

KRAY TRACING

RENDER ENGINE

GUIDE FOR BEGINNERS

TRACING

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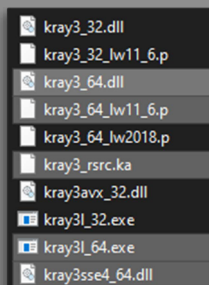
INSTALLATION

THERE IS NOT READY YET INSTALLATION FOR KRAY SO THIS PROCEDURE MUST BE DONE MANUALLY.
PROCEDURES FOR X64 BIT SYSTEM.

- 1.CREATE FOLDER CALLED: **K3** (CAN BY ANY NAME ALSO) IN LIGHTWAVE PLUGIN FOLDER
- 2.COPY ALL FILES FROM COMMON FOLDER OF K3 PACKAGE TO THE K3 FOLDER IN LIGHTWAVE

3.COPY SPECIFIC FILES FROM WINDOWS FOLDER OF K3 PACKAGE:

- IF YOU HAVE LIGHTWAVE 2015 OR OLDER USE SELECTED FILES:



- IF YOU HAVE LIGHTWAVE 2018 OR NEWER (ALSO 2019), INSTEAD **KRAY3_64_LW11_6.P** COPY **KRAY3_64_LW2018_6.P**

4.DOWNLOAD INTEL®OPEN IMAGE DENOISE FROM THE LINK(SELECT YOUR SYSTEM BEFORE):

<https://openimagedenoise.github.io/downloads.html>

5.WE NEED ONLY 3 FILES FROM THIS PACKAGE:

- **OPENIMAGEDENOISE.DLL**
- **TBB.DLL**
- **TBBMALLOC.DLL**

6.COPY**OPENIMAGEDENOISE.DLL** TO THE**K3** FOLDER

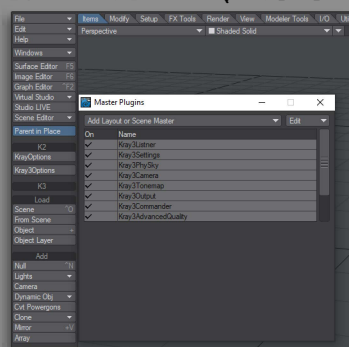
7.COPY**TBB.DLL** AND **TBBMALLOC.DLL** TO **..\NewTek\LightWave 2015.3\BIN** FOLDER

(BEFORE YOU CAN MAKE COPY OF THOSE FILES) YOU WILL BE ASKED TO REPLACE THEM.

8.**OPEN**LAYOUT AND USE **ADDPLUGINS** AND SELECT ALL FILES FROM **K3** FOLDER (SOME OF THEM ARE NOT PLUGINS BUT, NO WORRY ABOUT IT).

9.ACCESS TO KRAY CAN BE DONE IN MANY WAYS FOR EXAMPLE:

- BY PRESSING **CTRL+Q** AND ADDING **KRAY3SETTINGS**

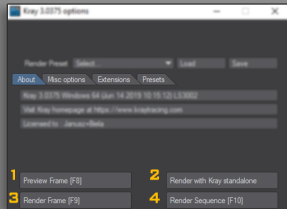


- BY MAKING BUTTON IN LW GUI INTERFACE
- BY GOING TO ADDITIONAL TAB IN LAYOUT AND SELECT **KRAY3CMDSETTINGS** (YOU NEED ONLY THIS BUTTON)



THERE IS NOT YET READY DESTINATION DESIGN LAYER OF GUI. THIS IS STRONGLY CONNECTED WITH FAST DEVELOPING AND UPDATING K3...THAT'S WHY WE KEEP STILL OLD GUI FROM K2. WHEN K3 WILL GET STABLE FEATURES UPDATES WE WILL MAKE IT SIMPLER FOR USERS. RIGHT NOW, IS NECESSARY TO KEEP STILL OL D GUI AS IT IS. WE WILL MARK ONLY THE MOST IMPORTANT OPTIONS WHICH YOU SHOULD KEEP AS THEY ARE, WITH SOME EXCEPTIONS. OPTIONS WHICH ARE BLURRED ARE NOT IMPORTANT FOR USER AND PLEASE DO NOT TOUCH THEM.

