Decal Master:
Advanced Deferred Decals

Deferred Decals extends Unity default render pipeline with projected decals. Decals can project on opaque surfaces its own materials (PBR) in real-time. This technique useful if you want add some details on your level or in real-time spawn some details like blood, bullet holes etc. Deferred Decals system works only in Deferred Rendering.

Video tutorial https://www.youtube.com/watch?v=x8vEQaMj01M

How it works?

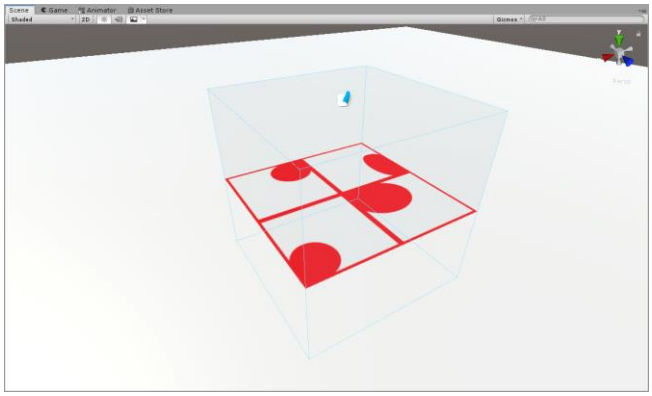
1. Register all decals
2. Setup command buffers for each camera on BeforeReflections camera event (after gbuffers)
3. Render all decals with decal shader direct to GBuffers (Diffuse, Normal, Specular Smoothness, Emission)

How decal shader works?

Each decal reconstructs world position from CameraDepthTexture (depth) and read world normals from GBuffer2. World position is used in calculating UV and world normal is used in clipping and blending by normals.

Quick start to use Deferred Decals System

1. Create new Scene
2. Select main camera and change 'Rendering Path' to 'Deferred'
3. Find DecalsSystem prefab in project by path 'Assets/Knife/Decal Master/Prefabs/DecalsSystem.prefab'
4. Drag and drop this prefab to scene
5. Create 'Plane' and place to (0, 0, 0) position
6. Create new Material
7. Change material shader to 'Knife/Decals/PBR'
8. Setup any opaque or semi-transparent texture to Diffuse texture slot in material
9. Create decal from menu 'GameObject/3D Object/Decal'
10. Place new decal to (0, 0.5 ,0) position
11. Assign new material to 'Material' field in inspector



Parameters

Deferred Decals System

Lock Rebuild	If enabled command buffers will not be recreated every frame
Terrain Decals	Defines how decals can works with terrains. Values: None, One Terrain, Multi Terrains
`TerrainDecalsType:None`	No decal blending with terrains height (regular projection)
`TerrainDecalsType:OneTerrain`	Decal blending with one terrain height (main)
`TerrainDecalsType:MultiTerrain`	Decal blending with all terrains heights
Terrain Height Map Size	Size of terrains heightmaps (this parameter is not change real terrain heightmap, it controls only copies of heightmaps)
Use Exclusion Mask	If enabled, all decals will be not projected on objects which have exclusion mask layer
Exclusion Mask	Decal projection exclusion layermask. All object with layer that included in Exclusion Mask will ignore decals projection. For example, you can add characters mask to ignore decals projection by characters renderers.
Frustum Culling	Enable or disable decals frustum culling
Distance Culling	Enable or disable decals distance culling
Start Fade Distance	Decals distance culling start fade distance. Begins from that distance value decals will be hided smoothly by distance.
Fade Length	Length of distance fading
Cube Mesh	Decal mesh used in rendering
Terrain Textures	Created heightmaps
Specular Smoothness Blitter	Shader that used in specular smoothness blitting with GBuffer1

Decal

Material	With that material decal will be rendering to GBuffers
Sorting Order	Rendering order of decal (affect only in decals rendering order)
Instanced Color	Diffuse instanced color, used when GPU Instancing enabled in material. For example, you can use one decal material but different colors on each decal.
Fade	Decal alpha blending parameter
UV Tiling	Decal tiling multiplier (useful with decals atlases)
UV Offset	Decal offset (useful with decals atlases)
Need Draw Gizmos	Does we need draw blue box when decal selected

Decal shader (Knife/Decals/PBR)

