

# THE 18

## Game Design Document



NHTVUNIVERSITY OF APPLIED SCIENCE – BREDA (NL)

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Version 2

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# 1 Game Overview:

## 1.1 Approach:

The game is trying to achieve a fun and challenging experience for fans of puzzle/platformer games. The difficulty will increase with every level of the game.

The game can be compared to other 2.5D platformer games. Examples of these are the Super Mario Bros games, the first Donkey Kong, LittleBigPlanet and certain parts of the Crash Bandicoot games.

## 1.2 General Information:

### 1.2.1 Genre and Platform:

The Crate Escape is a platform-puzzle game. The player will have to make his way through a collapsing factory full of obstacles while solving puzzles along the way.

The game was designed as a single-player experience. There will be no online functionality whatsoever.

The game was designed for the PC. Ease and cost of production were in this case preferred over the additional functionalities offered by other platforms.

### 1.2.2 Game Objective

The objective in this game is to escape an abandoned and collapsing factory.

### 1.2.3 Story and Narrative Delivery:

The game does not feature a narrative: the premise of being a robot escaping an abandoned factory is delivered to the player by the game's aesthetics, but is never explicitly explained to the player.

### 1.2.4 Player and Game World Representation:



The game features third person gameplay, viewed from the side like in most platforming games.

The character and the world are both presented as concrete realities. The game's aesthetics are themed after the Industrial Revolution.

The art style of the game is hand-drawn. For details, please refer to the art document ([art/concept\\_art/art\\_document.docx](#)).

The player is represented as a humanoid robot character. It has a golden steam engine on its back and is covered in brownish plates.

### 1.2.5 Gameplay and Mechanics:

#### 2.2.5.1 General

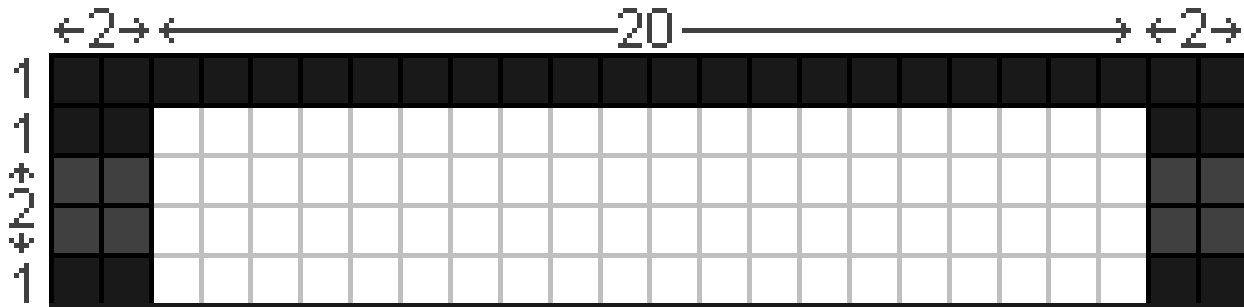
The game combines the platformer experience with puzzle elements. The core gameplay consists of running and jumping over or on top of obstacles. The player will be forced to think two steps ahead, as the player's actions on one floor of a level can impact the next floors.

The game's key mechanic is the player-influenced level lay-out. Interaction with one floor will impact the next floor: If the player jumps unto an obstacle that is not stationary (see Obstacle List in 2.2.7), this obstacle falls down to the next floor, where it could open a new path, or block an existing path. For obstacle behaviours, see section 2.2.7.

### 2.2.5.2 Level layout

The game will feature a total of 12 levels. The first five levels are introductory levels of low to medium difficulty, which will be used to explain all the game's obstacles. For details on each level, please refer to the level list (section 5.1).

Each level will be two to four floors high. Each floor shares the same dimensions:



The white area is where all obstacles, with the exception of the piston, will be located. Pistons will be placed inside the background wall (the upper layer). The dark grey areas on the sides are the elevators, which are used to advance to the next level. On the lowest floor, the elevator is replaced by a door which, when entered, makes the game load the next level.

### 2.2.5.3 Camera

The camera views the game world from the side, as such:



The camera will rotate around a pivot point located behind the scene. As the player moves through the level, the camera follows the player character.

When the player advances to the next floor, the camera moves to the next floor as well.