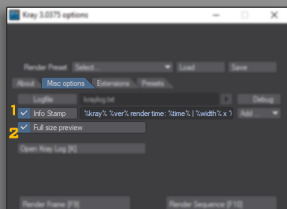
ABOUT



- 1.BUTTON TO START K3VPR (REAL TIME VIEWER) DO NOT USE, ITS DEVELOPMENT IS ON HOLD, BUT SOON WE WILL CONTINUE IT.
- 2.BUTTON WHICH START KRAY STANDALONE AND ALLOW USER RENDER SCENE WITHOUT LIGHTWAVE - DO NOT USE, ITS DEVELOPMENT IS ON HOLD, BUT SOON WE WILL CONTINUE IT.
- 3.RENDER STILL FRAME.
- 4.5.RENDER ANIMATION (ITS DEVELOPMENT IS ON HOLD, BUT SOON WE WILL CONTINUE IT.

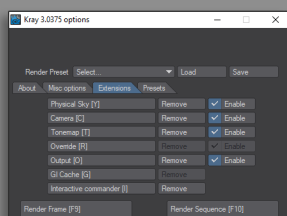
ANIMATION HAS HIS OWN PROCEDURES WHICH NEED TO BE EXPLAIN - NOT IN THIS DOCUMENT.

MISC OPTIONS

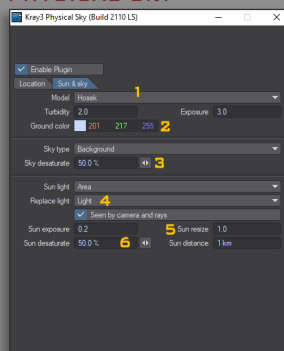


- 1.YOU CAN ADD INFO STAMP TO THE RENDER.
- 2.YOU CAN RENDER WITH FULL RESOLUTION 1:1 PIXEL (NOT SUGGESTING WHEN YOU RENDER FULL HD+ RESOLUTION).
DISABLING THIS OPTION FORCE KRAY USE SMALL PREVIEW WINDOW WHEN USING HIRES RESOLUTION

EXTENSIONS



PHYSICAL SKY



- 1.PLEASE USE ALWAYS **HOSEK PHYSICAL SYSTEM** (THE NEWEST IMPLEMENTATION OF PHYSICAL LIGHT).
- 2.YOU CAN "INJECT" COLOR TO THE BACKGROUND, AND IT IS A GOOD IDEA TO ADD BLUE COLOR THERE
- 3.YOU CAN DESATURATE PHYSICAL BACKGROUND: GOOD VALUES ARE 50% OR 100% WHEN YOU LIKE TO USE STUDIO LIGHT SYSTEM,
- 4.REPLACE LIGHT ALLOWS USER TO CONTROL SUN POSITION FROM LW LAYOUT - SIMPLY CHOOSE LIGHT FROM LAYOUT. THIS LIGHT AUTOMATICALLY WILL BE OFF FROM RENDER AND REPLACED BY K3 SUN.
- 5.SIZE OF BLUR/SHARP SHADOWS. THE MORE YOU INCREASE SOFT SHADOWS THE LESS YOU MUST PUT SUN EXPOSURE (WE WILL ADD AUTO MODE IN FUTURE).
- 6.DESATURATE SUN COLOR: GOOD VALUE IS 50% FOR STUDIO RENDER YOU CAN USE 100%.

WE RECOMMENDED TO USE PHYSICAL SKY INSTEAD OF HDRI FOR INTERIORS RENDERS AS OUTSIDE LIGHT SOURCE). HDRI MAYBE CAN GIVES YOU NICE STRONG REFLECTIONS IN REFLECTED SURFACES (IT COMES FROM HIGH VALUES OF PIXEL THAN LDR) BUT AS A LIGHT SOURCE HDRI IS A BAD CHOICE. HDRI PRODUCE A LOT OF BAD PHOTONS AND BAD COLOR GRADIENTS WHICH CAUSES BAD PHOTON MAP SOLUTION. BAD PHOTON MAP SOLUTION CAUSE BAD GI, BAD GI SAMPLING (QMC IN OUR CASE) ERRORS, LIGHTS LEAKS, HOT PHOTONS, ETC.

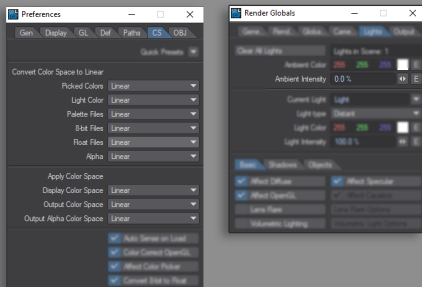
IF YOU WANT TO USE HDRI (EXTERIOR/INTERIOR), DO NOT USE LW BACKGROUND SYSTEM! SIMPLY CREATE SPHERICAL OBJECT AND MAP HDRI ON IT + ADD LUMINOSITY ON THIS OBJECT.



1. TYPE OF CAMERA (NORMAL, PANDRAMA, STEREO PANDRAMA, ETC)
2. PIXEL ORDER RANDOM IS SUGGESTED BY US AS STANDARD RENDER CALCULATION. YOU CAN USE OTHER SYSTEMS. THERE IS NOT SO MUCH DIFFERENCE IN SPEED BETWEEN THEM EXCEPT THAT RANDOM PIXEL ORDER IS THE MOST ACCURATE (MORE AVERAGE SYSTEM).

TONEMAP

BEFORE RENDER BE SURE THAT LIGHTWAVE TONE MAP SYSTEM IS LINEAR. YOU CAN CHECK THIS BY PRESSING D IN LAYOUT AND SELECT CS TAB. LINEAR MEANS OFF – LIGHTWAVE WILL NOT INTERFERE K3 TONE MAP SYSTEM. LUCKY LW TONE MAP SYSTEM AT THE DEFAULT START HAS LINEAR TONEMAP SETTING BUT THERE CAN BE THE SITUATION THAT USER OPENS SCENE USED BEFORE IN NATIVE LW ENGINE RENDER AND THERE CAN BE SELECTED SRGB OR ANOTHER. ALSO BE SURE AMBIENT MODE IN LIGHTWAVE HAS ZERO VALUE.... THIS IS COMMON WHEN USERS FORGET TO DISABLE IT DURING CREATION OF A SCENE FROM SCRATCH. LEAVING IT OVER ZERO CAUSES YOUR ENTIRE SURFACE TO BE LUMINOUS WHICH WILL RUIN GLOBAL ILLUMINATION.

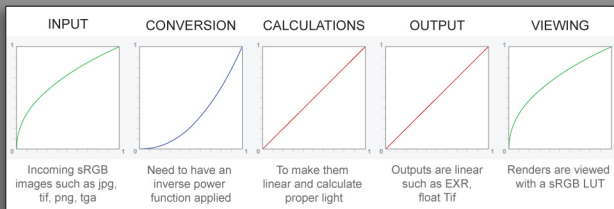


PLEASE AVOID MIXING LW TONEMAP WITH K3 TONEMAP ...EVEN IF EFFECT OF THAT IN RENDER LOOKS GOOD. USE ONLY K3 TONEMAP SYSTEM.

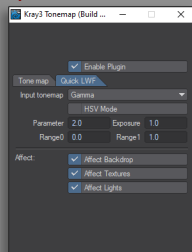
K3 TONEMAP SYSTEM CONTAIN TWO SUB SYSTEMS:

- LWF (LINEAR WORKFLOW)
- BLENDING

LWF PREPARE TEXTURES OR COLORS (INCLUDE LIGHT COLOR) - **CONVERSION** - BEFORE RENDER STARTS.

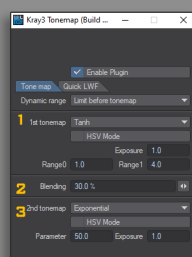


QUICK LWF



KEEP ALWAYS AS IT IS. BEST VALUES FOR PARAMETER ARE BETWEEN 1.8-2.0. DO NOT CHANGE ANYTHING THERE AND KEEP IT AS DEFAULT ALWAYS. IF YOUR RENDER LOOK TOO DARK (COLORS ARE STRONG OR TOO BIG CONTRAST) YOU CAN REDUCE PARAMETER TO 1.4 – 1.6 BUT WE SUGGEST KEEP ALWAYS 1.8-2.0.

BLENDING



BLENDING IS THE MAIN TONEMAP SYSTEM WHICH ALLOW MIX TWO DIFFERENT TONEMAPS. DO NOT EXIST PERFECT TONEMAP THAT'S WHY IS GOOD IDEA TO MIX THEM AND TAKE FROM EACH ONE WHAT IS THE BEST.

1. 1ST TONEMAP TANH IS VERY NEW TONEMP WHICH ALLOW CONTROL DARK AND VERY BRIGHT REGIONS OF RENDER (CLIPPING). WE SUGGEST KEEP THIS OPTION FROM THE SCREEN.
 2. BLENDING IS PERCENT TRANSMISSION BETWEEN TWO TONEMAPAS. IN THIS CASE 70% OF TANH AND 30% OF EXPONENTIAL.
 3. 2ND TONEMAP EXPONENTIAL.
- TRY KEEP THIS OPTION AS DEFAULT BUT OF COURSE YOU CAN EXPERIMENT WITH YOUR OWN SETTINGS.

IF YOU WANT TO SEE HOW TANH WORKS, GO TO THIS LINK:

<https://www.desmos.com/calculator/qanvydl29q>

WHEN 0,0 IS BLACK (IN K3 RANGE 0) AND 1,1 IS WHITE (IN K3 RANGE 1) ON THE LEFT TOP SIDE, YOU CAN CONTROL BOTH (I₀ AND I₁)

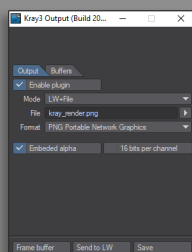
OUR IMAGE IS REPRESENTED BY SPACE BETWEEN 0,0 AND 1,1 COORDINATES. THIS WHAT IS UNDER 0 VALUE IS BLACK NEGATIVE (FOR US: BLACK) AND THIS WHAT IS OVER 1 VALUE IS OVER BRIGHT (FOR US: WHITE).

TANH OPERATE ON INTERNAL K3 BUFFER (HDR) SO THIS IS NOT LIKE COMMON PHOTOSHOP CURVE.

YOU CAN PLAY WITH TONEMAP IN REAL TIME WHEN RENDER IS FINISH (DO NOT CLOSE RENDER K3 WINDOW) AND SIMPLE OPEN TONEMAP OPTIONS TO CHANGE VALUES.

LWF IS NOT WORKING IN REAL TIME – THIS IS IMPOSSIBLE BECAUSE LWF IS PREPROCESSING SYSTEM.

OUTPUT

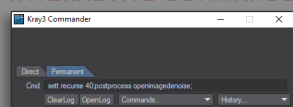


MODE: SUGGESTED TO USE LW+FILE – IT WILL OPEN LW AFTER RENDER WINDOW AND KEEPS K3 RENDER WINDOW IN THE SAME TIME. THIS OPTION ALLOW YOU ALSO USE REAL TIME TONE MAPPING WHEN K3 WINDOW RENDER IS OPEN.

IF YOU CLOSE K3 RENDER WINDOW YOU CAN CALL BACK IT BY PRESSING FRAME BUFFER BUTTON (K3 HOLDS ALL DATA IN MEMORY).

SEND TO LW SENDS ACTUAL RENDER BUFFER TO THE LW WINDOW POST PREVIEW WHICH WILL ALLOW USER SAVE IMAGE IN OTHER FORMATS (IF NEEDED OR FORGOT USE PATH IN KRAY TO SAVE FILE).

INTERACTIVE COMMANDER (CMD)



CMD ALLOWS USER TO ADD EXTRA COMMANDS TO ACTIVATE SPECIAL FUNCTIONS WHICH ARE NOT YET IN GUI OR ARE DEVELOP FOR TESTING PURPOSES OR ACTIVATE SPECIAL OPTION WHICH DOESN'T NEED TO BE IN GUI.

IN THIS CASE PLEASE KEEP ONLY TWO EXTRA COMMAND WHICH ARE NOT AVAILABLE YET IN GUI: AMOUNT OF BOUNCE LIGHTS AND DENOISER ACTIVATOR.

IN THIS VERY MOMENT WE SUGGEST KEEPING TWO COMMANDS IN COMMANDER:

set recurse 40;postprocess openimagedenoise;

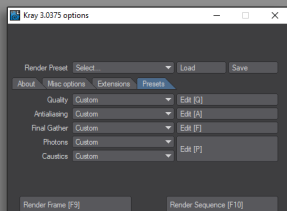
SETT RECURSE 40; AMOUNT OF BOUNCE LIGHTS

POSTPROCESS OPENIMAGEDENOISE; DENOISER ACTIVATOR

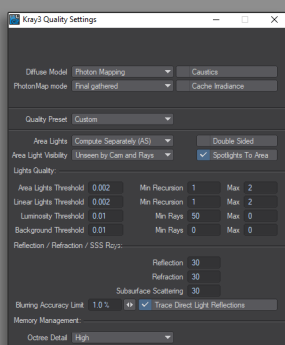
MORE COMMANDS THERE:

http://www.kraytracing.com/pub/docs/kray3_commands.html

PRESETS



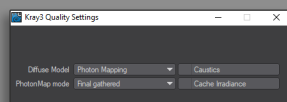
QUALITY



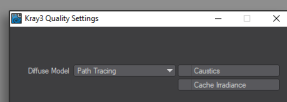
KEEP ALWAYS AS IT IS ON THE SCREEN. THIS WINDOW IN FUTURE WILL BE NOT AVAILABLE.

