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Contents: This white paper will give tips on the simultaneous, parallel operation of several instances of NeuroCheck software on one computer (Multi-operation mode).

As of: February 1, 2017

Notes: This document is not part of the official product documentation of the NeuroCheck software.
NeuroCheck GmbH does not accept responsibility for the correctness, accuracy or completeness of the information provided in this document.

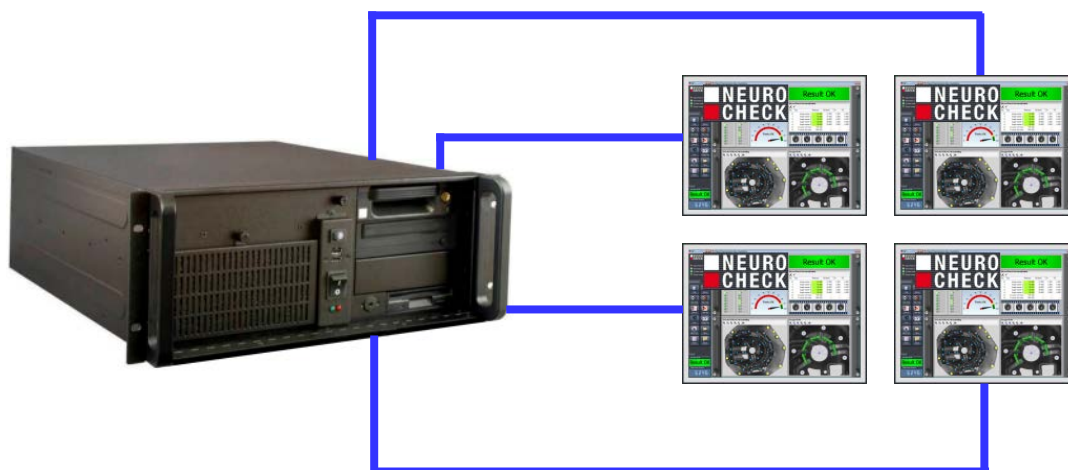


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1. Introduction

Operating the standard software NeuroCheck on industrial PCs has proven its worth for years.

However, there are applications where it would be desirable to operate several instances of NeuroCheck software simultaneously in parallel on a single PC.

Starting with NeuroCheck version 6.1, the software provides this possibility in a special license level “Premium Multi” thus saving the money and space for several PCs.

The new feature is especially interesting for subsequently adding a new inspection task to an existing station.



2. What are the benefits of Multi-operation mode?

In Multi-operation mode, you can operate up to four parallel NeuroCheck software instances on one computer with each instance processing one NeuroCheck project. Thus you can run several, completely independent and non-synchronized image processing systems on a single computer.

However, there are some fundamental limitations when running several parallel software instances on one computer simultaneously with regard to competing access to resources (hardware, system performance, files etc.).










3. Multi-operation mode in a nutshell

1. Use an up-to-date version of NeuroCheck 6.1 software.
2. Use a NeuroCheck dongle with a license level enabling Multi-operation (“Premium Multi Edition”).
3. Use a high-performance computer (minimum quad-core CPU, 64 bit operating system, minimum 4 GB RAM).
4. Only use components that have been tested and approved for multi-instance operation (see chapter 4).
5. Create several NeuroCheck projects separately with the help of the NeuroCheck project manager (see chapter 5.1).
6. Automatic configuration of NeuroCheck software multiple start with the help of the NeuroCheck multi-start manager (see chapter 5.3).




4. Components access

Not all hardware component drivers or 3rd party software libraries allow simultaneous access by several software instances.







Test results for devices:

- Cameras of NeuroCheck NCG series: runs. 
- Cameras of NeuroCheck NCFseries: does NOT run. 
- Framegrabber mvHyperion-CL: runs. 
- Hilscher field bus: runs. 
(Please read the instructions in chapter 6.1)
- Virtual field bus device: runs. 
- TCP/IP communication: runs. 
- Digital I/O Meilhaus: does NOT run. 
- Digital I/O ICP-DAS: runs CONDITIONALLY. 
- Serial interface: Tests have not been concluded yet. 