By using the arrow keys 'up' and 'down', the player can control the camera's position:

If 'up' is pressed, the camera is smoothly relocated so that it views both the current and next floor. This is only possible when the player is not located on the top floor. Example:



If 'down' is pressed, the camera is relocated so that it views the current floor, and the floor below it. Example:



#### 2.2.5.4 Player death

If the player dies, the player model falls apart into several smaller pieces, all controlled by physics. Shortly after, the screen will fade to black, the level will be reloaded, and the screen will fade back in.

The player can die in three ways:

1. Falling through the floor. If the player falls through a gap in the floor (this can be a pre-made gap, or a gap left by an obstacle that fell down), the player death animation is activated, and the level is restarted. The death event is triggered by a trigger collider located 0.5 units below the floor.
2. Colliding with a grinder. If the player touches a grinder (see 2.2.7), the player death animation is activated, and the level is restarted.

3. Being crushed by a piston. If the player is pushed into another obstacle by a piston, the player is crushed between the piston's head and the obstacle. The player death animation is activated.

### 1.2.6 Player progression and rewards:

The player is rewarded by introducing new obstacles, and new ways to clear them, throughout the game. The game does not feature pick-ups, upgrades or any other collectibles.

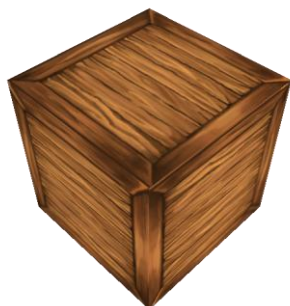
The difficulty of the game is also increased as the player progresses. For level difficulty, please refer to section 5.1 (level list).

### 1.2.7 Conflicts – enemies and obstacles:

The game's main conflicts are environmental obstacles: no enemies are present.

The game will feature the following obstacles, all of which will be sized 1x1x1 units (unless stated otherwise. Sizes are displayed as: x.y.z):

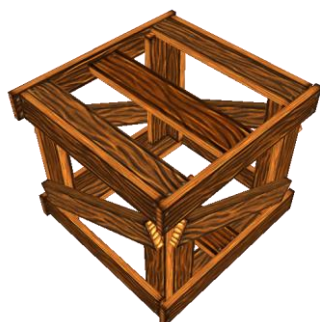
#### 2.2.7.1 Default crates



##### 2.2.7.1.1 Standard crate

The standard crate is an obstacle which will fall down to the next floor if the player jumps on top of them. They can be destroyed by dropping a weight on top of them. It will shake for 1 second before falling down.

Size: 1x1x1



##### 2.2.7.1.2 Fragile crate

A variation on the standard crate. This crate behaves exactly the same as the standard crate, but when the fragile crate falls to the next floor, it is destroyed as soon as it hits an obstacle or the floor. If any obstacle falls on top of it, it is also destroyed.

It will shake for 1 second before falling down.

Size: 1x1x1



##### 2.2.7.1.3 Solid crate

This metal crate is stationary: it will not fall down when the player jumps on top of it. The only way to remove it is to drop a weight on top of it.

Size: 1x1x1

## 2.2.7.2 Advanced crates



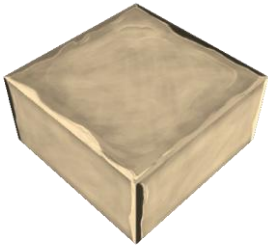
### 2.2.7.2.1 Weight

This obstacle acts exactly like the standard crate, but will destroy any destructible crate below it if it falls to the next floor. It is destroyed when another weight is dropped on top of it.

It will shake for 1 second before falling down.

Size (hitbox): 1x1x1

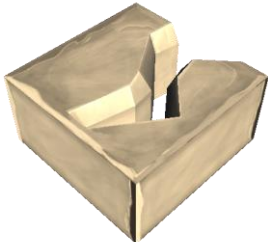
## 2.2.7.3 Tiles



### 2.2.7.3.1 Stable tile

The stable tile is the standard tile, which is used for the largest part of most floors. It will not be destroyed when the player stands on top of it. If an obstacle stands on top of it, and the player jumps on top of this obstacle, the tile is destroyed once the obstacle stops shaking, causing the obstacle to fall down.

Size: 1x0.5x1

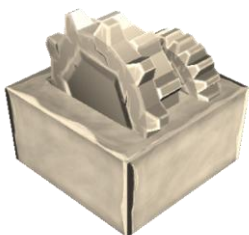


### 2.2.7.3.2 Unstable tile

This floor tile will destroy itself after a set delay if the player stands on top of it. If an obstacle is on top of it, it will act like a stable tile.

It will shake for 1 second before falling down.

