



**Color Science i<sup>2</sup>e image enhancement and ICC  
profiling software for the digital print workflow**

# **Reference Manual Version 2.1**

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# Table of Contents

<b>Introduction.....</b>	<b>1</b>
Two main problems in the production of digital prints today .....	1
Q-Enhancer digital image batch processing software.....	1
Q-Print automated printer ICC profiling and monitoring.....	2
Digital print workflow with image enhancement and printer profiling .....	2
<b>Software Requirements.....</b>	<b>3</b>
<b>Installation of Q-Enhancer .....</b>	<b>3</b>
<b>Language Setup.....</b>	<b>4</b>
<b>Operation Modes .....</b>	<b>4</b>
Two Folder Operation Mode.....	4
Single Folder Operation Mode .....	5
<b>The Master Channel .....</b>	<b>6</b>
<b>Setting a New Image Processing Channel .....</b>	<b>6</b>
<b>Making Temporary Changes for One Channel.....</b>	<b>11</b>

## Introduction

Q-Enhancer is a fully automatic solution for image enhancement and printer profiling built for high volume digital production environments. The Q-Enhancer system creates standardized quality digital prints independent of the printer type. Q-Enhancer helps to fully control the digital production process without any doubts about the quality of the output.

### Two main problems in the production of digital prints today

**1<sup>st</sup> Problem:** It is difficult to control the **image quality on different digital printers** in the lab so that contrast, density and saturation are always the same. Even if the printer is linearized using the gray scale, there are big differences from one printer to another. A linearized grayscale will not produce uniform color prints.

➔ **The Q-Enhancer solution:**

Every printer is ICC profiled. ICC profiling makes sure that the print quality for each different printer matches one (industry) standard. Carefully profiled printers will open the door to professional print markets.

**2<sup>nd</sup> Problem:** It is not possible for the lab to print the same customer image on different digital printers with the same result because every printer uses a **different image enhancement system**.

➔ **The Q-Enhancer solution:**

The i2e image enhancement application is put in front of the printers. This way the image enhancement is the same for every printer. The image enhancement of the digital printers is switched off.

### Q-Enhancer digital image batch processing software

For production, install the Q-Enhancer software in front of the printers. Q-Enhancer lets you define print channels using hot-folders. This way you can automatically route folders with image orders including order information to the right printer. Q-Enhancer will automatically convert the images using a generic, e.g., sRGB for digital camera images, or an attached input profile and a printer specific output profile.

For professional work, i<sup>2</sup>e image enhancement can be turned off. This way the professional photographer gets exactly the result he would get on his profiled proofing printer.

