

This document describes the necessary modelling steps in order to create a high quality vehicle for Train Fever. Also, tips and tricks are mentioned below.

Basically, five steps are needed. First, the 3d model should be created. Second, the mesh needs to be unwrapped so that afterward a texture can be mapped onto the model. Third, the color, normal, reflection and specular maps should be created. Fourth, configuration tasks like defining animations or specifying vehicle parameters need to be addressed. Fifth, level of detail models should be created, to that the vehicle can be rendered efficiently in the game engine.

Please find below for each step some hints and explanations. Note that this document may be updated and extended in future. Current version is 1.0.

1. Modelling

- Get some good blueprints and reference images
- Most modders use the freely available Blender software for modelling (use the TF export plugin)
- If it's a symmetrical vehicle, just create one half or one quarter of the model and mirror the result
- Re-use objects, you can already unwrap element if they're used several times
- Try to use quads, avoid five or more sided polygons
- Use more geometry in the more prominent and visible parts, less in the lower part
- Create an individual mesh for each part that needs to be animated separately (main body, doors, bogies, axles, ...)
- Make sure that the mesh normals point outwards and apply smooth vertex normals where needed
- Make sure that the axle distance is correct (1435 mm)
- Use a Train Fever model as size reference
- Already have the UV layout in mind

2. Unwrap

- Give the most visible and striking objects the most UV space
- The bottom side is barely visible, so don't use too much space for it
- Overlay mirrored or duplicated objects in the UV
- Be aware that mirrored parts can't have written text on them.
- Pack your objects as tight as possible, but keep a gap between the parts, to avoid mipmap artefacts

3. Texture

- For each vehicle create two RGBA 2048x2048 textures (colour map and normal map)
- The colour map contains the colours in the RGB channels and the reflection values in the A channel
- The normal map contains the normals in the RGB channels and the specular values in the A channel
- Start by creating the colours (RGB channels of the colour map) and set all other channels to a constant
- Compute / bake the ambient occlusion and use it as base (i.e. multiply with your texture)
- Render the UV mapping onto a texture and use it as a layer, so that you see the UV mapping
- Set the base colours to get a first layout
- Don't use plain colours, always use more than one tone for a base colour (like gradient or render cloud)
- Use masks to easily select your material groups
- Create the reflection A channel (colour map) by usually marking windows and lamps
- Paint a normal map and compute and apply the ambient occlusion from the normal map as well
- Don't forget to create the specular map, mostly from one single colour channel and without ambient occlusion
- Dark colours can also be shiny in the specular map

4. Config

- This step is probably the most difficult and if you haven't done this before, ask others or us
- The goal is to make sure that the vehicle drives correctly on the track / street
- Also, animations, sound, and game parameters need to be defined
- Find a similar vehicle and have a look at the config (.mdl file)
- Create groups for bogies
- Test the vehicle early enough before going further with the config
- Copy the animations and smoke from similar vehicles and then adapt the parameters
- Use realistic parameters (speed, power etc.)

5. LOD

- Creating level of detail models is the final step in order to make efficient rendering possible
- This step is just for efficiency reasons, the model is 100% functional also without this step
- You can take the model created in step 1 and simplify it multiple times
- Use a constant triangle count factor between the level of detail models
- If there are e.g. 10.000 triangles in LOD 1, 1.000 in LOD 2 and 100 in LOD 3 would be fine (constant factor 10)

Finally, be aware that there are player created tools available here:

<http://www.train-fever.net/filebase/index.php/Filebase/9-Werkzeuge-Tools/>

At a later point in time, we may also make available our own viewer and converter tools.

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Urban Games