Size: 1x0.5x1

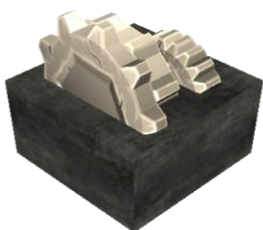


### 2.2.7.3.3 Grinder

This special floor tile has three rotating gears sticking out of its top. If the player touches the hitbox (0.8x0.8x0.8) surrounding these gears, the player death animation is activated, and the level is restarted.

There are two version of this tile: the light one, found on all floors except the lowest floor. If an obstacle falls onto this tile, the grinder is disabled, and the tile's behaviour changes to that of a stable tile.

The darker coloured version is only found on the lowest floor of any level. It behaves exactly like the light version, but it behaves like an unbreakable tile.





### 2.2.7.3 Unbreakable floor tile

This floor tile is used on the lowest floor of each level. It is indestructible: if the player jumps on an obstacle located above this tile, the obstacle won't fall down.

## 2.2.7.4 Utility



### 2.2.7.4.1 Piston

The piston is an obstacle located inside the background of the scene, which will move into the scene and back out at a set pace. The piston can push any obstacles, including the player, if it is in its way. If the player is pushed into another obstacle (the player's target position is taken by an obstacle), the player is crushed. This also happens if the player is pushed off the floor. The piston's contraction delay varies, and can be set for every piston individually.

Size: 1x1x1 (contracted) to 1x1x2 (extruded)

## 1.2.8 Audio

The game features a single soundtrack which is played throughout the entire game. This soundtrack can be reviewed at [sound/BGS\\_Loops/work\\_ricardo/oncein.mp3](#).

The sound effects are made by using items in the real world and recording the sounds they produce.

For a list of all the sound effects in the game, refer to [sound/sound\\_effects\\_raw](#) and [sounds/sounds\\_edited](#).

## 1.2.9 Technology:

The game will not use any new technology. The following programs will be used for the development of the game:

### Unity

The game will be built using the free-to-use version of the Unity engine. This engine is easy to use for new developers, and is the engine the team was instructed to use by our clients.

### Maya

The student version of Autodesk Maya will be used for all models and animations. The team's artists are given lectures in how to use this program to its fullest, making this an obvious choice. To prevent conflicts and to allow all artists to work on the same models, no other modelling tools are used to develop the game.

### Photoshop

Adobe Photoshop will be used to create the game's textures. The team's artists are given lectures in how to use this program to its fullest, making this an obvious choice.

### Paint.NET



The free-to-use image editing software Paint.NET will be used by some designers to design levels whenever working in the Unity project is not possible. This software was chosen as the level designer was familiar with this software, and was able to quickly create effective level designs using it.

### **TortoiseSVN**

TortoiseSVN is the version-control software used for the development of this game. The software is free-to-use and is the software we were instructed to use by the supervisors.

### **Word**

For creating text documents, the team uses Microsoft Word (various editions). For members who can't afford purchasing Microsoft Office, Open Office is used as an alternative.

### **1.2.10 Other Resources:**

N/A

## **3 Player/Game Interaction (control system) \***

### **3.1 In-game interaction**

#### **3.1.1 Activity 1 (Character Movement)**

The player will be able to control the main character's movements using the WASD keys.

A and D are used for movement along the X-axis (i.e. sideways movement): A for left and D for right.

S and W are used for movement along the Z-axis (i.e. depth movement): W moves the character deeper into the scene, S moves the character 'out of the screen'.

The player is able to move into only one direction at any time: diagonal movement is impossible.

This control scheme was chosen as it is a very commonly used control scheme for PC games: this makes it easier for players to start playing the game, as there is no additional learning required for the controls.

#### **3.1.2 Activity 2 (Jump)**

The player will be able to jump using the spacebar key.

The player will be able to jump slightly more than one unit high, allowing the player character to jump onto any of the obstacles, so long as they are not stacked.

The player will be able to jump slightly less than two units far, on a flat plane. This allows the player to jump over small gaps in the floor, but disallows him to jump over gaps of two or more units wide.

While in the air, the player is unable to switch directions. This prevents the player from jumping around corners.

#### **3.1.3 Activity 3 (Camera)**

The player will be able to control the game's camera, to a certain extent:

The camera is controlled by the arrow keys 'up' and 'down'.

By pressing the 'up' button, the player makes the camera move up, allowing the player to clearly see both the current floor, and the floor above it. This is useful to find out where mistakes were made, as the player will be able to see where blocks that are blocking a path came from. The player can also see what blocks should have been dropped, but were forgotten. This option is disabled when the player character is located on the highest floor of the level.