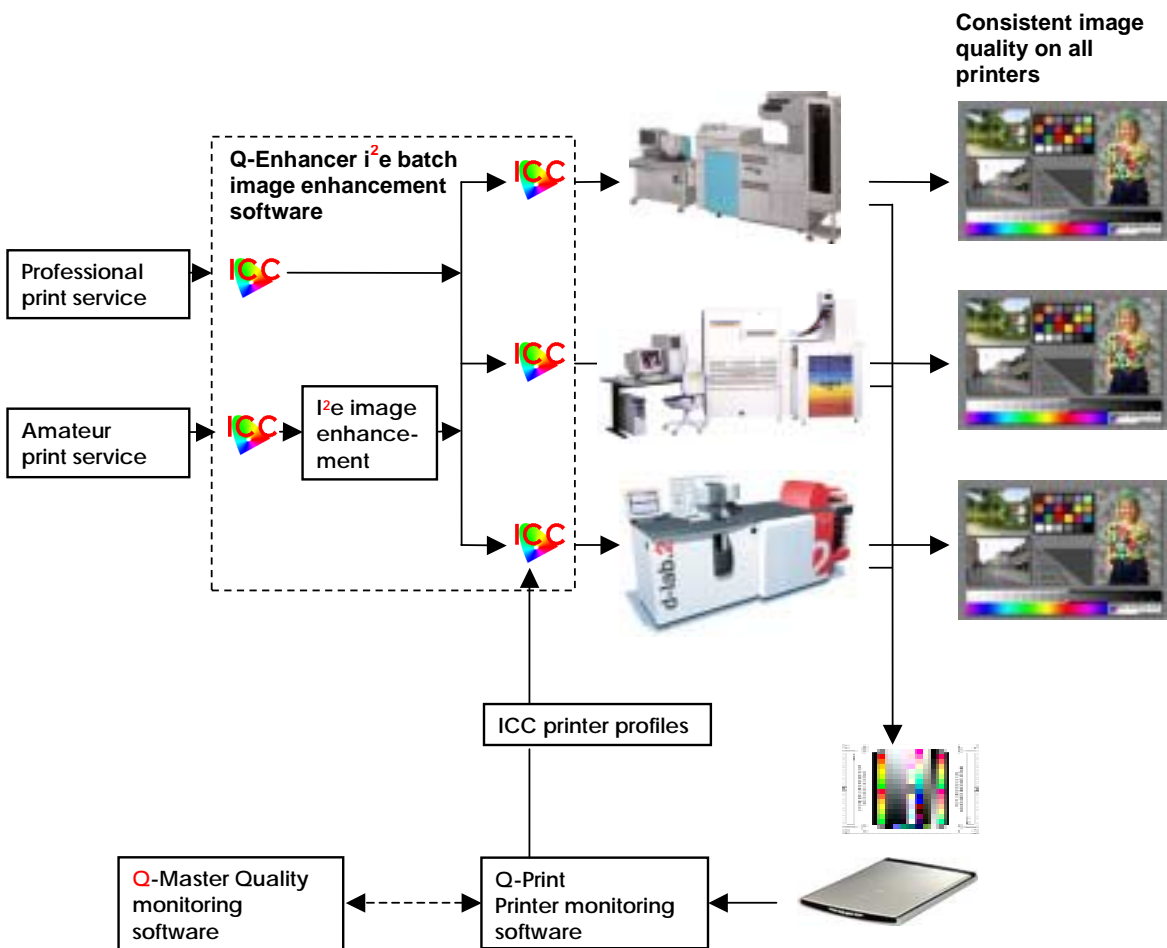
For amateur work, i<sup>2</sup>e image enhancement is turned on in the amateur print channels. Using the Master Balance, Q-Enhancer lets you adjust a general color balance, contrast, and saturation setting according to the lab's preferences. Q-Enhancer is fully automatic and needs no further attention.

## Q-Print automated printer ICC profiling and monitoring

When setting up an image enhancement system with Q-Enhancer, use Q-Print for fully automatic printer profiling. With other software, e.g. Gretag Macbeth Profile Maker, you cannot generate and validate profiles automatically, and any manual operations can introduce errors. With Q-Print, the operator prints a 4 x 6 inch color test pattern on each printer. These prints are scanned on a flatbed scanner or by using a color spectrometer. Q-Print will automatically update the profiles used by Q-Enhancer for every printer. Each new profile is checked against historical data for errors. This allows you to be 100% sure that the profile you have produced is ready for production. Q-Print also monitors the printer and warns you if any detected color deviations exceed a certain limit.

## Digital print workflow with image enhancement and printer profiling

The following diagram shows you the general setup of the system with two different printing channels. One channel is for amateur work and uses  $i^2e$  image enhancement. The other channel is for professional work.



Digital Print Workflow

## Software Requirements

Q-Enhancer requires:

- Windows 98, 2000 or XP operating systems
- 256Mb memory.

Q-Enhancer will not run on NT4. NT4 does not support ICC profiling. The server version of Q-Enhancer also supports multiprocessor systems.

## Installation of Q-Enhancer

Standard setup will install Q-Enhancer in the program folder on the C: drive. On an image processing server you may have heavy image traffic. Therefore, we recommend the setup of a D: drive on which you should install all the input and output hot-folders.

When you first start Q-Enhancer, it will start in demo single channel mode. In this mode, everything works, but all images are watermarked. The password for the demo mode is **I2E\_Demo**.