Test results for special data format converters:


- MODBUS over TCP/IP: runs. 
- Data base data format converter: runs. 
- Flow Control DFCs: Tests have not been concluded yet. 


Test results for special plug-ins:

- PI_ContourMatch (MIL): runs. 
- PI_CodeReader (MIL): runs. 
- PI_CodeReaderXNC: Tests have not been concluded yet. 
- PI_HalconWrapper: Tests have not been concluded yet. 
- PI_LensFocusControl: Tests have not been concluded yet. 
- PI_SonyCameraControl: Tests have not been concluded yet. 

Explanation:

 Driver entries or components marked with a green check mark allow parallel operation of various hardware components of this driver by several software instances. One hardware component (such as a GigE camera) can usually only be addressed once.

 For entries marked with a red X, drivers do not allow for parallel access. Thus, only a single NeuroCheck instance can use the hardware components of these drivers.

 Driver allows parallel access. However there must be *one ICP-DAS Digital I/O Device for each NeuroCheck instance.*

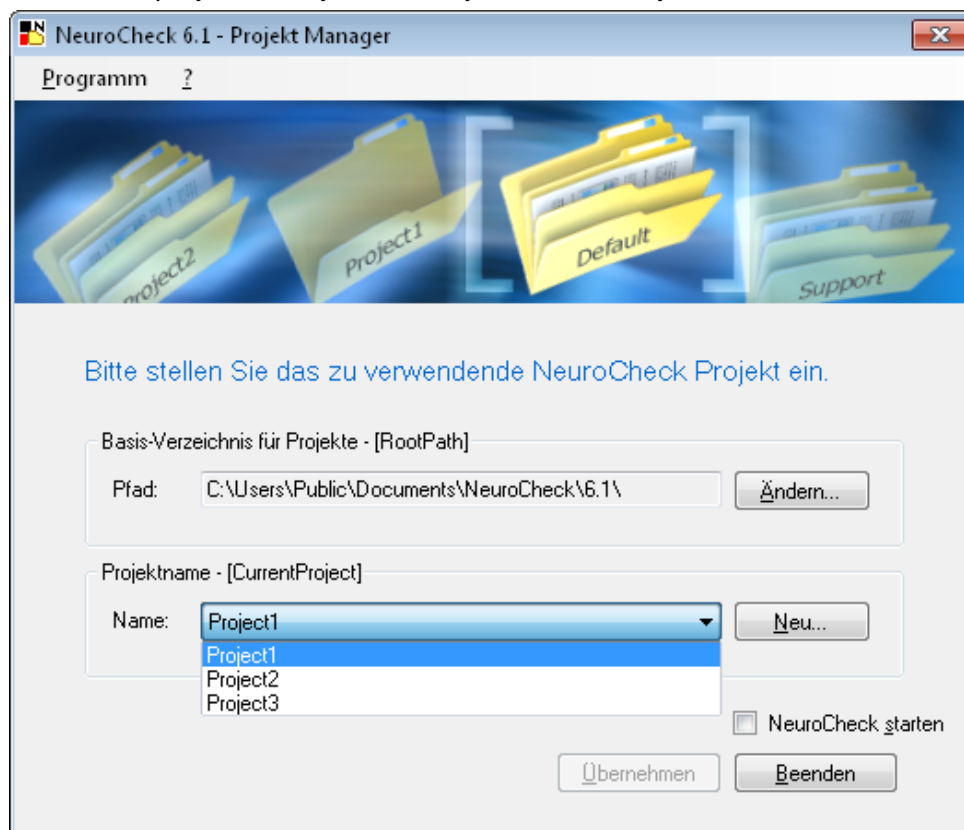
5. Detailed description of using Multi-operation

(1) Access to NeuroCheck project directory

NeuroCheck instances that run in parallel have to work with different NeuroCheck projects; otherwise there would be competitive access to files.

Please use the NeuroCheck Project Manager to create and manage several projects. You will find it in Windows Start menu > Program Files > NeuroCheck 6.1 > Tools.