By pressing the 'down' button, the player makes the camera move down, allowing the player to clearly see both the current floor, and the floor below it. This is essential when solving puzzles: as the player's actions impact the

floor below, the player must be able to see the floor below to be able to plan ahead his moves. This option is disabled when the player character is located on the lowest floor of the level.

### 3.1.4 Activity 4 (Reset)

The player will be able to reset (reload) the level that is currently being played by hitting the 'T'-button. This will reload the entire level: this is easier to do than resetting the positions of all obstacles manually.

### 3.1.5 Activity 5 (Help menu)

The player will be able to open the help menu by hitting the Escape button (ESC). For details on the help menu, refer to section 3.2.

## 3.2 Pre-Game (Front End) Interaction

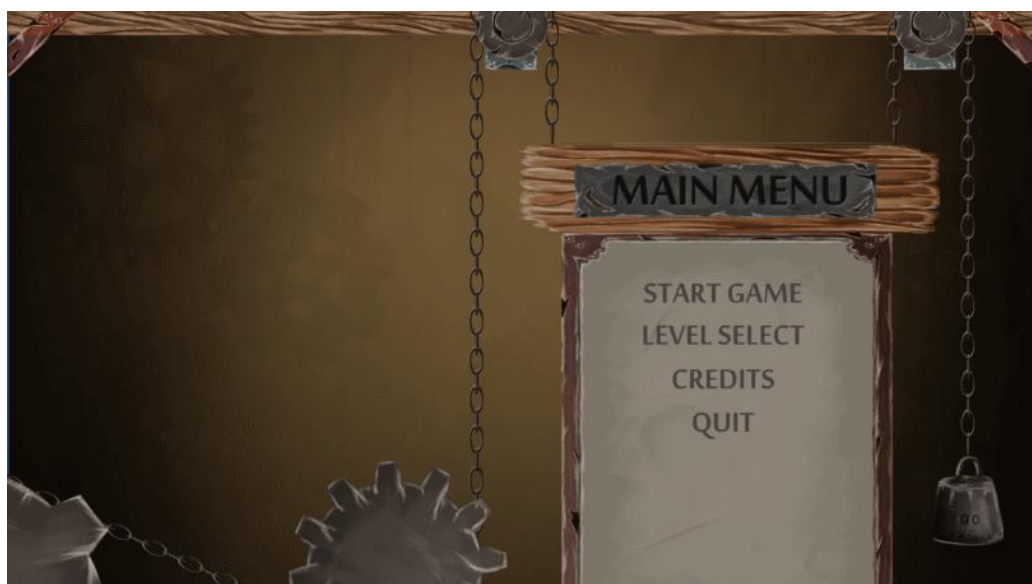
When the game is launched, a sequence of introduction images is shown. The NHTV logo, The 18 team logo and game logo are displayed.

### 3.2.1 Main Menu

After the introduction sequence has finished, the player is taken to the Main Menu. The Main Menu consists of four buttons on the right of the screen, positioned in a vertical row. These buttons are:

- Start Game - Pressing this button takes the player to Level 1.
- Level Select - Pressing this button prompts the level select menu to move onto the screen.
- Credits - Pressing this button takes the player to the credits overview.
- Quit - Pressing this button closes the game application.

The Main Menu is structured as such:



If the Level Select button is pressed, the level selection menu moves onto the screen from above:



The gears in the foreground rotate when the main menu is first loaded. The chains also move in such a way that it looks like the gears are 'pulling' them to pull the main menu board up.

The gears in the background rotate for a few seconds, come to a stop, and start rotating again in a cycle.

In the level selection menu, the player can choose a level to play. By pressing the arrows next to the level screenshots, the player can switch levels. By pressing 'Play Level', the currently selected level is loaded.

### 3.2.2 In-game menu

If the Escape (Esc) button is pressed while playing a level, the in-game menu pops up, and the game is paused. Here, player can use the following buttons:

- Resume - If this button is pressed, the pause menu is closed, and the game is continued.
- Level Select - By pressing this button, the player is returned to the main menu.
- Quit to Menu - By pressing this button, the player is returned to the main menu.

The pause menu is structured as such:



### 3.2.3 In-game GUI

The game uses very little in the way of a Heads Up Display. At the start of every level, the level number is shown in the top-left corner of the screen. This indicator fades away after a few seconds. There are no other elements shown on the HUD.

