part will result in an instant game over. The world of additive manufacturing has no place for substandard and dodgy practices, the consequences of delivering a faulty part could be very serious!

If you've delivered a good part and it is on the kanban board, congratulations. You will be assigned a score, based on the amount of time and resources the part took to manufacture (note that this is based on the minimum time and resources needed, if you use an inefficient toolpath the part will be worth just as much as if you'd used an efficient toolpath).