Registration window

To register the software, send Express Imaging Systems the primary key via [mail.@colour-science.com](mailto:mail@colour-science.com). You will find this key in the registration window. A valid run-time password will be provided. Once the password is entered correctly, Q-Enhancer will show the Main window.

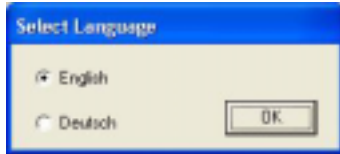


**Main window**

The main screen is quite simple. A large red (Stopped) or green (Running) label will indicate if the software is running or not. A list window will show you the status of all the processing channels that are set up.

**Language Setup**

Use the Select Language window to change the language of the interface. The Default is English.

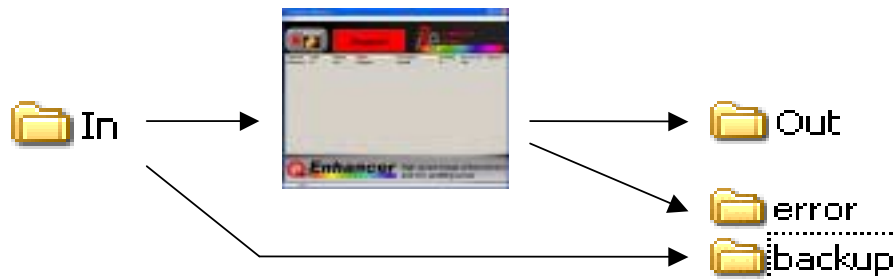


Select Language window

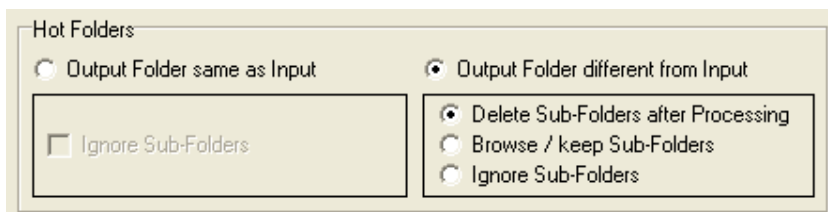
**Operation Modes**

**Two Folder Operation Mode**

The default operation mode is a hot folder mode where images dropped into an “in” (input) folder are processed and then saved in an “out” (output) folder. The original images are saved in a backup folder. Images that could not be processed are saved in an error folder.



Open the System menu, click Setup, and select Channel Setting. The Channel Setting window will open. Hot Folder settings can be found in the Input/Output tab. Q-Enhancer must be stopped before any changes may be made to the settings.



Hot Folders settings

By default, Delete Sub-Folders after Processing is selected. In this mode, whole folders with sub-folders filled with images can be processed. After processing, the sub-folders are deleted from the folder.

## Q-Enhancer reference manual

Keep in mind that Q-Enhancer will always move all files from “in” to “out” through the channel, but it will only process checked images. All other images, and also all other file types (.txt, .exe, .doc, .ini ), are moved unchanged through the channel. Q-Enhancer will also leave the whole folder structure of the incoming orders as they are.

Sometimes you may want to sort your work in different sub-folders, for example:

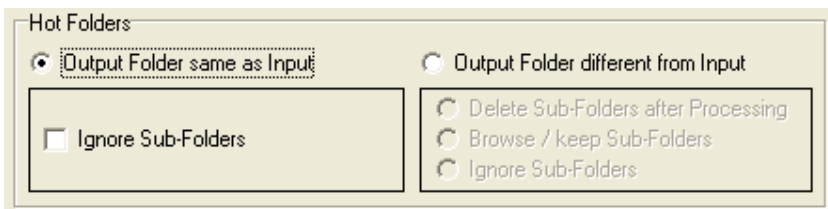
```
D:\in\4x6 inch
  \5x7 inch
```

If you chose the Browse/keep Sub-Folder option, then these folders will never be deleted.

Select Ignore Sub-Folders to ignore sub-folders and only process images in the top level of the in folder.