## 4 Recap of concept

The player spawns in a level. He MOVES to the right, holds down the 'down' button to ADJUST the camera, and creates a tactic for solving the puzzle. The player JUMPS onto a couple of normal crates, which fall down to the next floor. The player MOVES further to the right, and JUMPS onto a couple of fragile crates, which fall down and destroy themselves, along with the fragile crates they hit. The player MOVES onto the elevator, and advances to the second floor. Here, the player quickly realizes that his path has been blocked by the normal crates that were dropped from the floor above.

The player RESETS the level by pressing the 'T'-button, MOVES past the normal crates, and then proceeds as during the first attempt.

## 5 Extra Information

### 5.1 Level list

All levels\* are listed below. The level designs use the following colour codes as seen on the left.

□	Floor tile
■	Elevator tile
■	Wall
□	Floor gap
+	Standard box
-	Fragile box
=	Solid box
▲	Spiked box
■	Spikes
■	Fire
■	Unstable tile
■	Piston
■	Conveyor belt
■	Trigger
■	Triggered tile

For further information on how to read or use these level designs, refer to the Level Grid FAQ (documents/design/level\_design/level\_grid\_faq.docx).

*\*Note: the level designs shown below may not always be up-to-date. It is possible that the level design was slightly altered after its implementation in the Unity project.*

Once a level has finished loading, a level entry animation is played, in which the player character walks out of the entrance door, with the door closing behind it. Once the animation has stopped playing, the player takes control over the character's movement. If the player dies, and the level is restarted, this animation is skipped, and the player regains control over the character immediately.

#### 5.1.1 Level 1

Level 1 is the first introductory level. It introduces the player to the game's main mechanics, and the first two obstacles in the game: the Standard Crate and the Solid Crate. The level is of an easy difficulty.

For the level lay-out, refer to documents/design/level\_design/final\_levels/level\_1.png

### 5.1.2 Level 2

Level 2 is the second introductory level. It introduces the player to a new obstacle, the Fragile Crate. It also introduces the player to Unstable Tiles. The level is of an easy difficulty.

For the level lay-out, refer to documents/design/level\_design/final\_levels/level\_2.png

### 5.1.3 Level 3

Level 3 is the third introductory level. It introduces the player to another advanced obstacle, the Weight. The level is of an easy difficulty.

For the level lay-out, refer to documents/design/level\_design/final\_levels/level\_3.png

### 5.1.4 Level 4

Level 4 is the fourth introductory level. It introduces the player to the game's first dangerous obstacle, the Grinder. The level is of an easy difficulty.

For the level lay-out, refer to documents/design/level\_design/final\_levels/level\_4.png

### 5.1.5 Level 5

Level 5 is the fifth and last introductory level. It introduces the player to the last obstacle, the Piston. The level is of an easy difficulty.

For the level lay-out, refer to documents/design/level\_design/final\_levels/level\_5.png

### 5.1.6 Level 6

Level 6 is the first level to use all obstacles and have a higher difficulty level.

For the level lay-out, refer to documents/design/level\_design/final\_levels/level\_5-4.png

### 5.1.7 Level 7

Level 7 features all obstacles in a level of medium difficulty.

For the level lay-out, refer to documents/design/level\_design/final\_levels/level\_5-3.png

### 5.1.8 Level 8

Level 8 features all obstacles in a level of medium to high difficulty.

For the level lay-out, refer to documents/design/level\_design/final\_levels/level\_5-2.png

### 5.1.9 Level 9

Level 8 features all obstacles in a level of high difficulty.

For the level lay-out, refer to documents/design/level\_design/final\_levels/level\_x-1.png

### 5.1.10 Level 10

Level 8 features all obstacles in a level of high difficulty.

For the level lay-out, refer to documents/design/level\_design/final\_levels/level\_x-2.png

### 5.1.11 Level 11

Level 8 features all obstacles in a level of high difficulty.

For the level lay-out, refer to documents/design/level\_design/final\_levels/level\_x-3.png

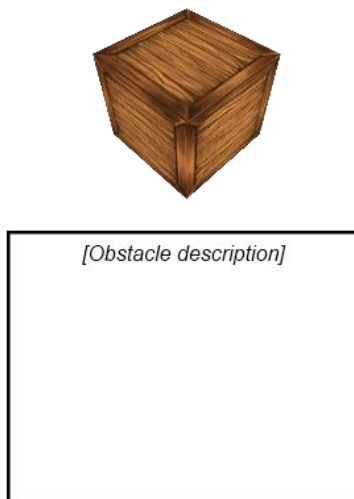
### 5.1.12 Level 12

Level 9 is a special level, which features only three floors. Unlike in the other levels, the multitude of floor tiles is made up of unstable floor tiles, forcing the player to keep moving once he has stepped onto the first unstable tile. There will be one safe spot (a stable tile) in the middle of each floor.

