Easy Decal

Operation Manual

Content

1 Overview

The **Easy Decal** system provides a very simplified workflow for putting decals all-over your game world. The Easy Decal system supports all kinds of shaders and materials from parallax occlusion to transparent. You can add details everywhere and upgrade your game environment to a new level.

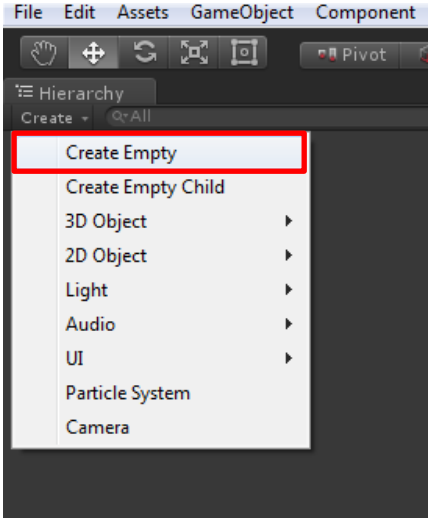
2 Usage

2.1 Create a new decal

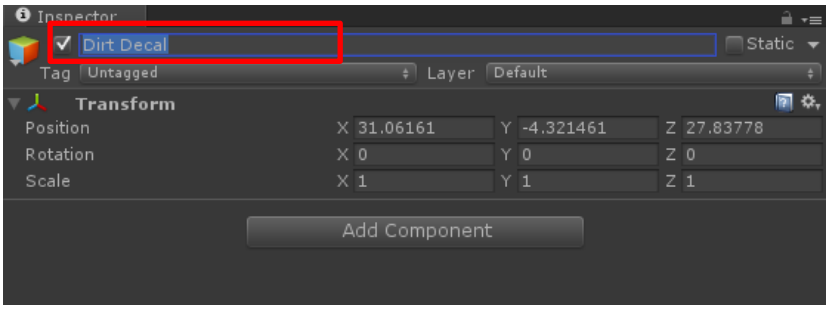
To create a new decal from scratch, please follow the steps below.

1. Create an empty GameObject.

   a. `Create -> Create Empty`
   or
   `GameObject -> Create Empty`

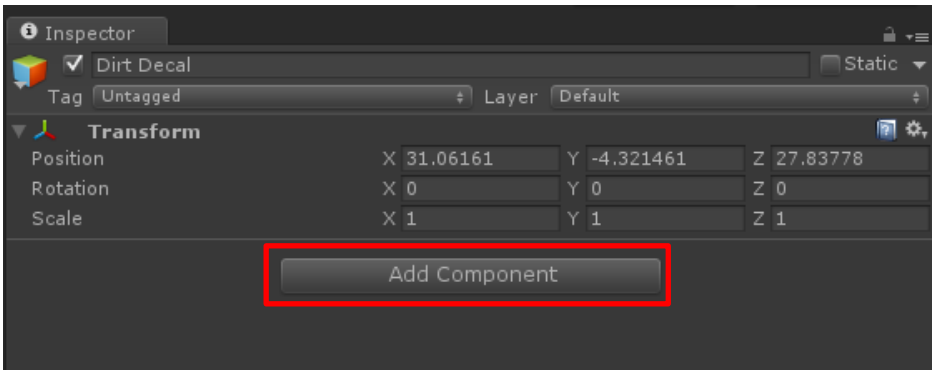


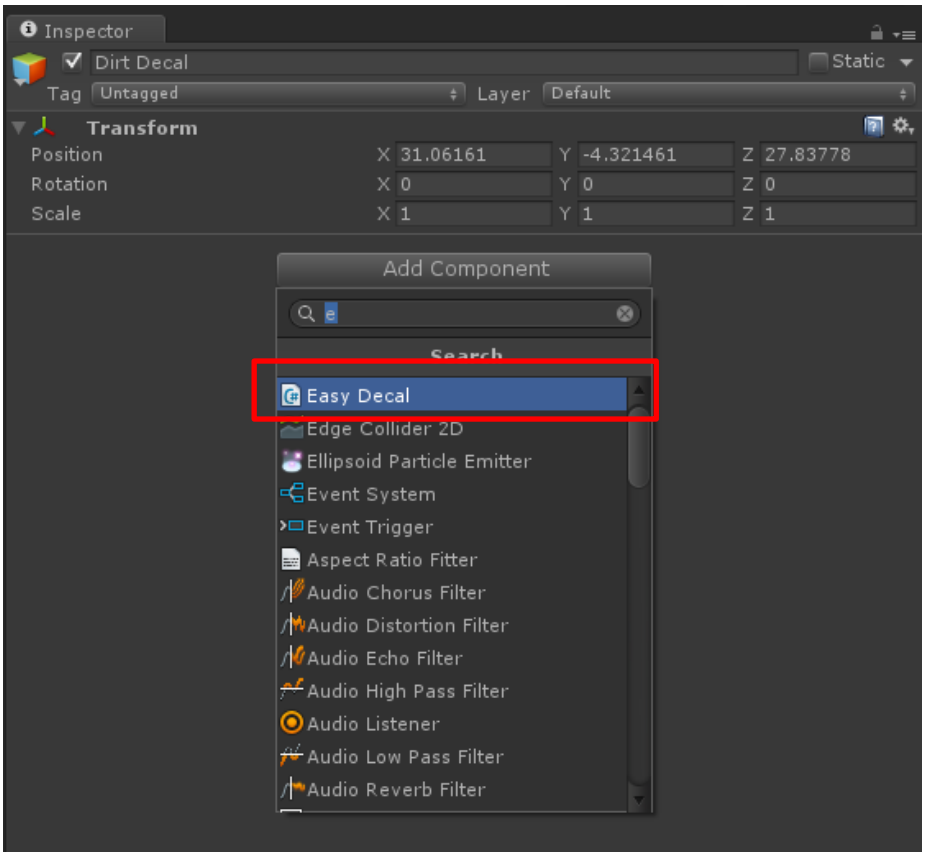
   b. Give a meaningful name. For example: Dirt Decal



2 Append the `EasyDecal` script to the recently created GameObject.

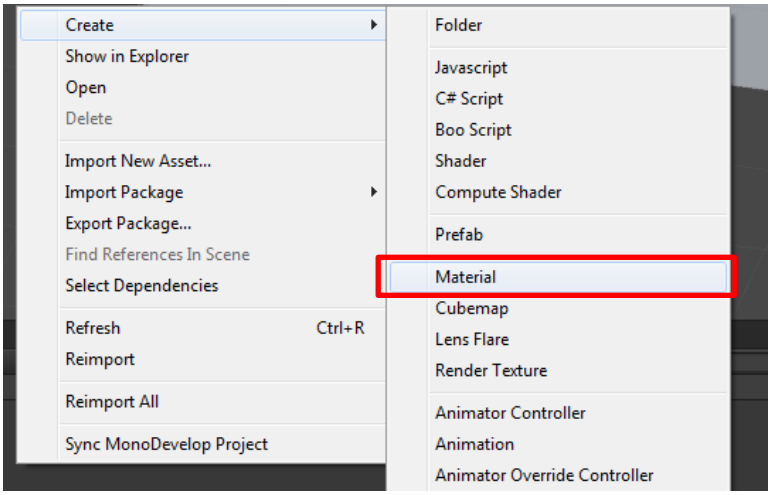
`Component -> Add…->EasyDecal`
or
By clicking on the Add Component button in the `inspector->EasyDecal`
or
By dragging the EasyDecal script to the inspector and drop it there

