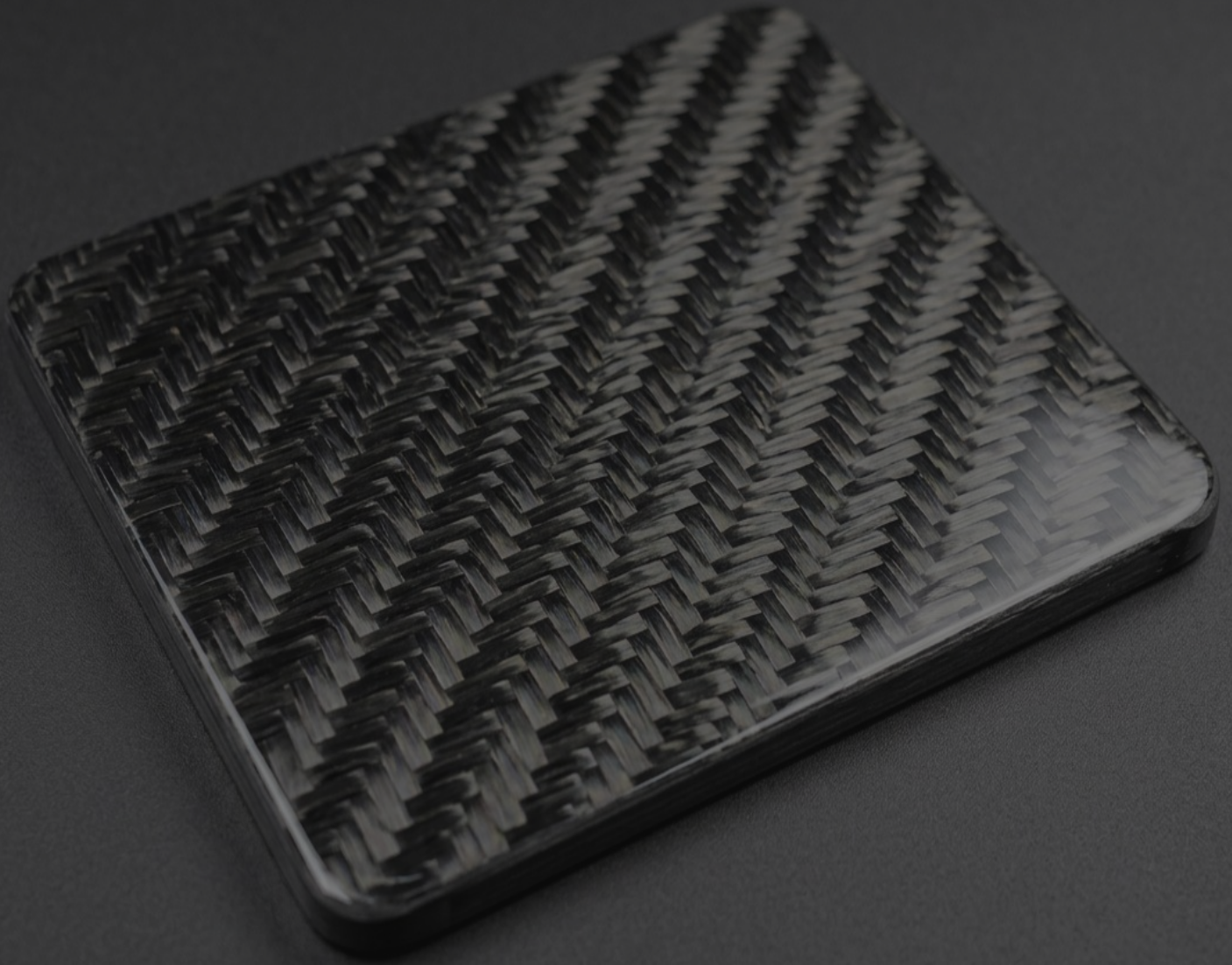




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**HYPER · RENDERING ACCELERATOR**

# Texture & Material Manual

Realistic race-part rendering in Autodesk Fusion and Inventor

Carbon fibre · Forged carbon · Hexagonal carbon · Brushed aluminium · Leather

## CONTENTS

# Contents

|                                              |    |
|----------------------------------------------|----|
| 1 About this manual                          | 3  |
| 2 Understanding the texture maps             | 4  |
| 3 Choosing the right material                | 5  |
| 4 Setting up a material in Autodesk Fusion   | 6  |
| 5 Setting up a material in Autodesk Inventor | 7  |
| 6 Scale, orientation and mapping             | 8  |
| 7 Material reference settings                | 9  |
| 8 Lighting and presenting renders            | 10 |
| 9 Troubleshooting                            | 11 |
| 10 Glossary and support                      | 12 |

## CHAPTER 1

# 1 About this manual

This manual explains how to turn a grey CAD model into a convincing, presentation-ready render using the Hyper texture packs. It is written for designers, engineers and clients who work in Autodesk Fusion or Autodesk Inventor and want parts that look like the real finished article: glossy carbon bonnets, brushed aluminium brackets, leather-wrapped steering rims.