For the level lay-out, refer to documents/design/level\_design/final\_levels/level\_x-4.png

## 5.2 Tutorials

The game features several simple tutorials which should help players to familiarize themselves with the game's controls and obstacles. They all consist of a text field explaining the game mechanic or obstacle. All tutorials, with the exception of the camera and restart tutorials, are accompanied by an image of the obstacle or mechanic. All tutorials can be closed by pressing the 'Enter' button. They use the following structure, and are displayed at the centre of the screen:




For additional information on the tutorials, refer to documents/design/tutorials.docx.

For information on when the tutorials are played, see the sections directly below.

### 5.2.1 Movement tutorial

The first tutorial is the movement tutorial. In it, the player is explained how to move his/her character through the levels. It is shown during Level 1, right after the level entry animation has stopped playing.

It uses the following text: "Use  to move".

The image shows the player character in a walking stance, with four arrow underneath it, pointing in all directions the player can move in.

### 5.2.2 Jumping tutorial

The second tutorial explains how to jump. It is displayed right after the movement tutorial has been closed.

It uses the following text: "Press  to jump".

The image shows the player character in a jumping pose, with a large, bended arrow behind it, which shows the path of a jump.

### 5.2.3 Standard Crate tutorial

The first obstacle tutorial explains the behaviour of Standard Crates. It is displayed as soon as the player nears the first row of Standard Crates in Level 1.

It uses the following text: "Standard Crates are the most common crates. They can be dropped to the next floor by jumping on top of them".

The image shows a Standard Crate on a platform of 3x3 Stable Tiles.

### 5.2.4 Solid Crate tutorial

This tutorial explains the behaviour of Solid Crates. It is displayed as soon as the player nears the second row of Solid Crates in Level 1.

It uses the following text: "Solid Crates are special crates. They can't be dropped to the next floor".

The image shows a Solid Crate on a platform of 3x3 Stable Tiles.

### 5.2.5 Fragile Crate tutorial

This tutorial explains the behaviour of Fragile Crates. It is displayed as soon as the player nears the first row of Fragile Crates in Level 2.

It uses the following text: "Fragile Crates break when they hit the ground, or any other obstacle. They can also be destroyed by dropping another crate on top of them!"

The image shows a Fragile Crate on a platform of 3x3 Stable Tiles.

### 5.2.6 Unstable Tile tutorial

This tutorial explains the behaviour of Unstable Tiles. It is displayed as soon as the player nears the bridge of Unstable Tiles in Level 2.

It uses the following text: "Unstable Tiles will crumble beneath your feet. Be careful!"

The image shows a platform of 3x3 tiles, in which some of the Stable Tiles are replaced by Unstable Tiles.

### 5.2.7 Camera tutorial

This tutorial explains how to control the camera. It is shown as soon as the level entry animation has stopped playing, in Level 3.

It uses the following text: "Use  to move the camera".

### 5.2.8 Weight tutorial

This tutorial explains the behaviour of Weights. It is displayed right after the camera tutorial has been closed.

It uses the following text: "Weights will destroy anything they hit while falling. Use them to clear high towers of crates!"

The image shows a Weight on a platform of 3x3 Stable Tiles.

### **5.2.9 Grinder tutorial**

This tutorial explains the behaviour of Grinders. It is displayed as soon as the player nears the first Grinder in Level 4.

It uses the following text: "Grinders are dangerous: they will grind you to pieces! Drop a crate on top of them to disable them for good".

The image shows a Grinder replacing the middle tile on a platform of 3x3 Stable Tiles.

### **5.2.10Piston tutorial**

This tutorial explains the behaviour of Pistons. It is displayed as soon as the player nears the Piston in Level 5.

It uses the following text: "Pistons will push anything that's in their way. Use them to move crates, or use them as platforms! But be careful, they can also push you!"

The image shows a Piston Crate on a platform of 3x3 Stable Tiles, with a piece of a wall connected to its back.

### **5.2.11Restart tutorial**

This tutorial explains the player how to reset the level. It is displayed alongside the camera tutorial. The restart tutorial is displayed above the camera tutorial.

It uses the following text: "Use T to restart the level when you're stuck".