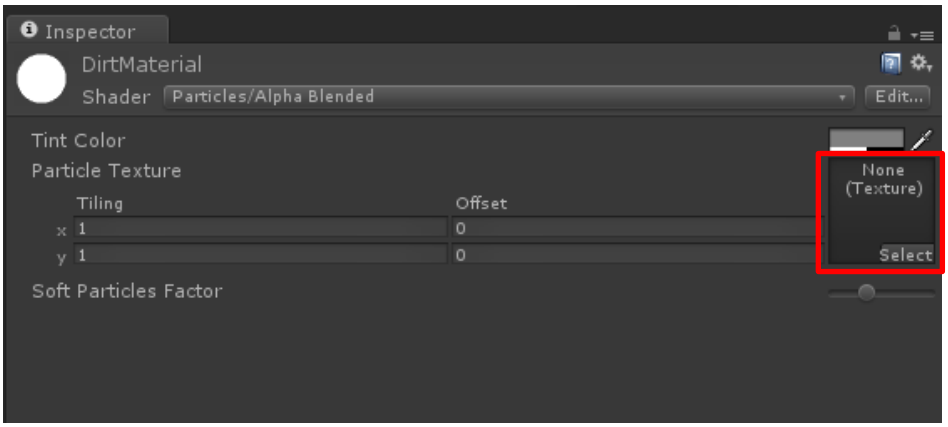




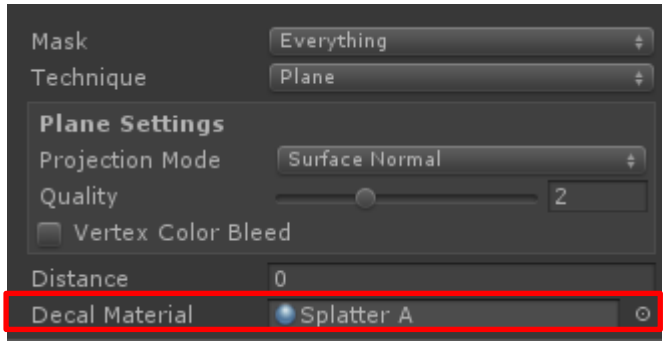
3 Create a new material with your favorite shader and equip it with your decal texture.

Right click within the project view `Create -> Material`

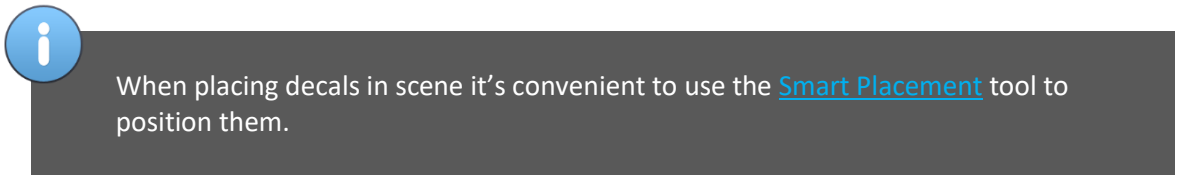




Assign the just created Material to the material slot of the `EasyDecal` interface.



4 Place the decal in the 3D space. You can move, rotate and scale the decal object like any other `GameObjects` by using the inspector Transform component or directly within the Unity scene view.



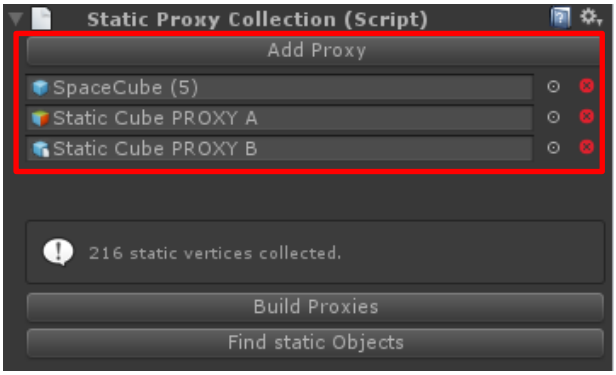
When placing decals in scene it's convenient to use the Smart Placement tool to position them.

2.2 Create a static Mesh Proxy Collection

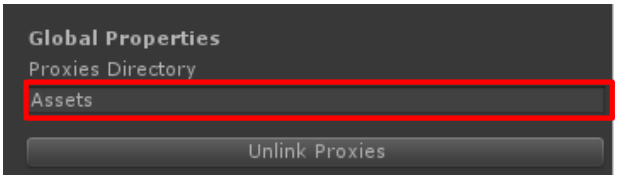
If you need to include static meshes that have no collider component attached, you have to use a `StaticProxyCollection` and register the `GameObjects` at design-time.

Note that those objects cannot directly receive decals as they have no collider, but their geometry can be included as additional targets by the Box Projector.
The proxy collection is meant to be a replacement for colliders at all.

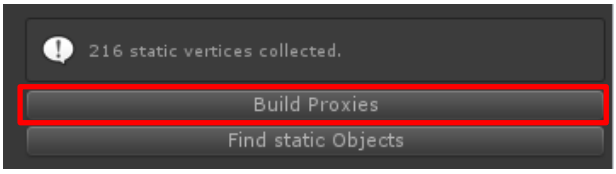
1. Create an empty `GameObject`
2. Add a `StaticProxyCollection` component
3. Manually add all static colliderless `GameObjects` that should be considered by the projector



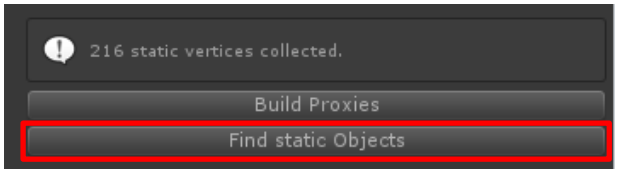
4. When using built-in Unity 3D-Objects you have to specify the output path for the mesh proxies. The path must be set relatively to your project's directory. All proxy assets get stored in this folder.



5. Press Build Proxies to initialize the vertex list used by the projector.



6 Alternatively you can automatically search for colliderless static `GameObjects` by pressing the “Find static Objects” button.



7 To register a proxy collection, just add this line after loading the scene.

```
//Assign the proxy collection for the level here
public StaticProxyCollection ProxyCollection;


public void Start()
{
    // Set the proxy collection
    EasyDecal.SetStaticProxyCollection(ProxyCollection);
}
```

To unregister a proxy collection call the method with a null argument.

```
// Set the proxy collection
EasyDecal.SetStaticProxyCollection(null);
```

2.3 Duplicate a Decal

There are four different ways to duplicate a decal:

2.3.1 Shallow Duplication

WIN	MAC
CTRL + D	CMD + D

The standard duplication makes a shallow copy of the decal object. The geometry gets shared between the instances. This duplication mode is suitable for decals that are on a similar surface (e.g. on a flat wall or floor). The original decal remains.

2.3.2 Prefab Duplication

WIN	MAC
SHIFT + D	SHIFT + D

If the decal is an instance of a prefab, a new instance gets instantiated otherwise the system creates a deep copy of the current decal object. This duplication mode is suitable for prefab decals. The original decal remains.

2.3.3 Deep Duplication

WIN	MAC
ALT + D	ALT + D

The deep duplication makes a deep copy of the decal object. The geometry gets cloned and is not shared between the instances. This duplication mode is suitable for decals that need the same properties, but need to be placed on different surfaces. The original decal remains.

2.3.4 Convert to Mesh

WIN	MAC
ALT + C	ALT + C

Converts the selected decal to a mesh and places it in the scene root. The original decal remains.

2.4 Deferred Decal Masking

Deferred decals have many advantages over mesh decals. But they also have one significant disadvantage: They cannot be layer-masked as regular mesh decals because they get applied in screen space.

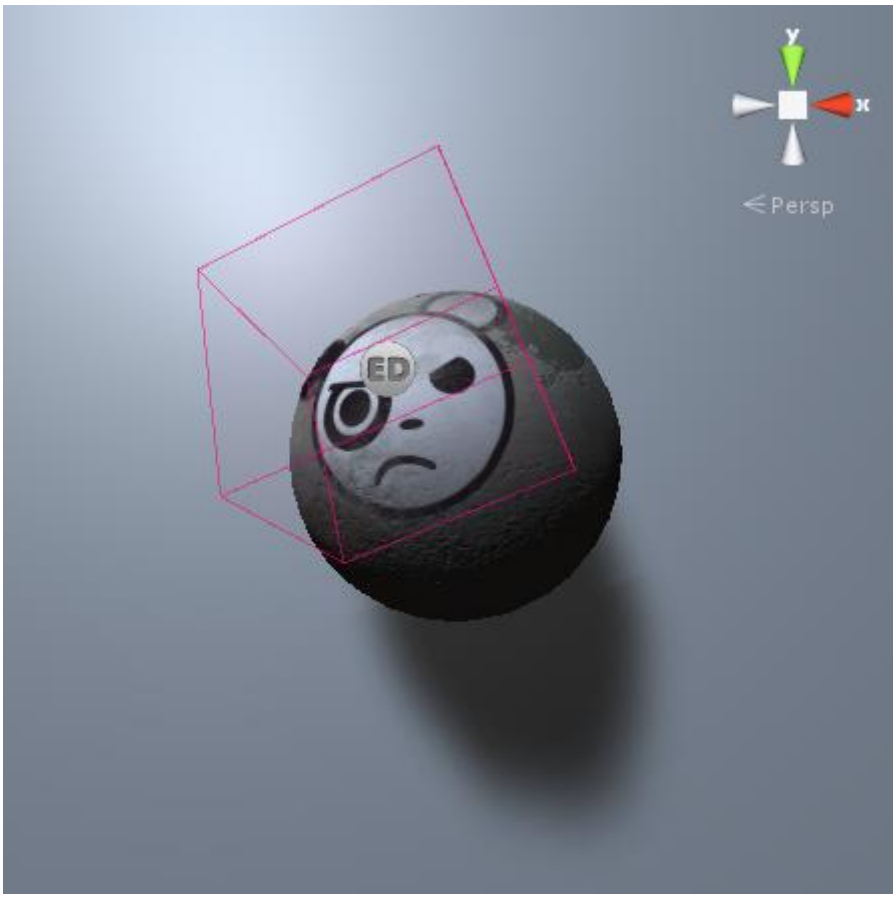
The deferred decals need to be masked on the shader level. Every object that should not receive deferred decals must use one of the following shaders in their materials:

- Standard DSSD Mask (Metallic)
- Standard DSSD Mask (Specular)

3 Projectors

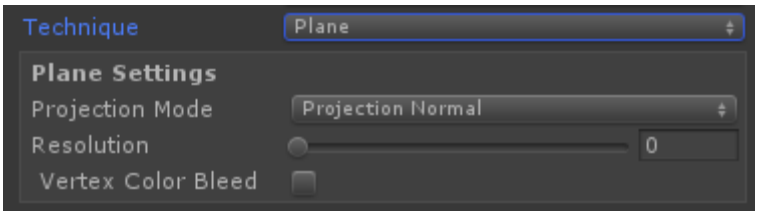
3.1 Plane

The plane projector uses raycasts to project a plane mesh with a predefined resolution onto a receiver. The plane technique should be used for simple surfaces.



Performance affected by	• Resolution property
Best for	• Simple surfaces • Convex surfaces
Drawbacks	• May creates unnecessary geometry on complex surfaces • Always needs colliders • Not necessarily fitting the receivers geometry

3.1.1 Dedicated Settings

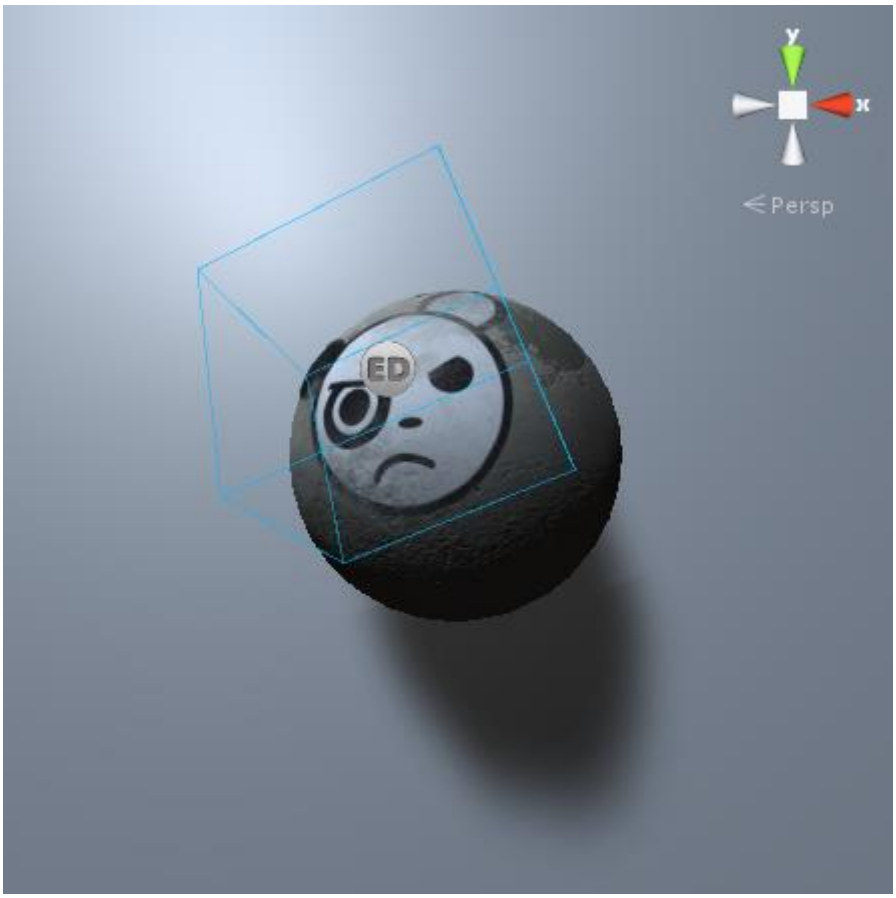


Parameter Name	Description
Projection Mode	The mode of the projection. **Surface Normal :** The distance from the receiver gets determined by the normal vector of the receivers face. **Projection Normal :** The distance from the receiver gets determined by the direction vector of the projection ray.
Resolution	The resolution of the dynamic geometry. Increase this value when used with uneven or bumpy receivers. **Note** : Be careful with this value, every step doubles the geometry. Too high values could lead to a performance impact.
Vertex Color Bleed	Enables a fade-out effect at the borders of the decal. The effect only works with the Plane Projector and shaders that support vertex colors.

Be careful with the resolution settings these can affect performance. Do only increase this value if really needed. For a plane surface a value of 0 (zero) is sufficient.

3.2 Box

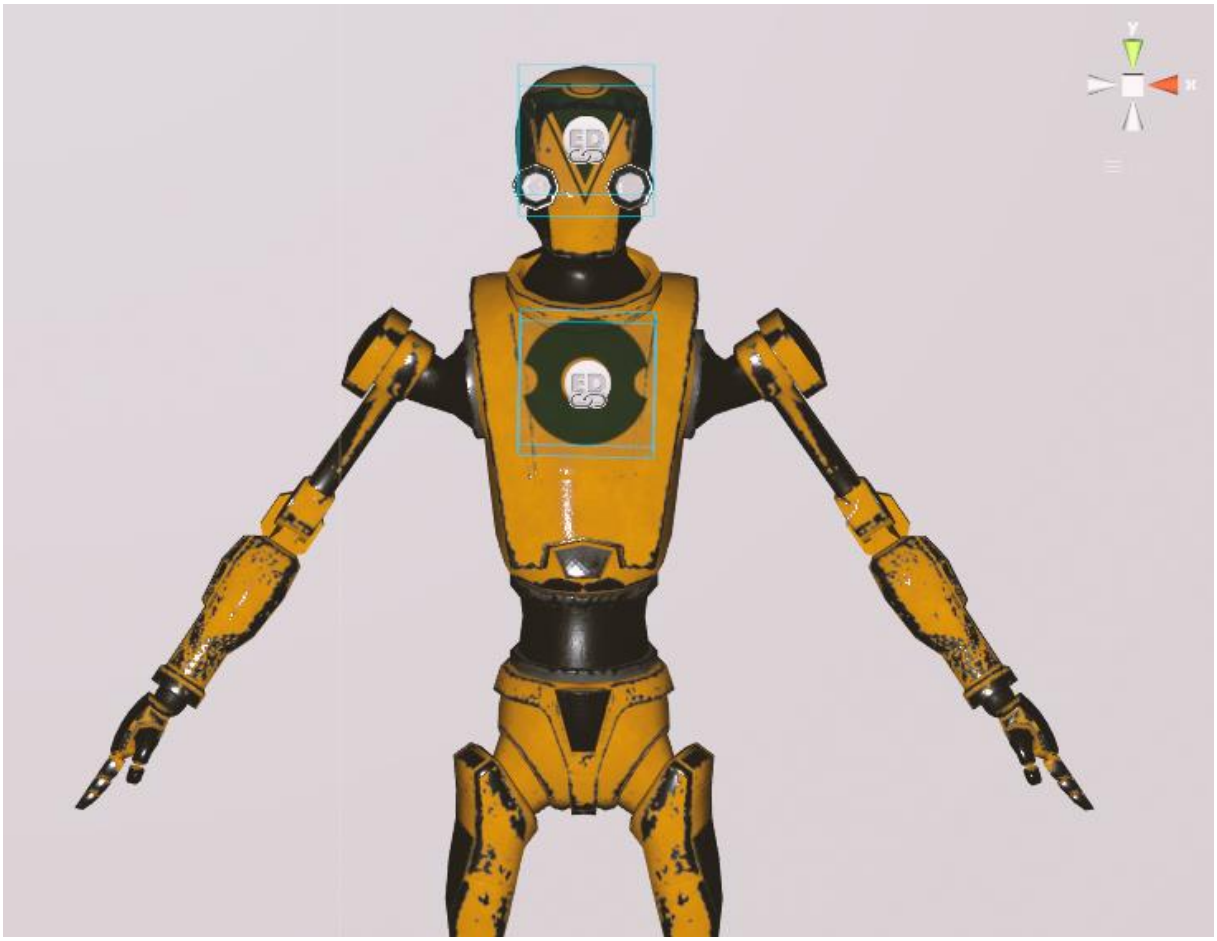
The box projector cuts out all geometry intersecting the specified bounding box. The box technique should be used for complex surfaces.