Color	Diffuse color, multiplied on diffuse map value
Diffuse (RGBA)	Regular color map, RGB – color value, A – transparency value
Normals (XYZ)	Regular Unity normal map
Normal Scale	Power of normal map
Specular (RGBA)	Regular specular workflow texture. RGB – specular color, A – smoothness value
Emission Color (HDR)	Emission color, multiplied on emission map value
Emission (RGB)	Regular emission color map, RGB – color value
Smoothness [0;1]	Smoothness value, multiplied on specular map smoothness value
Blend normal [0;1]	Control how amount normals will be blended. Zero – use normals of the surface on which decal projected. One – use normals of decal
Terrain Decal	Defines that all decals with that material will be projected only on terrain height
Clip by Normals	Controls how decal will be blended on normals. Enabled – clipping, Disabled – alpha blending
Normal Edge Blending	If enabled normals will not use diffuse color * color value alpha in normals blending. It will be use procedural soft circle mask to blend normal.
Normal Mask	If enabled normals will use diffuse map color alpha. Requires Enabled Normal Edge Blending
Clip normals	Decal normals clipping threshold
Terrain height clip	Terrain heightmap blending threshold
Terrain height clip power	Softness of terrain heightmap blending

Blend normals equals 1

Blend normals equals 0

Normal map only decal and diffuse is white

Normal map only decal Normal Edge Blending enabled and diffuse is transparent

Normal map only decal Normal Edge Blending enabled and diffuse is semi-transparent texture

Decal Master:
Decal Placement Tool

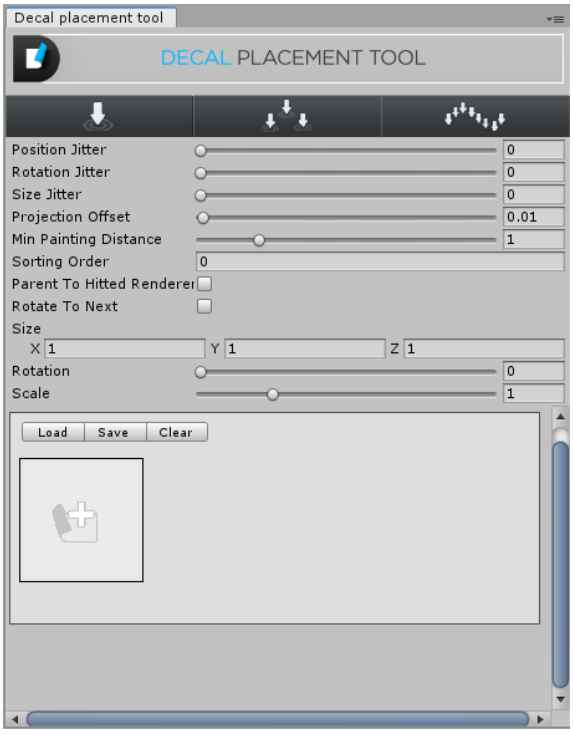
Decal Placement Tool provide easy decal placement workflow. You don't need colliders to place decal direct on surfaces.

How it works (GPU Raycaster)?

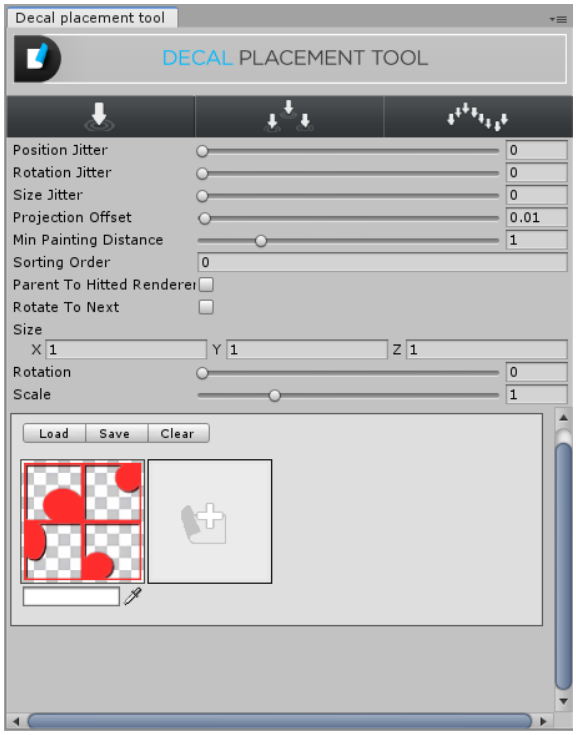
1. When you click in scene view specific camera renders same as scene view camera but with custom shader
2. Custom shader writes world position, world normal and object ID to 3 render targets
    a. If we use full screen data compute shader copy data from textures to compute buffers and data from compute buffers copies from GPU to CPU (ComputeBuffer.GetData(Array array))
    b. If we need only one pixel (mouse click position) textures data copies from GPU to CPU with Texture2D.ReadPixels with 1 pixel rectangle
3. We have data (world position, normal and object ID if needed) and place decal with that data