Every material described here is supplied as a free pack of seamless, 2048 × 2048 pixel image maps, together with a setup sheet for each program. The chapters build on one another: read chapters 2 to 4 once, then use chapters 5 to 7 as a reference whenever you set up a new part.

## How to use this manual

- New to texture maps? Start with chapter 2, which explains what each file in a pack does.
- Setting up a material today? Go straight to chapter 4 (Fusion) or chapter 5 (Inventor), then look up the values in chapter 7.
- Preparing images for a client? Chapter 8 covers lighting, camera and output settings.
- Something looks wrong? Chapter 9 lists the common problems and their fixes.

### A note on the numbers

All settings in this manual are tested starting points, not absolute values. Lighting, display settings and the scale of your part all affect the final look. Make a quick test render, compare it with a photo of the real material, and adjust in small steps.

## CHAPTER 2

## 2 Understanding the texture maps

A modern material is described by several greyscale or colour images, each controlling one property of the surface. Programs combine these maps with the lighting in your scene to decide how every pixel should look. This approach is called physically based rendering (PBR). Because each map describes a real physical property, one pack gives consistent results across different programs.

| Map                             | What it controls                                                                        | Used in          |
|---------------------------------|-----------------------------------------------------------------------------------------|------------------|
| Base color                      | The colour of the surface with no lighting or shine baked in.                           | Fusion, Inventor |
| Roughness                       | How blurred reflections are. White is rough and dull, black is mirror-smooth.           | Fusion           |
| Glossiness                      | The inverse of roughness. White is shiny. Inventor's reflectivity reads shiny as white. | Inventor         |
| Normal (GL)                     | Fakes fine surface relief such as fibre tows and grain, without changing the model.     | Fusion           |
| Normal (DX)                     | The same information for DirectX-style programs. Do not use it in Fusion.               | Other renderers  |
| Height                          | Greyscale relief. Used as a bump map, or for true displacement.                         | Inventor, others |
| Metallic                        | White where the surface is bare metal. Only the aluminium pack uses it.                 | Fusion           |
| AO / ORM / Specular / Clearcoat | Extra maps in the full forged carbon set for game engines and advanced renderers.       | Other renderers  |

### Seamless tiling

Every map is seamless: the left edge joins the right edge and the top joins the bottom. The program repeats the image across the part, so a single 2048 px map can cover a whole bonnet. The tile size tells the program how many millimetres of the part one copy of the image covers. Getting it right is the single biggest factor in realism, and chapter 6 is dedicated to it.

## CHAPTER 3

## 3 Choosing the right material

The packs are grouped into five families. Choose the family that matches the real part, then the finish that matches its surface.

### Woven carbon fibre

Plain weave (1x1) is a tight checkerboard used on structural panels. Twill 2x2 is the classic diagonal race-car look for bonnets, wings and mirror caps. Twill 3x3 and 6x6 use wider tows for a bolder pattern on large panels such as floors and diffusers.

### Forged carbon

Chopped fibres pressed in resin give a marbled, directionless pattern. Available in gloss, satin, matte, brushed and brushed gloss. It hides seams well on complex shapes such as intake trumpets and interior trim.

### Hexagonal carbon

Raised hexagon cells with woven fibre inside and dark gaps between them. A distinctive look for accent parts. Available in gloss, satin and matte.

### Brushed aluminium

Bare machined metal with straight satin grain, for brackets, pedals, shift plates and wheel centres.

### Black leather

Pebble-grain leather for steering rims, seats and trim. Pair it with an aluminium or carbon centre for a complete steering wheel.

#### Which finish?

Gloss — lacquered show parts and bodywork. Satin — a soft sheen, common on interior carbon. Matte — raw or sanded parts, and a modern stealth look. Brushed — directional texture that catches light along one axis.

## CHAPTER 4

## 4 Setting up a material in Autodesk Fusion

Fusion renders with a physically based Standard Surface material, which maps directly onto the files in each pack. The steps below create a reusable appearance that you can drag onto any body.