### Single Folder Operation Mode

Sometimes you do not want to move the images from one folder to another. For example, you may be running an image server and prefer that the enhanced images stay in place.



**Hot Folders Setup found in the Channel Settings window**

In single folder mode, you cannot define an output folder. Q-Enhancer will look at the images in the input folder and enhance them.

To avoid having images processed twice, use a system that changes select letters of the file extension from upper/lower case.

A processed image will always have the middle letter written in capital letters

Example:

```
Unprocessed:    1.jpg, 2.Jpg, 3.JPG, 4.bmp
Processed:      1.jPg, 2.jPg, 3.jPg, 4.bMp
```

## The Master Channel

Changes in the master channel will affect all channels.



Master Balance window

## Setting a New Image Processing Channel

By default, there is already a predefined “Channel 1”. This channel will work instantly. After installation, shortcuts to the “in” and “out” folders are automatically placed on the desktop. Drop images in the “in” folder and process them.

To setup new channels:


- 1) Select Channel setting from the Setup menu. The Channel Setting window will open.



Setup menu

- 2) For a new channel, click New and enter the new channel name.

The following example displays the default options as they appear in the Input/Output tab.



**Channel Setting**

Channel | Use Settings from ...

Channel Name: Channel 1  Enabled

Analysis Mode:  Single Image  Order 2

Input / Output | Processing | Image Enhancement | Color Management

Hot Folders

Output Folder same as Input  Output Folder different from Input

Ignore Sub-Folders  Delete Sub-Folders after Processing  Browse / keep Sub-Folders  Ignore Sub-Folders

Input

Input Root Path: C:\Programme\Q-enhancer\in

Short Name: In

Image Analysis Sub-Folder:

Enhance images of type:

JPG 8bit  TIF/TIFF  BMP  GIF  JPEG 12 bit  Special

Ignore images older than (Day Month Year): 01 01 00

Output

Output Root Path: C:\Programme\Q-enhancer\out

Short Name: Out

Output File Type:  JPG  BMP

JPG Compression [1..100]: 99

Down Sizing

Number of Pixels:

No Down Sizing  Down Size the smaller Dimension of the Image  Down Size the larger Dimension of the Image

New Delete Save Set Defaults Quit

Insert the name of the new channel.

Enable or disable a channel either here, or in the main window.

Single image processing is the default analysis, or processing, mode. Order processing is used for film scanners where images come from one film and a statistical image analysis of the whole order is needed.

This is the hot folder processing mode described in the "Operation Modes" section of this document.

This is the path of the input folder together with the short name to be displayed in the main window.

Select the image file types you wish to enhance. If ICC profiling is used, all file types are always profiled, but not all have to be enhanced.

This is the path of the output folder together with the short name to be displayed in the main window.

The Output File Type is the save type and compression of the images that are output.

This is the downsizing option. Downsizing is always proportional, so you have to enter only one size.

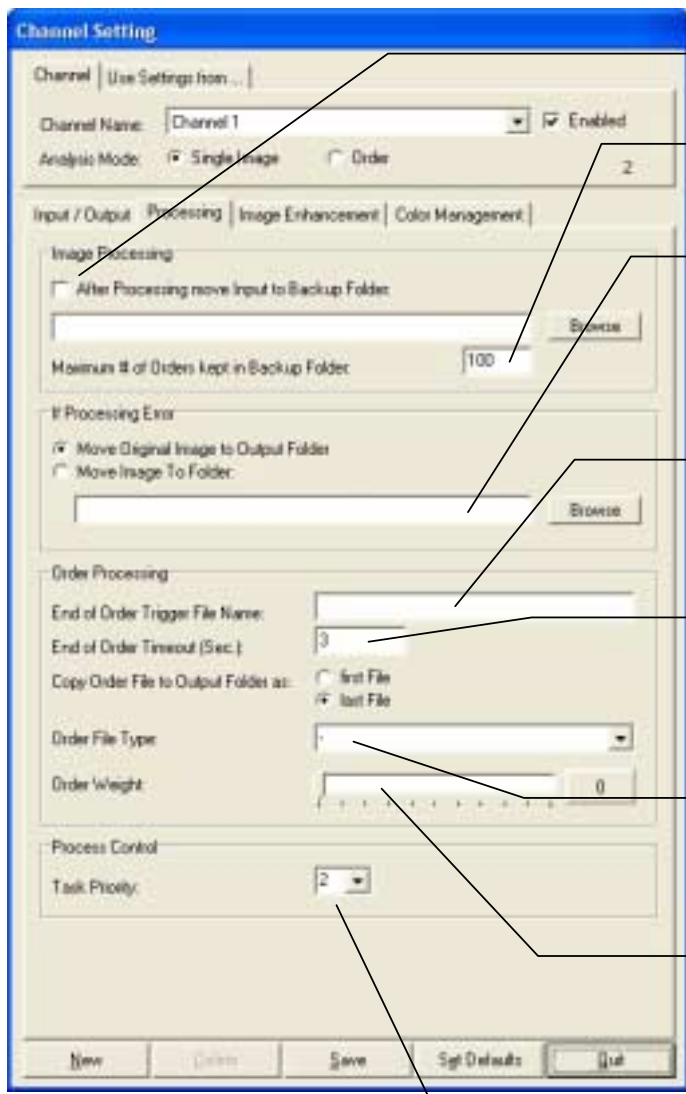
Create a new channel.

Delete a channel.

Save the channel settings.

Sets all values to default.

Use the Processing tab to determine the processing options. The following example displays the default options.



The screenshot shows the 'Channel Setting' dialog box with the 'Processing' tab selected. The dialog is divided into several sections: Channel, Image Processing, If Processing Error, Order Processing, and Process Control. Callouts point to specific settings with explanatory text boxes.

- Channel:** Channel Name: Channel 1, Analysis Mode: Single Image (checked), Order (unchecked), Enabled (checked).
- Image Processing:** After Processing move input to Backup Folder (unchecked), Maximum # of Orders kept in Backup Folder: 100.
- If Processing Error:** Move Original Image to Output Folder (checked), Move Image To Folder (unchecked).
- Order Processing:** End of Order Trigger File Name: (empty), End of Order Timeout (Sec.): 3, Copy Order File to Output Folder as: Last File (checked), Order File Type: (empty), Order Weight: 0.
- Process Control:** Task Priority: 2.

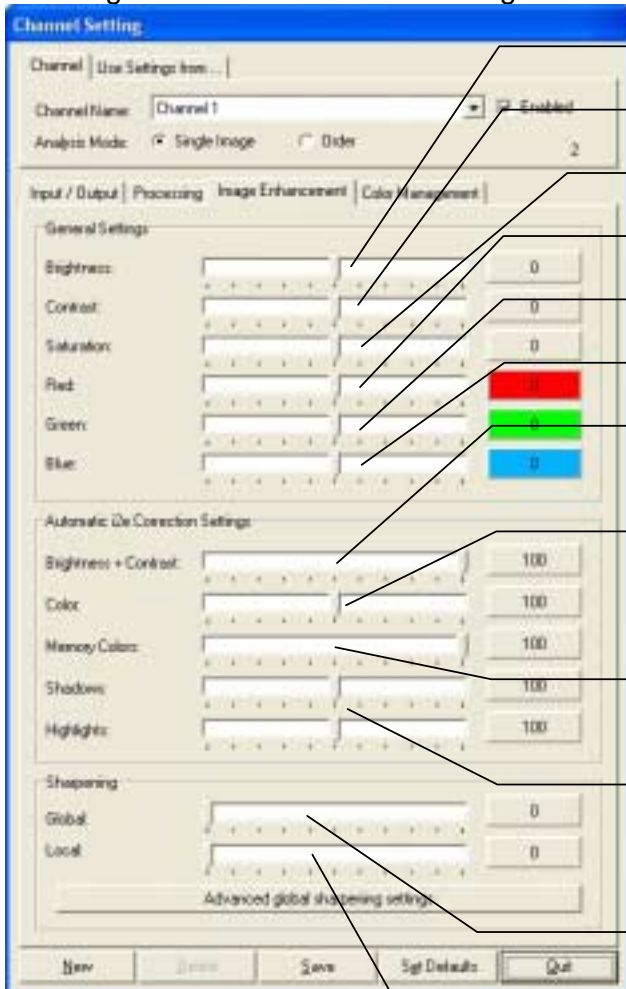
Callout boxes provide the following explanations:

