Focus RENDERING

The rendering creation process is an operation that requires a certain amount of time and depend on the PC hardware capability, the software and the final resolution to be obtained. Of course taking in account the scene and the 3d model complexity to be rendered.

Keeping fixed the PC/software/3d Model configuration what can be changed freely is the render Image resolution. The resolution, which is actually the expression of the quality level of the image, is one of the reason why the elaboration process can take very long time or even can crash software and/or the hardware (due to the memory overflow).

Resolution on printed paper represent the density of dots that create the image, referred to a linear measurement (for example dot/cm or dot/inch).
A screen (tv, tablet, smartphone etc) instead can't display line or drawing but only dots. When dots are reasonably small and close (smaller and closer than the eye capacity of distinguee the separation between two points) the observer get the impression of seeing lines or drawings in place of points.

Resolution is usually expressed in DPI (Dots Per Inch), PPI (Pixels Per Inch) or L/mm (lines per millimetre). 280 DPI are equal to 11 L/mm and represents the average accuracy of the human binocular aye capacity at 25cm distance.

That's why a 15x10 cm rendering format observed from a reading distance (25cm) should be printed at 280DPI resolution. The same rendering observed from 75cm distance should be enlarged 3 times and the resolution reduced by 3 (45x30 and 96DPI). If the distance become 250cm, the image can be enlarged x10 and the resolution reduced at 28DPI.

As the eye can't see more than 11 L/mm, augmenting the distance from the image we can enlarge the image format and considerably reduce the printing resolution. That's means also a reduction of the waiting time for the rendering process and less crash risks.

How do we set the correct resolution value avoiding all the related issues without losing quality? The first step is defining the objective of the rendering, if it will be printed or shown on monitors.

after dealing whit the rendering objectives, we need to choose the final dimension to be obtained (best practice is to decide previously the dimensions because when redimensioning a render already complete, this tend to loose quality).

Here are a series of tables that shows the suggested parameters for printing or monitor-displaying options.

Printing for paper and plotter

format	Dimension [mm]	DPI	Dimension [Pixel]
A4	297x210	350	4092x2893
A3	420x297	250	4092x2893
A2	594x297	200	4092x2893
A1	841x594	150	4967x3508
A0	1188x841	100	4092x2896
Poster 300x200 cm	3000x2000	50	5906x3937
Poster 400x300 cm	4000x3000	40	6299x4724
Poster 600x300 cm	6000x3000	30	7087x3543

Printing for traditional photo format

Format	Dimension [mm]	DPI	Dimension [Pixel]
Photo 9x13 cm	85x127	300	1500x1004
photo 10x15 cm	101x152	300	1795x1193
photo 13x18 cm	127x178	300	2102x1500
photo 15x21 cm	152x216	300	2551x1795
photo 20x30 cm	203x305	300	3602x2398
Poster 30x45 cm	305x457	200	5398x3602
Poster 40x60 cm	405x609	200	7193x4783
Poster 50x76 cm	508x762	200	9000x6000
Poster 76x115 cm	762x1143	200	13500x9000

Printing for digital photo format

Format	Dimension [mm]	DPI	Dimension [Pixel]
photo 10x13 cm	95x127	300	1500x1122
photo 11x15 cm	114x152	300	1795x1346
photo 13x17 cm	127x169	300	1996x1500
photo 15x20 cm	152x203	300	2398x1795
photo 20x27 cm	203x270	300	3189x2398
Poster 30x40 cm	305x406	200	4795x3602
Poster 40x55 cm	405x540	200	6378x4783
Poster 50x67 cm	508x677	200	7996x6000
Poster 76x100 cm	762x1016	200	12000x9000

Rendering for digital visualization on monitors

format		DPI	Dimension [Pixel]
640x480 px	VGA (4/3)	96	640x480
800x600 px	SVGA (4/3)	96	800x600
1024x768 px	XVGA (4/3)	96	1024x768
1280x720 px	HD 720p (16/9)	96	1280x720
1920x1080 px	Full HD (16/9)	96	1920x1080
3840x2160 px	Ultra HD 4K (16/9)	96	3840x2160
7680x4320 px	Ultra HD 8K (16/9)	96	7680x4320