Performance affected by	• World space size of decal • Geometry complexity of receiver
Best for	• Complex surfaces
Drawbacks	• May creates unnecessary geometry on flat surfaces • Performance is size-dependent

3.3 Skinned Box

The skinned box projector cuts out skinned geometry intersecting the specified bounding box. The skinned box projector currently only supports one skinned mesh as geometry source.



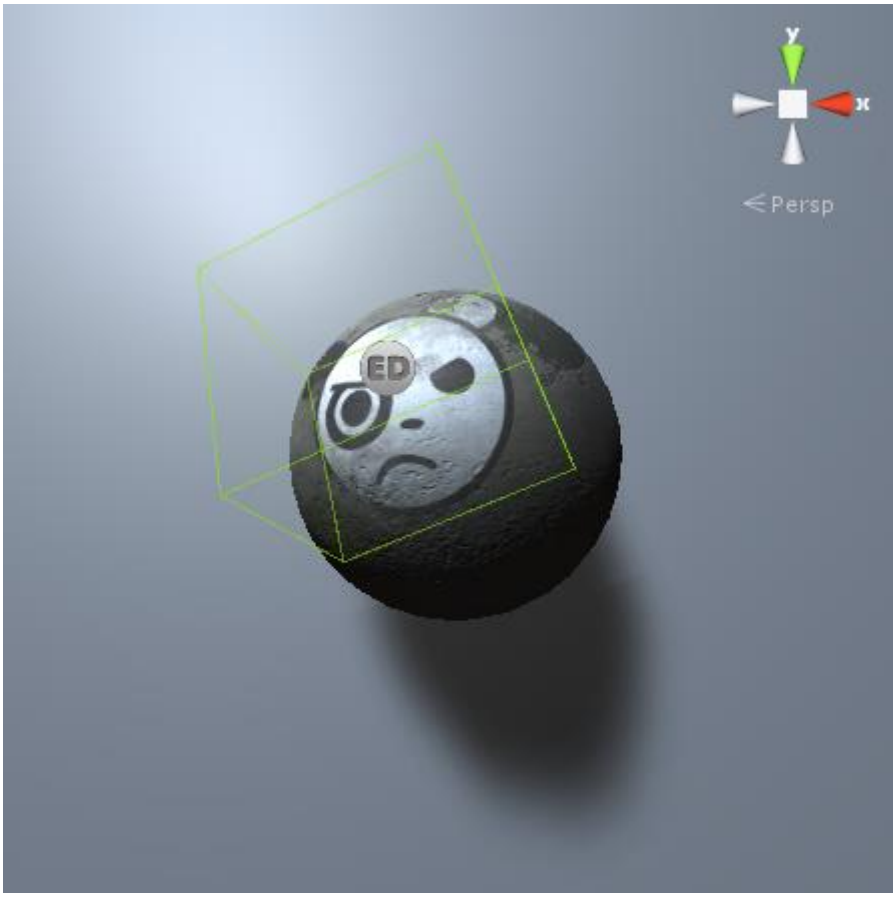
Performance affected by	• World space size of decal • Geometry complexity of the skinned receiver • Complexity of rig (bone count)
Best for	• Skinned meshes
Drawbacks	• Works only with skinned meshes • Performance is size-dependent

3.3.1 Dedicated Settings

Parameter Name	Description
Skinning Quality	The quality level of the skinned mesh decal. **Auto :** Use Unity's quality settings to determine the skinning quality. **Bone 1 :** Use 1 bone to influence the deformation of a vertex. **Bone 2 :** Use 2 bones to influence the deformation of a vertex. **Bone 2 :** Use 4 bones to influence the deformation of a vertex.

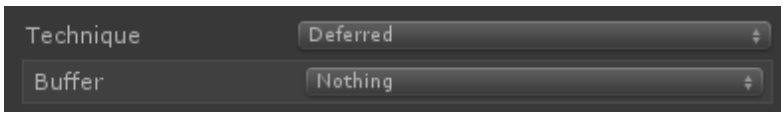
3.4 Deferred

The deferred decal projector renders the decal in screen space. The different texture maps get written to the respective g-buffer just before the lighting pass.



Performance affected by	• Screen space size of decal
Best for	• Complex surfaces • transparent decals with the need of proper shadow receiving
Drawbacks	• Cannot be batched • Works only with deferred rendering path • Works only with perspective camera • Constraint options are limited

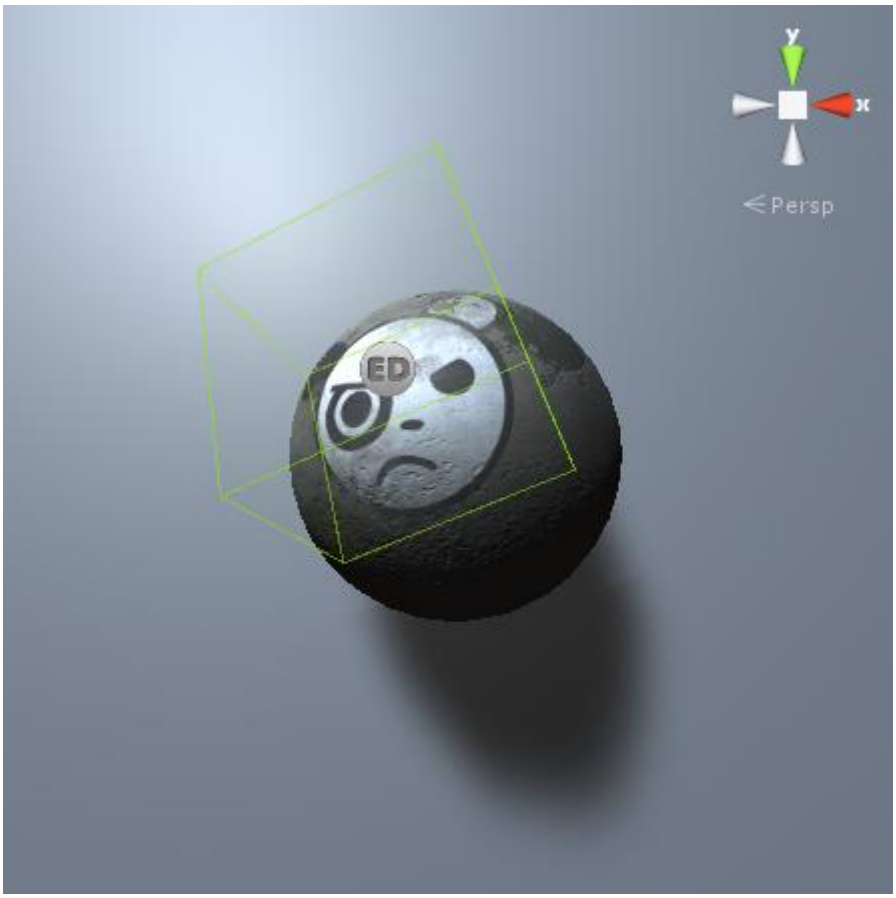
3.4.1 Dedicated Settings



Parameter Name	Description
Buffer	The buffer/s to write to. **Diffuse :** Writes to the diffuse buffer. **Normal :** Writes to the normal buffer

3.5 Screen Space

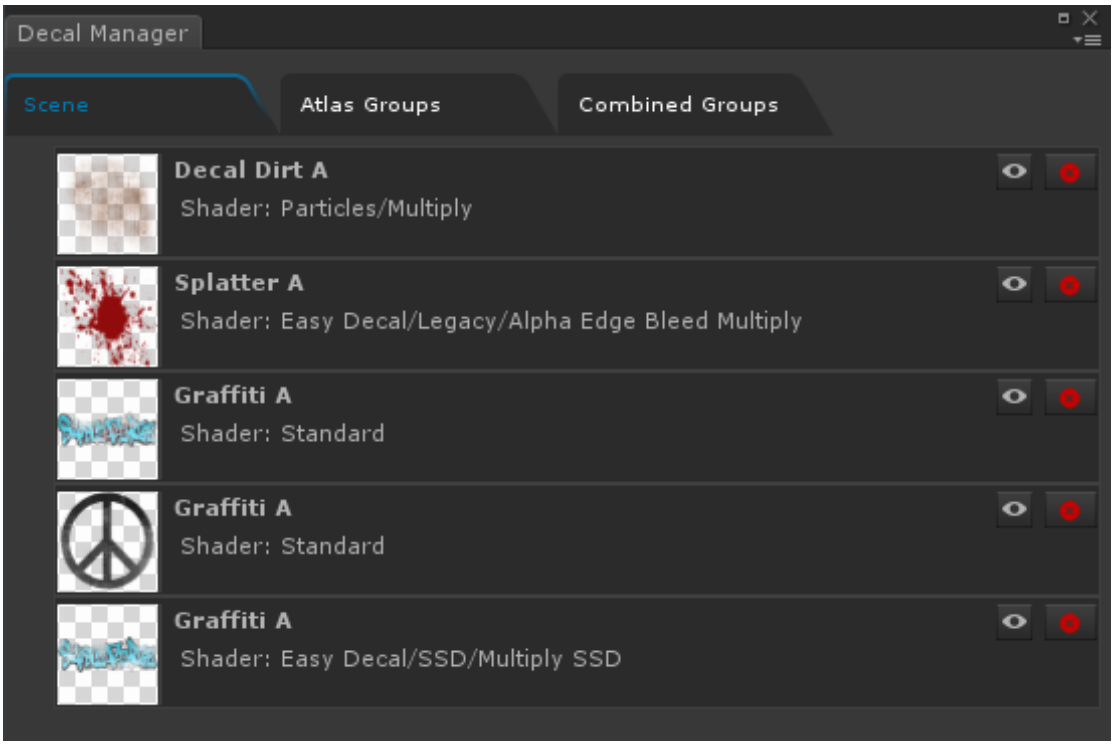
This projector renders the decal in screen space. Currently, only a multiply blending mode is available.



Performance affected by	• Screen space size of decal
Best for	• Complex surfaces • screen space decals in forward rendering path
Drawbacks	• Cannot be batched • Works only with perspective camera (OpenGL) • No constraint options

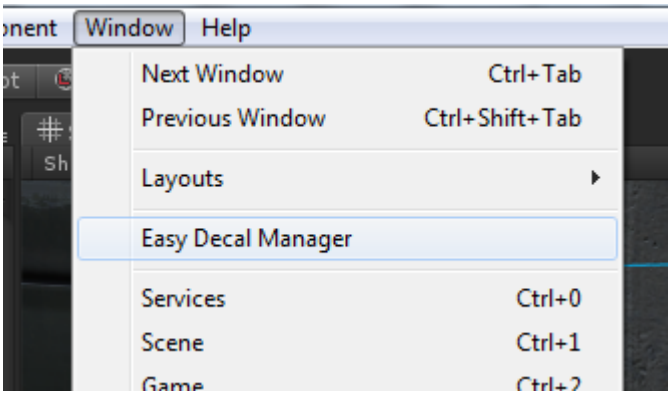
4 Decal Manager

The Decal Manager window can be used to display and manage all decals currently present in a scene and combining decals sharing the same atlas to a draw call group.

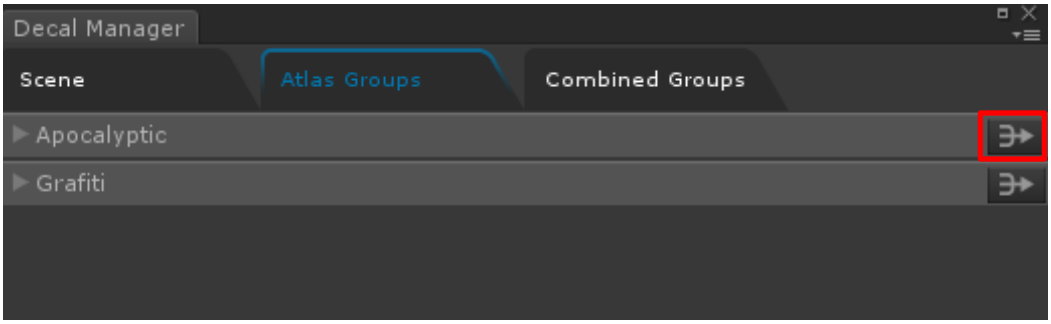


4.1 Combine an atlas group

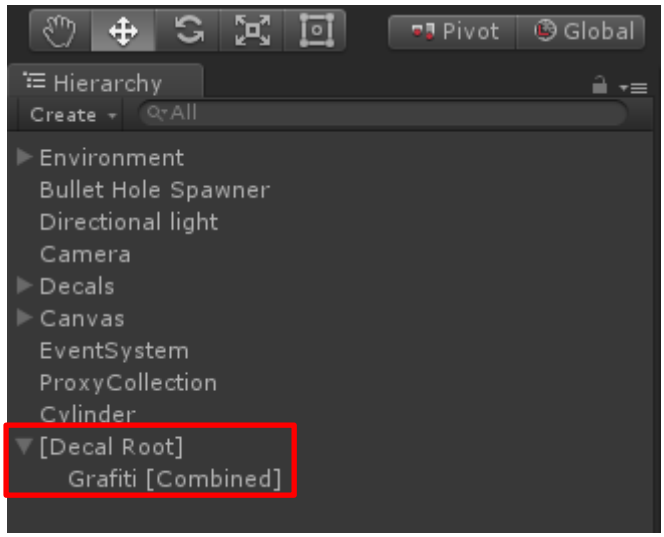
1 Open the Decal Manager from the main menu **Window > Easy Decal**



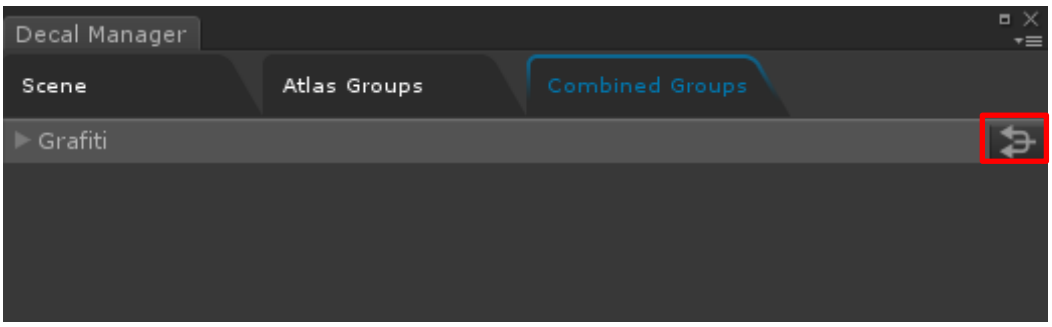
2 Go to the **Atlas Groups** tab and click on the combine button of the group that you want to have combined. All original decals in the atlas group get automatically deactivated.



The combined group now shares the geometry and material and is a child object of the **[Decal Root]** game object in the scene.