- This will save a copy of the original images in a specified backup folder.
- Here you can specify to delete old images or orders in the backup folder when the number exceeds the specified number.
- Here you can specify the way errors are handled. Normally, the original image will be moved to the output folder if the image cannot be processed for any reason. It is also possible to save such images in a special error folder.
- In some workflows, orders are collected in folders and there is a special file, e.g., endorder.txt to declare an order as complete.
- Once the last image inside an order has been processed, the empty folder will be deleted at the end of the timeout period.
- If an order trigger file is specified insert the file type here. It is then possible to read the order file first and perform the treatment specified in that file for every image.
- If the analysis mode is set to Order Processing, then here you can specify between 0=single image correction or 100=correction and use a weighted average of all images inside this order.
- The task priority (1-3) allows you to give one channel priority over another channel. Also, with lower priorities other applications run smoother on the same PC.

The default settings will meet your requirements most of the time.

## Q-Enhancer reference manual

Use the Image Enhancement tab in the Channel Settings window to define the automatic and the general color correction settings.



This is the general brightness correction.

This is the general contrast correction.

This is the general saturation correction.

This is the general red correction.

This is the general green correction.

This is the general blue correction.

This is the i2e brightness and contrast (ABE) auto correction strength. Default value is 100.

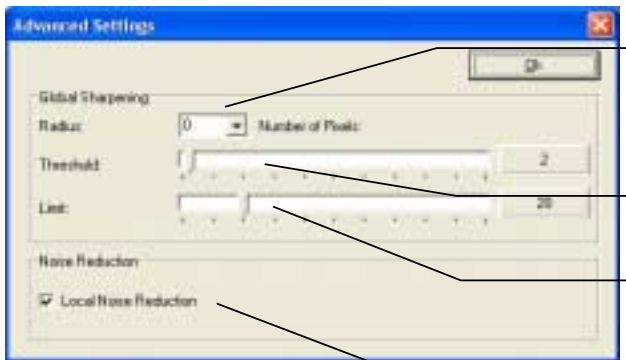
This is the i2e color enhancement (ACE) auto correction strength. Default value recommended for unattended processing is 100. Maximum is 200.

This is the i2e memory color enhancement (MCE) auto correction strength. Default value is 100.

This is the i2e shadow and highlight enhancement (SHE) auto correction strength. Default value is 100 for both. Maximum is 200.

This is the strength of the global unsharp masking (GSE). Recommended value is about 50.

This is the strength of local sharpness enhancement (LSE). Make print tests to find the best setting. It is possible to combine GSE with LSE for best results, for example, GSE=50, LSE=100.