Create the projects "Project1", "Project2" and "Project3":



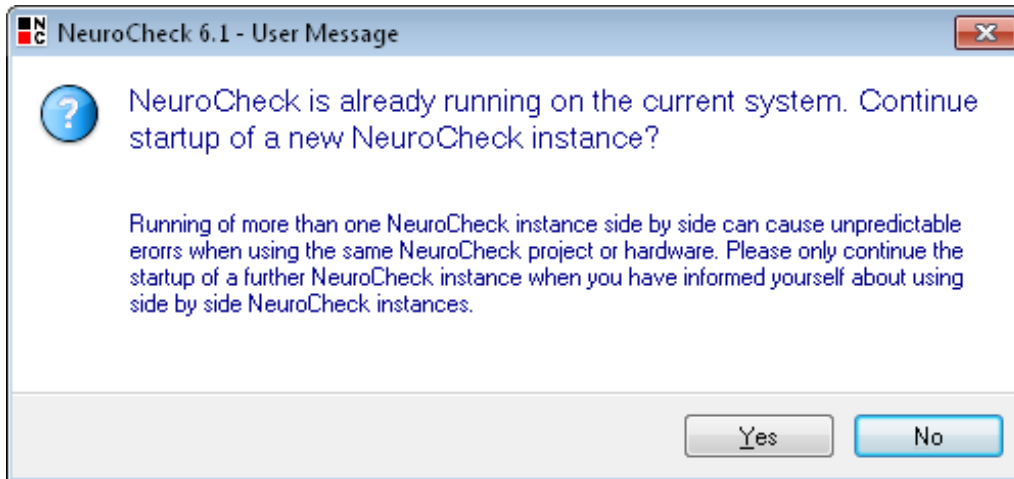
Pressing the "Apply" button saves the settings to the "C:\Users\Public\Documents\NeuroCheck\6.1\NeuroCheck61.ini" file.

Now, if you start the NeuroCheck software it will read this file and load "Project1". In the NeuroCheck Project Manager you can now switch to "Project 2", click "Apply" and start a second NeuroCheck instance. NeuroCheck starts and loads "Project 2) etc.

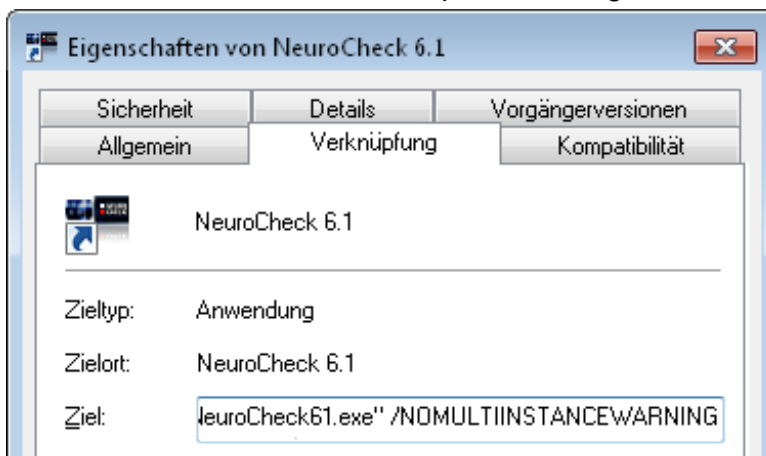
Now you can create your NeuroCheck image processing projects as usual. Chapter 5.3 will tell you how to optimize this process for use in automatic mode.

(2) Warning when starting more instances

Since the parallel operation of several NeuroCheck instances only makes sense after having read this document, the following message is displayed in the standard configuration upon each start of another NeuroCheck instance.