1. Open the Appearance dialog (press A). Under In This Design, right-click any appearance and choose Duplicate. Rename it, for example Twill 2x2 Gloss.
2. Right-click the new appearance and choose Edit, then open the Advanced editor.
3. Base: set Color to Image and choose the pack's basecolor map. Set weight as shown in chapter 7.
4. Specular: set Roughness to Image and choose the roughness map. Leave IOR at 1.5 for carbon and leather.
5. Metalness: 0 for carbon and leather. For aluminium set it to 1, or load the metallic map.
6. Coat: for gloss and satin finishes, enable the coat and set weight and roughness from chapter 7. This is the clear lacquer layer that gives carbon its depth.
7. Geometry → Bump: choose Normal map, load normal\_gl and set the depth.
8. Texture map controls: link all maps together, set the sample size to the tile size, and choose a projection (chapter 6).
9. Drag the appearance onto the body, switch to the Render workspace and check it with in-canvas rendering.

**Tip: keep a material library**

Once a material looks right, right-click it and add it to My Appearances. It will then be available in every design, and you only set it up once.

## CHAPTER 5

## 5 Setting up a material in Autodesk Inventor

Inventor uses a Generic appearance with image slots. It does not read roughness maps directly, so the packs include a glossiness map for its reflectivity slot.

1. Go to Tools → Appearance (or Manage → Appearance Browser). Right-click a Generic appearance in the document and choose Duplicate; rename it.
2. Double-click it to open the Appearance Editor.
3. Generic → Color: choose Image and load the basecolor map.
4. Reflectivity: enable it and load the glossiness map into both Direct and Oblique. For matte finishes lower the values.
5. Bump: enable it, choose Image, load the height map and set the amount to about 0.3 (0.6 for leather).
6. Click the image thumbnail to open the Texture Editor. Set Sample Size to the tile size and lock the aspect ratio.
7. For aluminium, start from a Metal appearance instead of Generic so the reflections take on the metal's colour.
8. Apply the appearance to the part and check it in Realistic visual style, or in Inventor Studio for a final render.

**Tip: shared libraries**

Save finished appearances to a custom appearance library (.adsklib) so the whole team uses identical materials.

## CHAPTER 6

## 6 Scale, orientation and mapping

The pattern must be the same size as it would be on the real part. If it is too large, a bonnet looks like a chessboard. If it is too small, the weave turns into a grey shimmer.

| Material                  | Recommended tile | Real-world reference             |
|---------------------------|------------------|----------------------------------|
| Plain weave 1x1           | 100 mm           | 3k tows, about 5–6 mm per square |
| Twill 2x2                 | 80–100 mm        | 3k tows, classic race-car weave  |
| Twill 3x3                 | 120 mm           | Wider tows, bolder diagonal      |
| Twill 6x6                 | 200 mm           | 12k look for large panels        |
| Forged / hexagonal carbon | 100 mm           | Flakes and cells about 5–15 mm   |
| Brushed aluminium         | 50 mm            | Fine machining grain             |
| Black leather             | 150 mm           | Automotive pebble grain          |

### Orientation

- Run woven carbon along the length of the part: lengthwise on a bonnet, spanwise on a wing.
- For a 45° bias look, rotate the texture by 45° in the mapping controls rather than rotating the part.
- Line brushed aluminium grain up with the part's longest straight edge, as real machining marks would be.

### Projection

- Planar suits flat panels and plates.
- Box suits most bodywork and brackets; it limits stretching on curved parts.
- Cylindrical suits tubes, steering rims and exhaust tips.
- If the weave stretches on a tight curve, split the body into faces and map each face separately.

## CHAPTER 7

## 7 Material reference settings

Starting values for the Fusion Standard Surface material. Inventor users should apply the same tile sizes and use the bump amounts given in chapter 5.