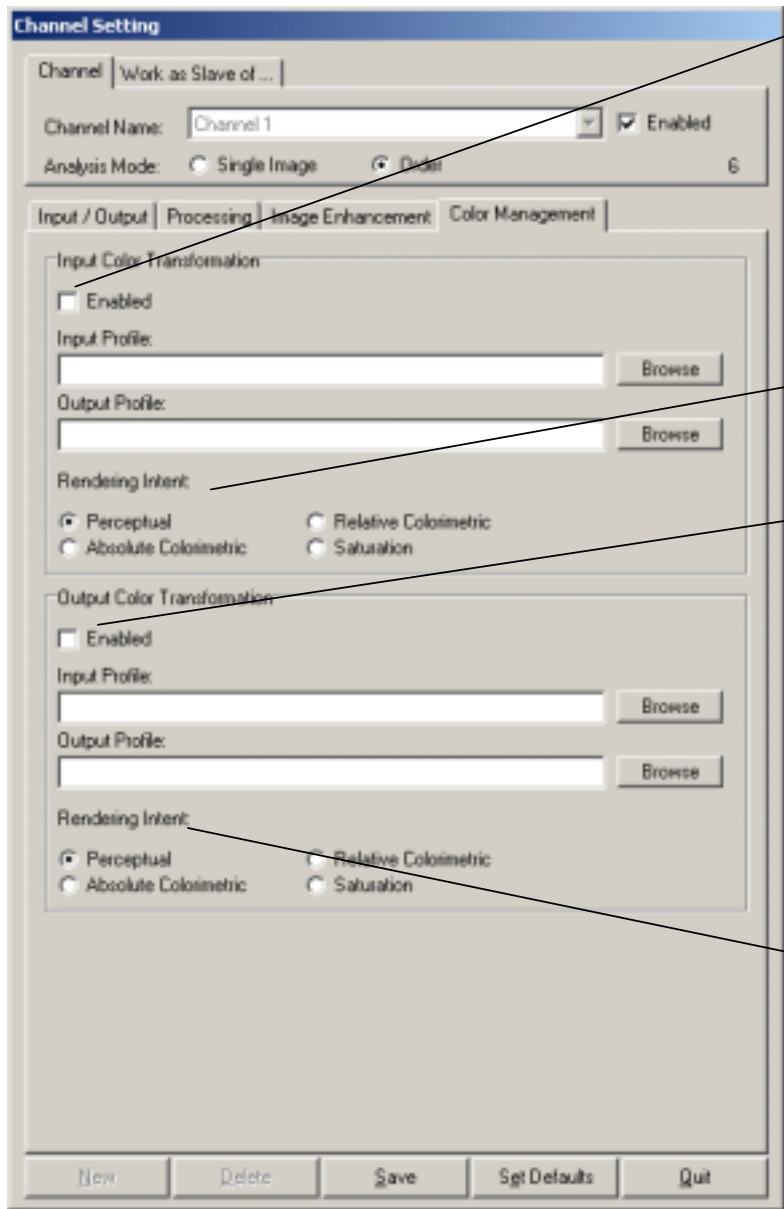
This is the Radius of the unsharp masking in pixels. A value of 0 means that the radius is automatically fitted to the pixel size of the image.

This is the threshold (or trigger) level of the unsharp masking.

This will limit the halo effect around edges.

Local noise reduction prevents pixel noise when using the Local Sharpness Enhancement (LSE) feature.

Use the Color Management tab in the Channel Settings window to define the color management options.



Here you can enable an ICC transformation on the input side of Q-Enhancer. Current input devices are scanners or digital cameras. The input profile is, for example, the scanner profile, and the output profile is the sRGB profile. This way Q-Enhancer can apply the automatic i2e image enhancement steps in the sRGB color space.

This is the Rendering Intent of the ICC profile color transformation.

Here you can enable an ICC transformation on the output side of Q-Enhancer. Current output devices are printers. The input profile is, for example, the photogamut.icc profile of the printer profile.

For printer output we do not recommend using the sRGB profile as the input profile, but rather profiles which are better adapted to the printer gamut like the photogamut.icc, or the Colour-Science\_RGB\_Input.icc profile.

This is the Rendering Intent of the ICC profile color transformation.

You perform input and an output color transformations. If, for example, you have scanner images and a profile for this scanner then you have to use the input transformation. If you want to enhance and print these images on a profiled printer then you have to perform the following transformations:

Scanner.icc -> sRGB.icc -> i2e image enhancement -> photogamut.icc -> printer.icc

The input color transformation will transform the scanned data into the sRGB color space. In this color space we will enhance the image. Note: For printing we recommend a generic profile that better reflects the printer gamut than the sRGB input profile. We recommend the photogamut.icc profile. The output profile is the printer's profile.

## Making Temporary Changes for One Channel

Right-click on a channel to open an Operations menu. This Operations menu lets you:

- Activate or de-activate a channel
- Insert temporary color corrections for the channel
- Look at the error log file for this channel.



- opens ->



📁 In 📁 Out