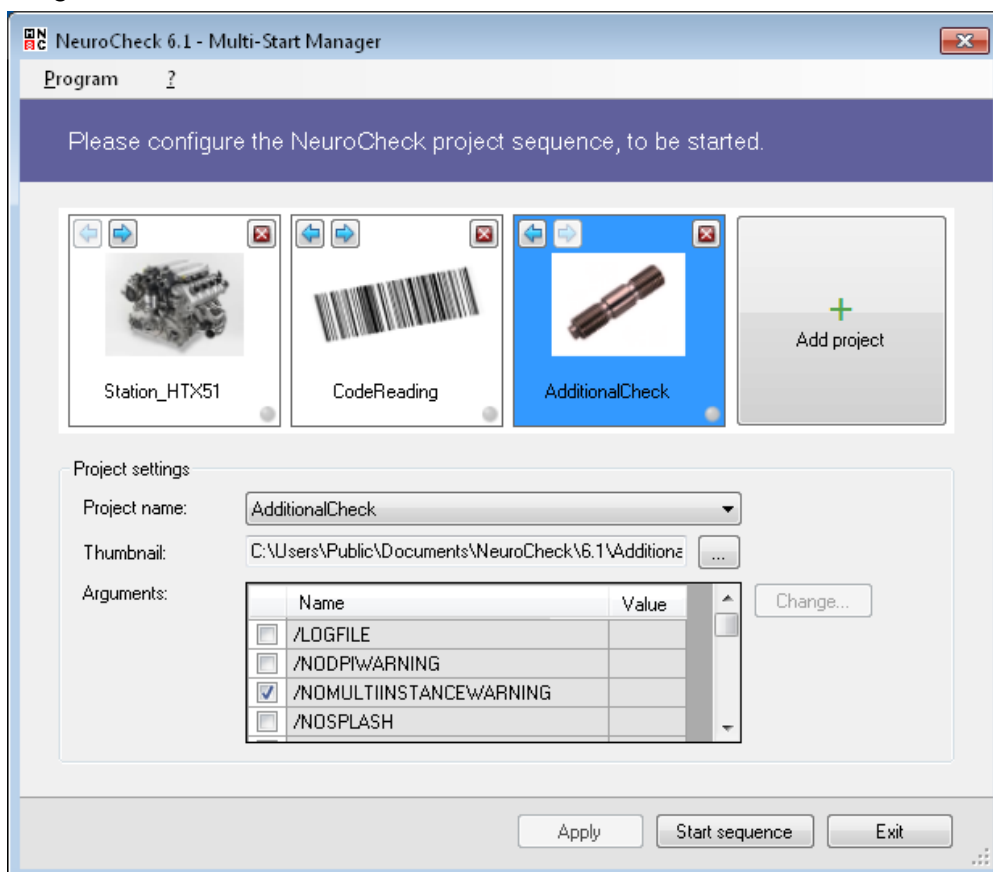
You can add the parameter `/NOMULTIINSTANCEWARNING` to the start of the NeuroCheck software that will stop this message from being displayed.



(3) Configuration of automatic multi project start

For fully automated operating several NeuroCheck inspection systems using one computer, starting manually as described in chapter 5.1 is not applicable.

Please use the NeuroCheck Multi-start Manager to create and manage an automatic start sequence for several projects. You will find it in Windows Start menu > Program Files > NeuroCheck 6.1 > Tools.



Add the projects to be started in a sequence.

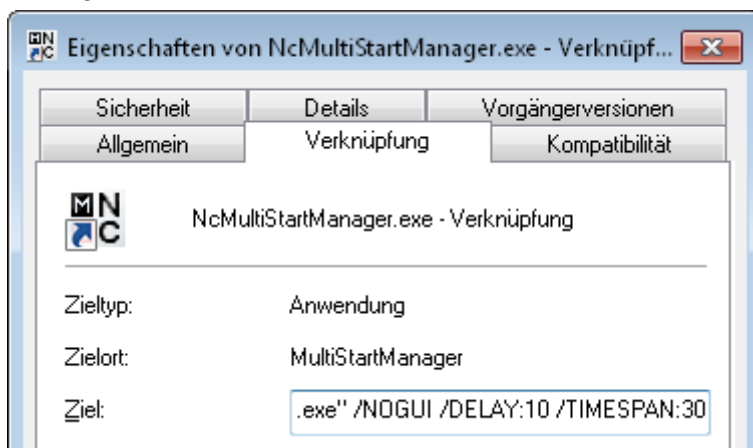
For the selected project (blue color in the project sequence) you can edit its properties in the lower section of the dialog.

Configure the command line parameters to be handed over on start of the appropriate NeuroCheck instance.

Press the “Apply” button to save your configured settings. Press the “Start sequence” button to test if the sequence works as expected. