

Bit Depth

Customers commonly ask what is 'Bit Depth' and why should they use it. This White Paper will help to answer this question and explain the importance and principles behind it.

What is Bit Depth?

Bit depth is the range of colour for each primary colour channel in a rendered image.

The colour channels are Red, Green and Blue, often referred to as 'RGB'. The larger the number/bit depth the more colour variations you will have. Often the higher the number, the smoother the colours will appear if there are any gradients.

What does 'Bits' mean?

'Bits' relates to the number of ways a colour can be described.

The bit number is the 'power number' which describes the potential combinations for the user. For Example, if we have an 8-bit file (commonly used in JPGs) then we have a power of 8, frequently wrote as 2^8 . A 16-bit file, (generally used in PNGs/TGAs) would have a power of 16, or 2^{16} . And so on.

By then doing the maths we have the resultant colour range, or levels per RGB channel.

- 8bit = 2^8 = **256** colour levels
- 12bit = 2^{12} = **4096** colour levels
- 16bit (half float) = 2^{16} = **65536** colour levels
- 32bit (full float) = 2^{32} = **4294967296** colour levels

NOTE: I would not recommend going above 16-bit (half float) per channel for most tasks. This is common practice in the film industry, and is a misconception with many new users that they must save to 32 bits files. 16 bits will do just fine and ensure better performance on common tasks in 'Post'.

Which File format?

I would recommend using the OpenEXR file format. This will offer the most flexibility when using the enhanced colour range. This is of particular benefit when using it in conjunction with 3ds Max Composite. The default settings will be set up with the above workflow and considerations in mind, but with the added benefit of embedded 'render elements' for a more streamlined compositing pipeline.



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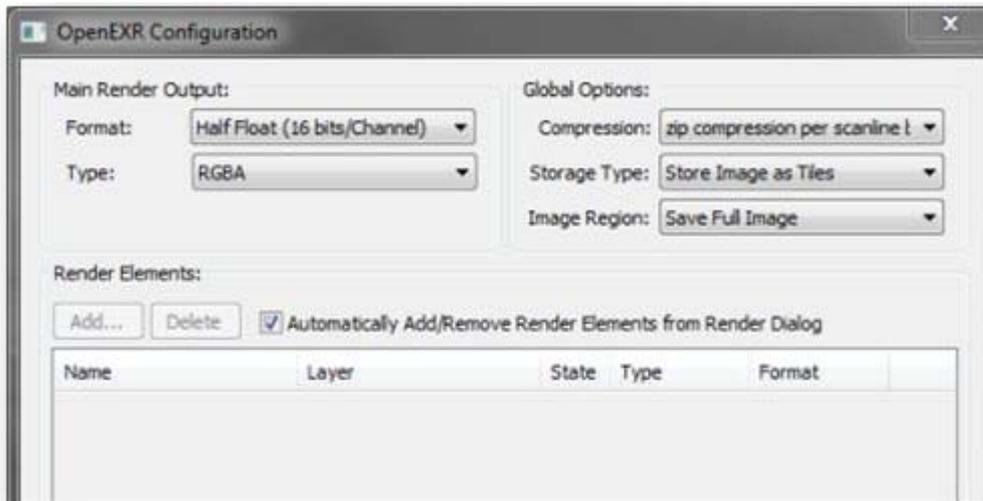


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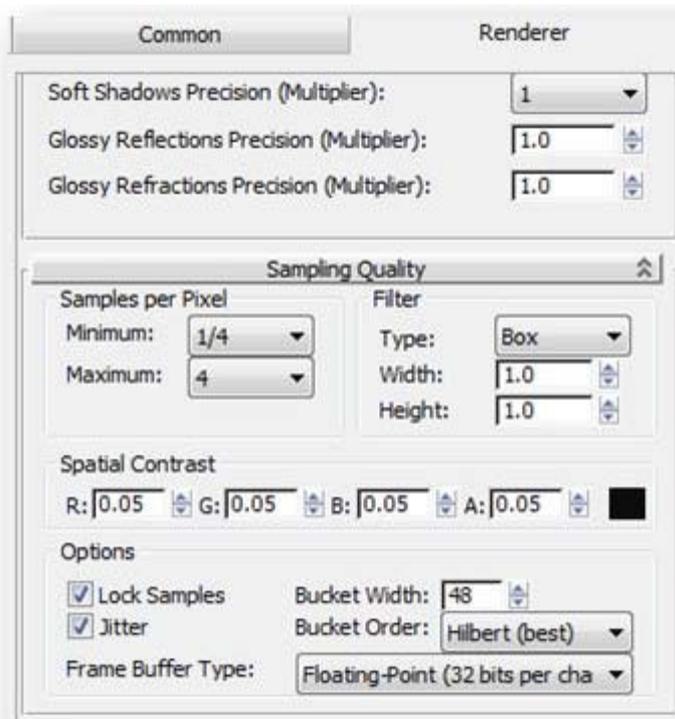
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In 3ds Max/Design the mental ray render window (Virtual Frame Buffer) is set to 32 bits per channel by default. (Render Menu>Render Setup>Renderer Tab>Sampling Quality>Frame Buffer Type)



Happy Max'ing

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