Quick Start to use Decal Placement Tool

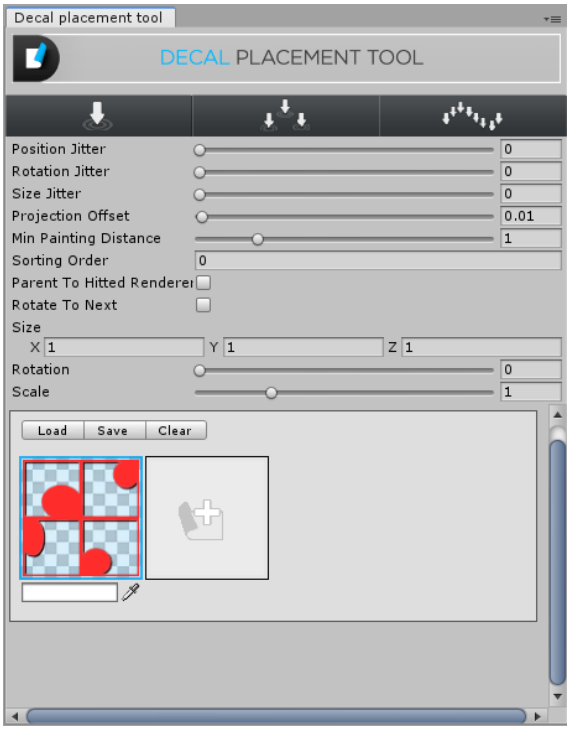
1. Open Decal Placement Tool Window 'Window/Knife/Decal Placement Tool'
2. Create new Decal Material (skip if you already have decals materials)
3. Drag and drop decals materials to Decal Placement Tool Window (pict. 1, 2)
4. Click to new decal template in Decal Placement Tool Window (pict. 3) to select template
5. Click Simple Placement Mode (pict. 4) to enable placement mode
6. Move mouse on some surface in scene view. You would see decal that projecting on surface in current mouse position
7. Click left mouse button in place where you want place decal



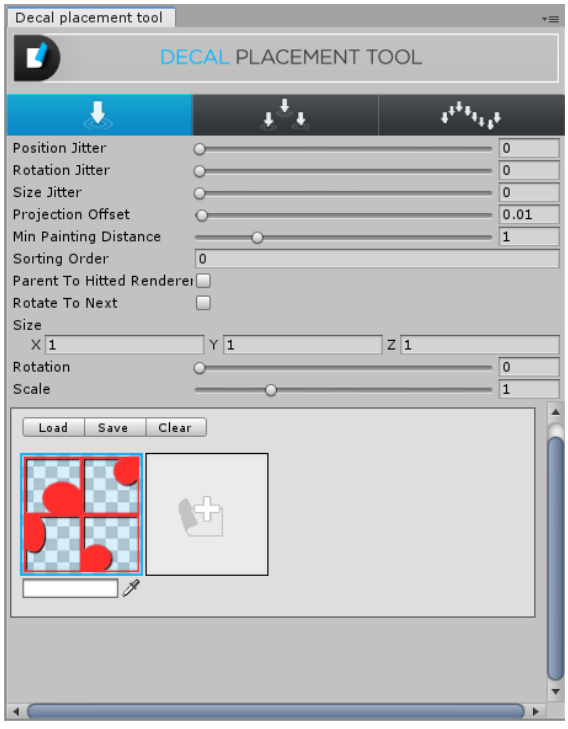
Pict. 1



Pict. 2



Pict. 3



Pict. 4

Placement Modes

1. Simple placement mode provides one decal per one click
2. Burst placement mode provides many decals per one click with random clamped positions
3. Painting placement mode provides many decals by left mouse button holding and lines drawing.