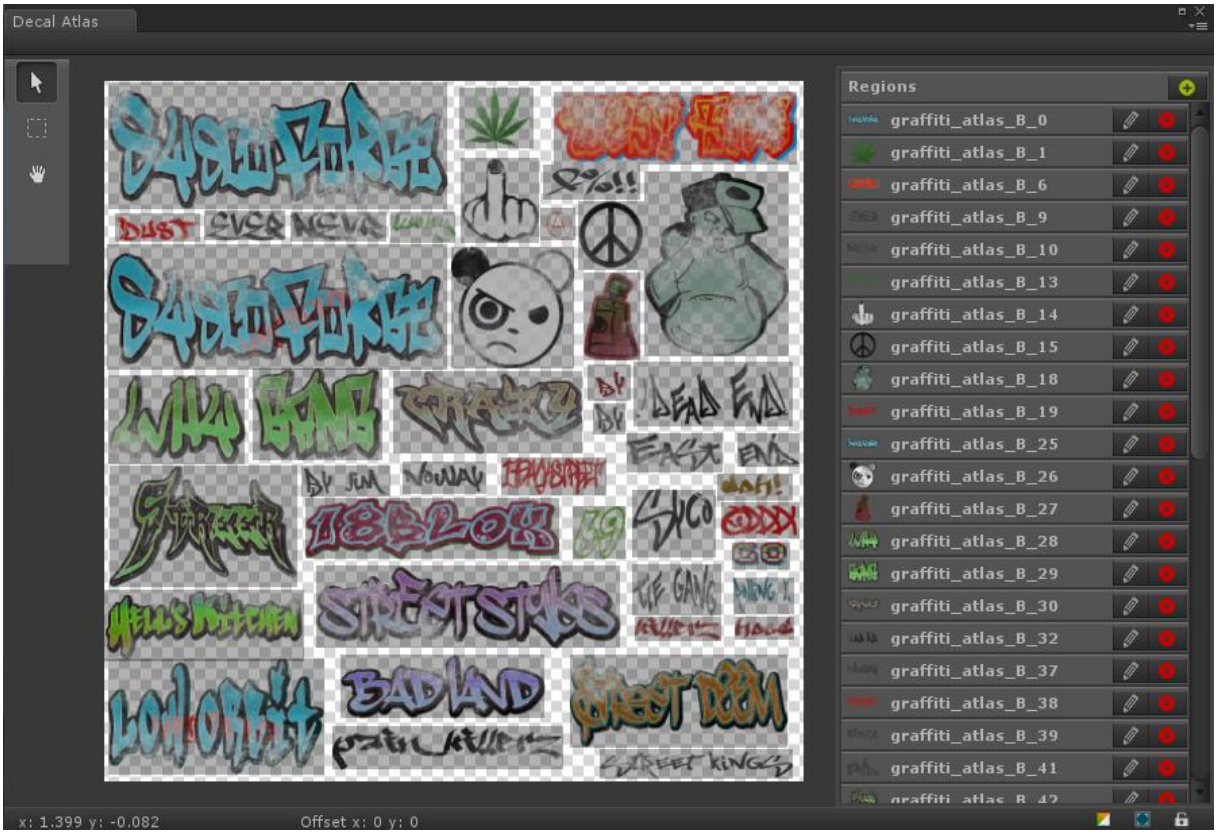
3 To separate a combined group, just go to the **Combined Groups** tab and click on the separate button of the group that you want to have separated.



5 Texture Atlas

Texture atlases introduce several advantages compared to single texture decals.

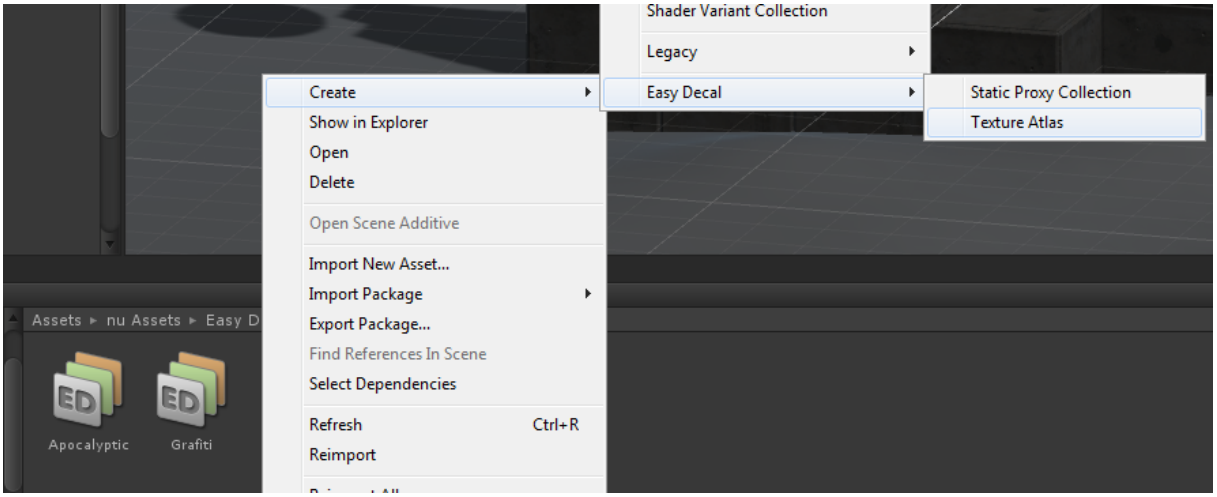
- Decals placed at design time can be combined to groups consuming just one draw call.
- Loading just one big atlas is done much faster than loading several smaller textures.
- Decals can share a material.
- Reduced texture swapping at device level.



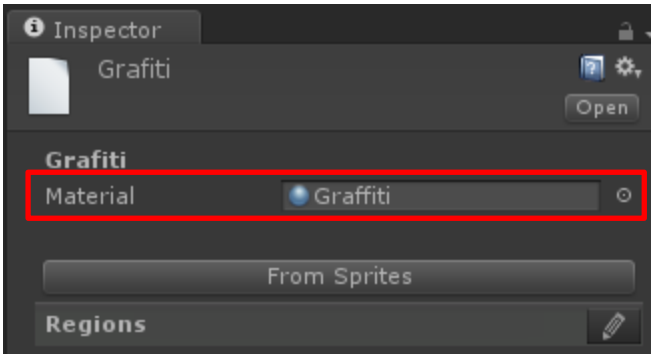
5.1 Create a new Texture Atlas.

Please follow the steps below to create a new texture atlas from scratch.

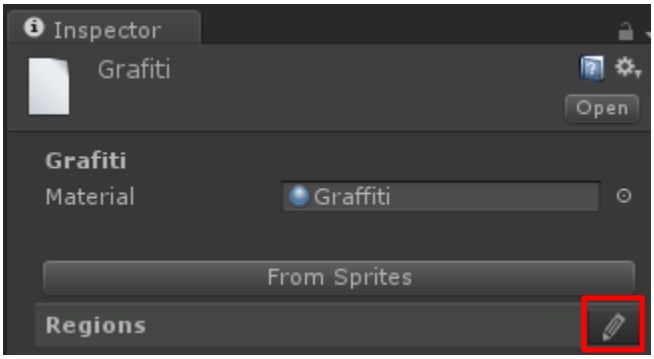
1. Navigate to the folder where you want to have the atlas created.
2. Right-click to open the context menu.
3. Click to **Create > Easy Decal > Texture Atlas**.