WE SUGGEST USING RIGHT NOW TWO SYSTEMS OF RENDERING:

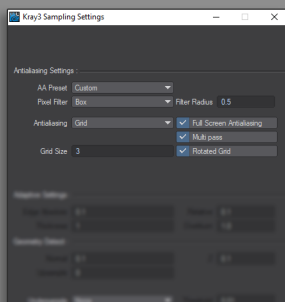
1. PHOTON MAPPING + QMC (BRUTE FORCE) SAMPLING FOR INTERIORS.



2. PATH TRACING FOR EXTERIORS

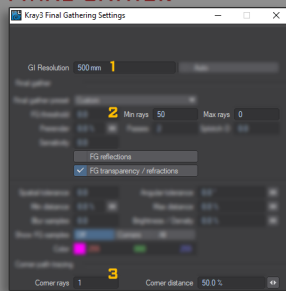


ANTIALIASING



KEEP ALWAYS AS IT IS ON THE SCREEN. THESE SETTINGS ARE NECESSARY FOR DENOISER ENGINE TO WORK PROPERLY.

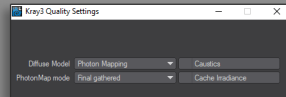
FINAL GATHER



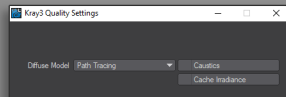
KEEP ALWAYS AS IT IS ON THE SCREEN. THIS WINDOW IN FUTURE WILL BE NOT AVAILABLE.

1. GI RESOLUTION IS DISTANCE BETWEEN PHOTONS. 500 MM IS BEST DISTANCE FOR INTERIORS AND GIVES BEST RESULTS.
2. MIN RAYS IS ONLY FUNCTION WHICH CONTROL QUALITY OF RENDER (IN THIS CASE: NOISE LEVEL SO ALSO SPEED OF RENDER). CONSIDER THAT RAISING UP MIN RAYS VALUE YOU REDUCE NOISE BUT ALSO INCREASE TIME LENGTH OF RENDER. BECAUSE WE USE NOW DENOISER IS NOT NECESSARILY GO HIGHER THAN 50 RAYS.
3. CORNER RAYS/DISTANCE IS PATH TRACING TOOL FOR CORRECTION. NO NEED TWEAK IT.

WHEN PM+QMC IS ACTIVATED WORKS ONLY OPTIONS 1,2,3



WHEN PATH TRACING IS ACTIVATED WORKS ONLY OPTION 2



HERE ARE SMALL HINTS HOW TO DEAL WITH RESOLUTIONS AND DENOISER:

MORE RAYS – LESS NOISE

100 RAYS IS TWICE LONGER TO RENDER THAN 50 RAYS.

HIGHER RESOLUTION – LESS RAYS NEED TO BE SET AND FASTER RENDER WE GET.

4K RENDER CAN BE ONLY TWICE LONGER RENDER THAN 1080P (INSTEAD LOGICALLY 4 TIMES)

THE HIGHER RESOLUTION THE LESS RAYS NEED KRAY ALSO BETTER WORKS DENOISER.

DENOISER IN LOW RESOLUTION CAN PRODUCE ARTEFACTS BECAUSE LEVELS OF DETAILS ARE VERY LOW TO BE RECOGNIZABLE BY DEEP LEARNING DENOISER.

DEDICATED SETTINGS:

FAST PREVIEW 720P/1080P – 20 RAYS + FSAA G2 (FULL SCREEN ANTI-ALIASING GRID 2)

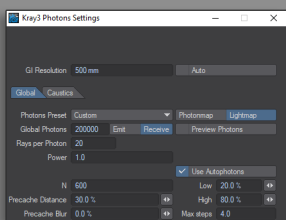
QUALITY RENDER 720P/1080 – 50 RAYS + FSAA G4

QUALITY RENDER 4K – 50 RAYS + FSAA G2

FAST RENDER 4K – 20 RAYS + FSAA G2

PANORAMA 10000/5000 PIX – 10-30 RAYS + FSAA G2

PHOTONS



KEEP ALWAYS AS IT IS ON THE SCREEN. THIS WINDOW IN FUTURE WILL BE NOT AVAILABLE.

WHEN PATH TRACING IS ACTIVATED THIS OPTION DOESN'T WORK.