Control hotkeys

Hotkeys works only if some placement mode enabled and some decal template selected.

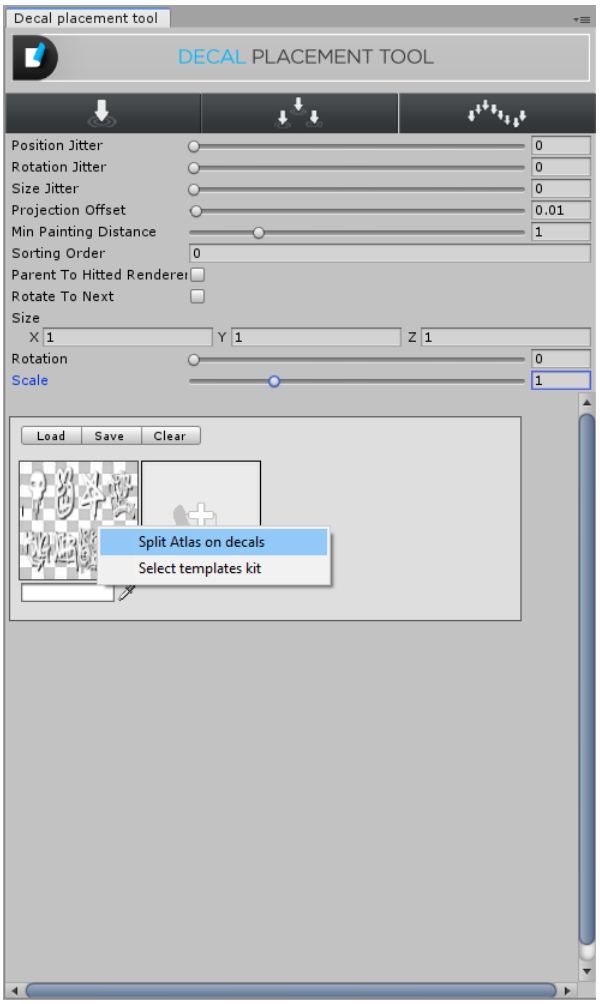
Left Mouse Button	Selected placement mode spawn selected decals
CTRL + Left Mouse Button + Mouse Move	Scale decal
CTRL + Right Mouse Button + Mouse Move	Rotate decal
CTRL + Mouse Wheel	Scale decal
SHIFT + Mouse Wheel	Rotate Decal

Parameters

Position jitter	Randomness of decal position
Rotation jitter	Randomness of decal rotation
Scale jitter	Randomness of decal scale
Projection Offset	Distance between decal pivot position and projecting surface
Projection Distance	Length of projection (decal height)
Min Painting Distance	All decals will spawn only if distance between current and previous position is greater than that value. Works only in Painting Placement Mode
Sorting Order	Decals sorting order number. Decals with greater the value will be drawn above than decals with smaller the value
Parent to Hitted Renderer	If enabled all decals will be setparented object below mouse
Rotate to Next	If enabled all decals will rotate forward axis to next decal. Works only in Painting Placement Mode
Line As One Decal	If enabled only one decal will be spawned and its UV will be tiled. Works only in Painting Placement Mode
Size	Non-uniform size of decal
Rotation	Decal rotation value
Scale	Decal size value
Burst count	Decal count that will be spawned. Works only in Burst Placement Mode
Burst size	Radius of decals position randomness in screen-space coordinates. Works only in Burst Placement Mode

Decals Atlas Splitter. How to use.

1. Add decal material to Decal Placement Tool
2. Click right mouse button on template
3. Select Split Atlas on decals
4. In Atlas Splitter window you can manually create rects (click and hold left mouse button on canvas and drag to another corner of rectangle)
5. Or you can automatically split atlas by grid
    a. In left top corner you can see Auto Split options
    b. Select tiles counts by x and y axes
    c. Click auto split button and your atlas will be automatically split by grid
6. Click Split button in left top corner, window will be closed and decals will be added in Decal Placement Tool




Split
SPLIT
Tiles
X 4
Y 2
AUTO SPLIT


Split
SPLIT
Tiles
X 4
Y 2
AUTO SPLIT

Decal Placement Tool Window overview