| Pack                                | Metal     | Roughness  | Coat            | Normal | Tile      |
|-------------------------------------|-----------|------------|-----------------|--------|-----------|
| Forged carbon – Gloss               | 0         | 0.18 (map) | 1.0, rough 0.03 | 0.2    | 100 mm    |
| Forged carbon – Satin               | 0         | 0.45 (map) | 0.5             | 0.2    | 100 mm    |
| Forged carbon – Matte               | 0         | 0.75 (map) | none            | 0.2    | 100 mm    |
| Forged carbon – Brushed             | 0         | map        | none            | 0.2    | 100 mm    |
| Forged carbon – Brushed gloss       | 0         | map        | 1.0             | 0.2    | 100 mm    |
| Hexagonal carbon – Gloss            | 0         | 0.18 (map) | 1.0             | 0.25   | 100 mm    |
| Hexagonal carbon – Satin            | 0         | 0.45 (map) | 0.5             | 0.25   | 100 mm    |
| Hexagonal carbon – Matte            | 0         | 0.75 (map) | none            | 0.25   | 100 mm    |
| Plain weave 1x1 – Gloss             | 0         | map        | 1.0, rough 0.03 | 0.25   | 100 mm    |
| Twill 2x2 – Gloss                   | 0         | map        | 1.0, rough 0.03 | 0.2    | 80–100 mm |
| Twill 3x3 – Gloss                   | 0         | map        | 1.0, rough 0.03 | 0.2    | 120 mm    |
| Twill 6x6 – Gloss                   | 0         | map        | 1.0, rough 0.03 | 0.2    | 200 mm    |
| Brushed aluminium                   | 1.0 (map) | 0.3 (map)  | none            | 0.1    | 50 mm     |
| Black leather (base 0.85, spec 0.4) | 0         | 0.6 (map)  | none            | 0.6    | 150 mm    |

### Material notes

- Carbon: real carbon is almost black. Keep the base colour dark; the depth and shine come from the coat.
- Aluminium: without metalness at 1 it will look like grey plastic.
- Leather: never add a coat; the sheen comes from the roughness map alone.

## CHAPTER 8

## 8 Lighting and presenting renders

A good material only looks good under good light. For client work, aim for clean, consistent studio images.

### Environment

- In Fusion, use a studio environment such as Photo Booth or Plaza and turn the background to a solid dark colour or gradient.
- Gloss carbon needs large, bright reflections to show its depth; rotate the environment until a highlight runs along the part.
- In Inventor Studio, use a three-point setup: a large soft key light, a dimmer fill, and a rim light behind the part.

### Camera and output

- Use a longer focal length (60–90 mm) to avoid distortion on close-ups.
- Render at least 1920 × 1080 px for screens, and 3000 px or more on the long edge for print.
- Use the highest quality setting for final images; low settings leave grain in dark carbon.
- Keep the same camera angle and lighting across a set of parts so they read as one product family.

#### Before you send images to a client

Check the weave scale against a known dimension, confirm the weave direction matches the real layup, and view the image on a second screen to catch colour or brightness problems.

## CHAPTER 9

## 9 Troubleshooting

| Problem                                    | Likely cause                                  | Fix                                              |
|--------------------------------------------|-----------------------------------------------|--------------------------------------------------|
| Weave looks inside-out or lit from below   | normal_dx loaded in Fusion                    | Load normal_gl instead.                          |
| Shiny areas look dull and dull areas shiny | Glossiness loaded where roughness is expected | Use roughness in Fusion, glossiness in Inventor. |
| Pattern looks like a chessboard            | Tile size too large                           | Halve the tile size.                             |
| Grey shimmer instead of weave              | Tile size too small                           | Double the tile size.                            |
| Pattern stretched on curves                | Planar projection on a curved face            | Switch to Box or Cylindrical projection.         |
| Visible seams or lines                     | Map cropped or edited                         | Use the original, uncropped map.                 |
| Carbon looks grey or washed out            | Base colour weight too high or no coat        | Lower the base weight; enable the coat.          |
| Aluminium looks like plastic               | Metalness left at 0                           | Set metalness to 1 or load the metallic map.     |
| Blurry close-ups                           | Tile larger than about 300 mm                 | Reduce the tile size for close camera shots.     |
| Surface looks like fabric                  | Normal or bump depth too high                 | Reduce depth in steps of 0.05.                   |

## CHAPTER 10

# 10 Glossary and support

| Term       | Meaning                                                                         |
|------------|---------------------------------------------------------------------------------|
| Appearance | Fusion and Inventor's name for a material's visual settings.                    |
| Clear coat | A transparent lacquer layer over the base material.                             |
| IOR        | Index of refraction; controls reflection strength. 1.5 suits resin and lacquer. |
| PBR        | Physically based rendering, a method that models real light behaviour.          |
| Projection | How a flat image is wrapped onto a 3D surface.                                  |
| Seamless   | An image whose edges join invisibly when repeated.                              |
| Tile size  | The real-world size one copy of the map covers on the part.                     |
| Tow        | A bundle of carbon filaments; 3k means 3,000 filaments.                         |

## Downloads and support

All packs, their setup sheets and live previews are available free at [hyper-render-accel.lovable.app/packs](https://hyper-render-accel.lovable.app/packs). You can try other colours in the Variant Lab and preview parts in the Model builder.

Have a question, or want a render of your own part? Contact us at [hyper-render-accel.lovable.app/contact](https://hyper-render-accel.lovable.app/contact).