4. Select the created atlas object in the project view.
5. Assign a material

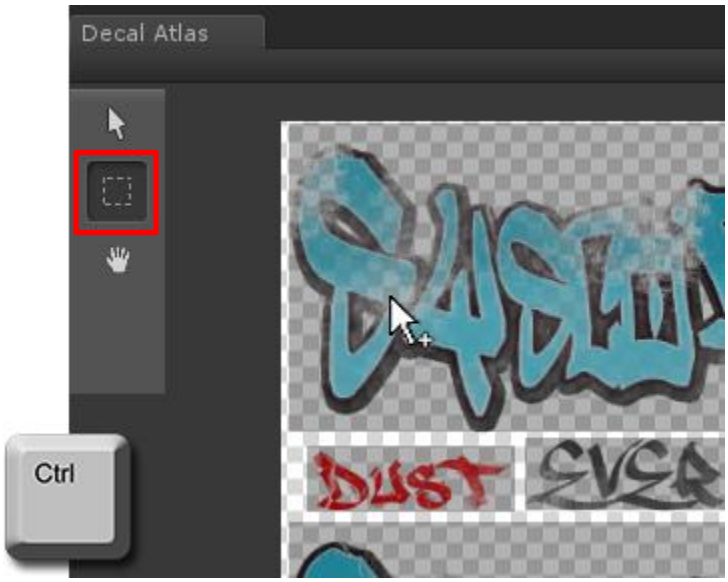


6. Open the atlas editor to create or change the different regions of the atlas.

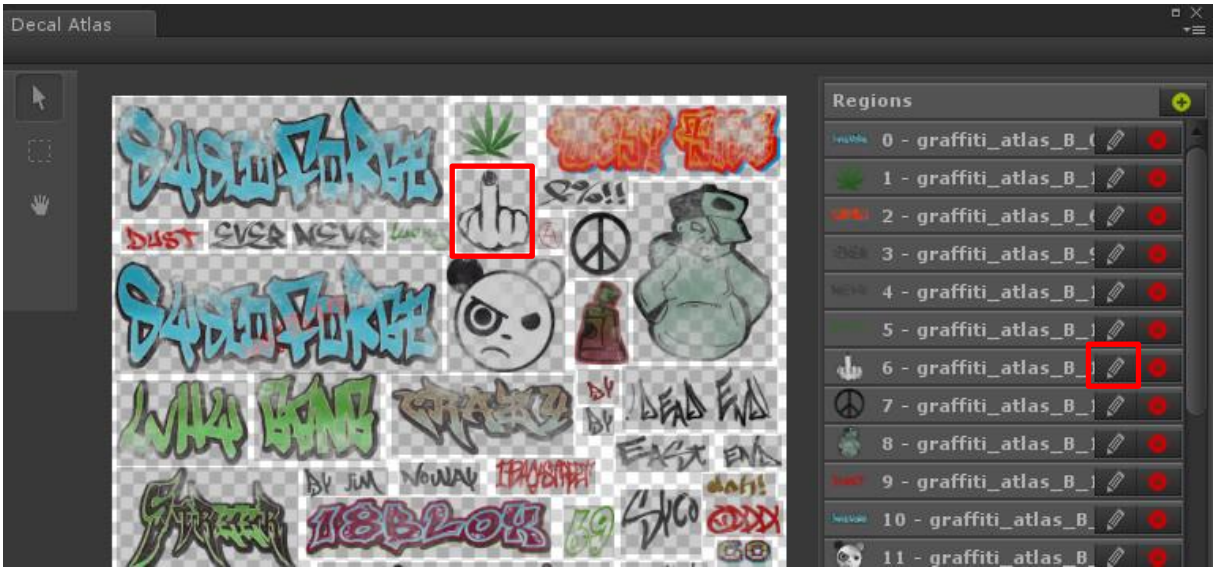


7 Create as many regions as you need by clicking on the green add button.

Alternatively, consecutive regions can be created by holding down the CTRL key with the Marquee tool selected.



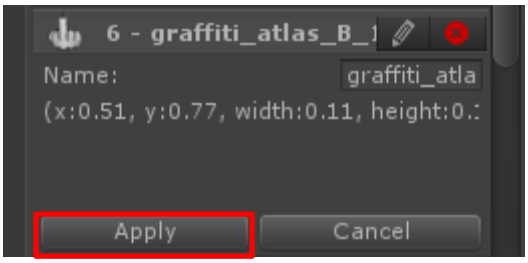
8 An existing region can be edited by either clicking on the edit button or directly selecting the region on the canvas.



9 An active region can be move or resized with the Arrow tool.

An active region can also be overridden by defining a new selection with the Marquee tool.

10 Changes made to a region can be accepted by either clicking to empty location on the canvas, by clicking on the **Apply** button or just by pressing **Enter** on your keyboard.


6 - graffiti_atlas_B_1
Name:
graffiti_atla
(x:0.51, y:0.77, width:0.11, height:0.:
Apply
Cancel

6 Runtime Instantiating

6.1 Example 1: Bullet Holes

The following snippet instantiates a bullet hole prefab at the impact (mouse) position.

The `EasyDecal.ProjectAt` method also instantiates the decal within the receivers local space and parents the decal to the receiver.

```
using UnityEngine;
using ch.sycoforge.Decal;

public EasyDecal DecalPrefab;

void Update()
{
        if (Input.GetMouseButtonUp(0))
        {
            // Shoot a ray thru the camera
            Ray ray = Camera.main.ScreenPointToRay(Input.mousePosition);
            RaycastHit hit;

            // Check if ray hit something
            if (Physics.Raycast(ray, out hit, 200))
            {
                // Instantiate the decal prefab according the hit normal
                EasyDecal.ProjectAt(DecalPrefab.gameObject,
                                    hit.collider.gameObject, hit.point, hit.normal);
            }
       }
}
```

6.2 Example 2: Simple Instantiating

The following snippet instantiates a decal prefab at a specified position in the game world.

The `EasyDecal.Project` method instantiates the decal prefab at a given position with a given rotation.

```
using UnityEngine;
using ch.sycoforge.Decal;

public EasyDecal DecalPrefab;
public GameObject Target;

void Start()
{
       // Instantiate the decal prefab as child of the Target GameObject
      EasyDecal.Project(DecalPrefab.gameObject,
                        Target, Vector3.zero, Quaternion.identity);

}
```

7 Smart Placement

The Smart Placement system helps you positioning your decals in 3D space without the hassle of the standard transformation handles.

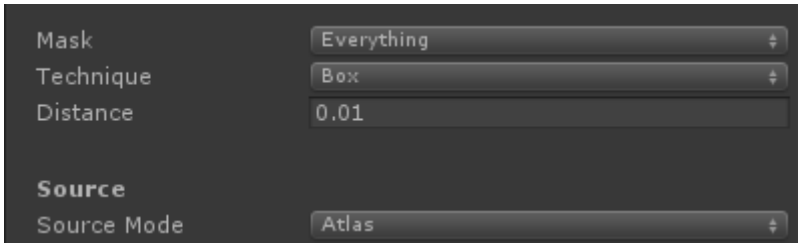
Note: The Smart Placement feature is currently in a beta state.

LMB: Left Mouse Button,
MMB: Middle Mouse Button,
RMB: Right Mouse Button

Hotkey	Description
Ctrl+Alt+LMB [Drag]	Move the decal on the surface.
Ctrl+Alt+MMB [Drag ↕]	Scale the decal while preserving its aspect ratio.
Ctrl+Alt+RMB [Drag ↕]	Rotate the decal along the projection direction.
Ctrl+Alt+Wheel [Spin]	Change atlas index.
Ctrl+Alt+LMB [Click]	Rotate the decal along the projection direction by 90 degrees (Clockwise).
Ctrl+Alt+MMB [Click]	Select random atlas index.
Ctrl+LMB [Drag ↕]	Horizontally scale the decal.
Ctrl+MMB [Drag ↕]	Scale the decal along the local z-Axis. (Box Projection)
Ctrl+RMB [Drag ↕]	Vertically scale the decal.
Ctrl+Wheel [Spin]	Stepwise increase the quality steps of the decal mesh (Plane Projection)

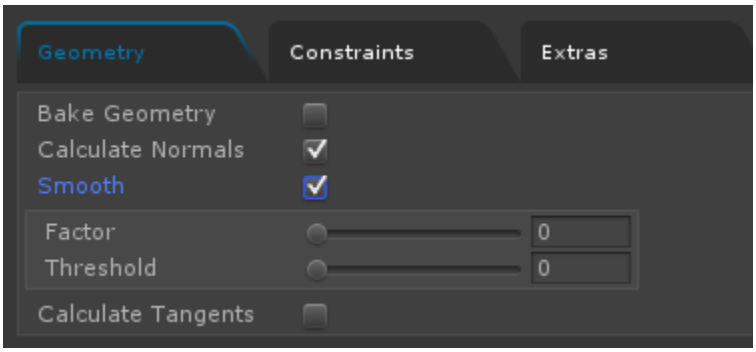
8 Interface

8.1 General



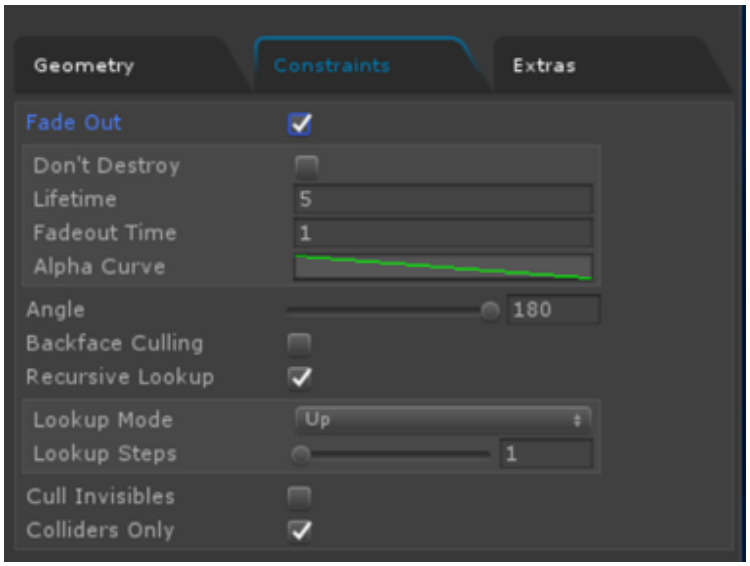
Parameter Name	Description
Mask	The mask used by the decal system.
Technique	The projector technique used to generate the decal. Please go to the Projectors paragraph for detailed information.
Projection Mode	The mode of the projection. **Surface Normal :** The distance from the receiver gets determined by the normal vector of the receivers face. **Projection Normal :** The distance from the receiver gets determined by the direction vector of the projection ray.
Quality	The quality of the dynamic geometry. Increase this value when used with uneven or bumpy receivers. **Note** : Be careful with this value, every step doubles the geometry. Too high values could lead to a performance impact.
Vertex Color Bleed	Enables a fade-out effect at the borders of the decal. The effect only works with the Plane Projector and shaders that support vertex colors.
Distance	The distance to the target projection area (receiver). Increase this value if you want to work with lower quality levels and the decal should be placed onto a bumpy target (e.g. terrains).
Decal Material	The material used to render the decal.
Aspect Mode	**None**: The decal inherits the scale of the prefab or the scale specified in the API method no matter what aspect ratio the actual UV rectangle has. **Width**: The decal keeps its width and the height gets calculated according the UV rectangle's aspect ratio. **Height**: The decal keeps its height and the width gets calculated according the UV rectangle's aspect ratio.

8.2 Geometry



Parameter Name	Description
Bake Geometry	Enable this option to bake the geometry. Once the geometry of a decal is baked, the decal will skip the dynamic update process. Baked decals cost fewer CPU time in the editor as well at runtime.
Calculate Normals	Enables normals calculation in the dynamic mesh system. Enable this option if the receiver does not have any normal information or you want to have the normals to be recalculated.
Smooth	Enable normal smoothing.
Smooth - Factor	The strength of the smoothing [0..1]. Where 0 (zero) means no smoothing at all and 1 (one) full smooth.
Smooth - Threshold	Threshold value from what slant the smoothing should start taking effect. Use this value to control the smoothing amount at sharp edges.
Calculate Tangents	Enables tangents calculation in the dynamic mesh system. Enable this option if you use shaders that need the tangent information to work properly (e.g. Bump Shaders).
Double Sided	**Deprecated** Use a double-sided shader to achieve the same results.

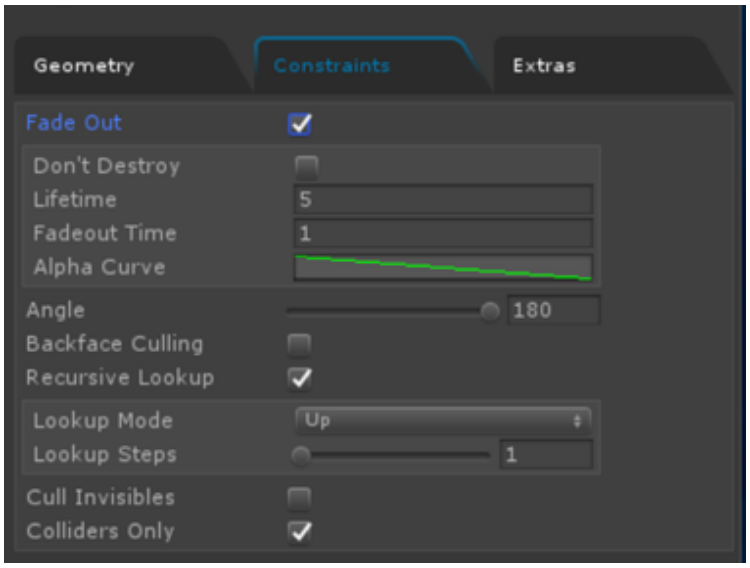
8.3 Constraints



1 Box Projector Technique

2 Plane Projector Technique

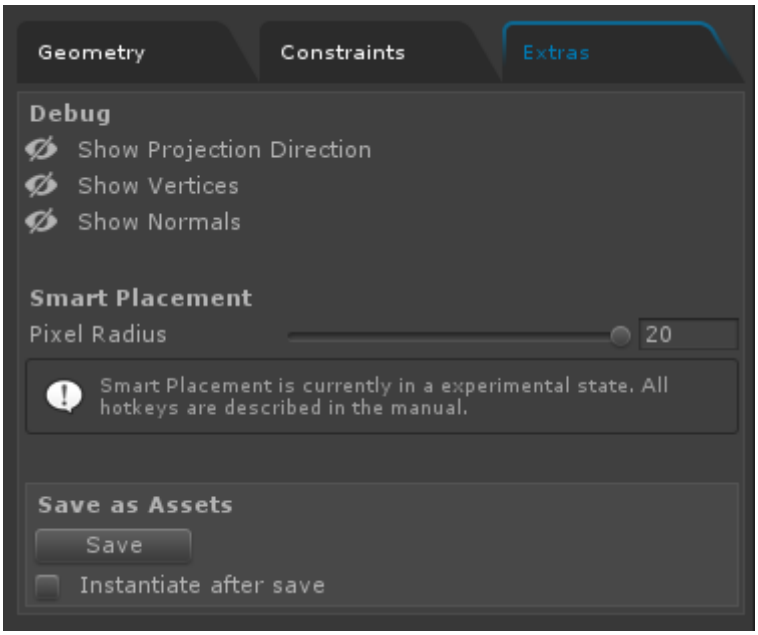
Parameter Name	Description
Max Distance	The maximum distance a vertex can be projected measured from the decal's origin/pivot.
Angle	Limits the angle between the surface normal of each polygon and the projection direction. All faces that are not fulfilling the requirement are getting culled.
Backface Culling	Limits the projection to faces that are visible to the projector.
Combined Mesh	Allow the projector to project the decal over multiple meshes/objects. **Note**: This may lead to unrealistically overlapping geometry when the decal gets projected at a moving object and at projection-time there's a second receiver affected. This effect can be attenuated with the *Max Distance* constraint.
Colliders Only	When enabled only objects with a collider are affected by the projector. The search for objects that could be affected by the projector is faster when this option is enabled.



3 Box Projector Technique

Parameter Name	Description
Recursive Lookup	Allows the projector to recursively search for possible target meshes in the game object hierarchy. Enable this option when collider and mesh filter are not on the same object or hierarchy level.
Lookup Steps	Determines how many hierarchy steps the recursive lookup can perform.
Fade Out	Enables or disables fading out the decal. **Note**: The visual fade-out of the decal only works when a shader with vertex color support is used.
Don't Destroy	Enables or disables the automatic destruction of the decal after a specified time has elapsed.
Lifetime	The lifetime of the decal in seconds.
Fadeout Time	The time used to completely fade-out the decal in seconds.
Fadeout	The curve describing the normalized fade-out over time [0..1].

8.4 Extras



Parameter Name	Description
Show Projection Direction	Shows the direction of the projection in the scene view.
Show Vertices	Shows the vertices of the projected geometry in the scene view.
Show Normals	Shows the vertex normals of the projected geometry in the scene view.
SP Pixel Radius	The radius in pixels used by the Smart Placement system for calculating the decal's orientation. The larger the value, the softer the orientation change.
Save as Assets	Saves the selected decal as an asset. The geometry of the decal gets converted to a mesh. The decal itself does not get modified, only the underlying mesh gets saved. When the **Instantiate after save** option is enabled the asset prefab gets instantiated after it was successfully saved.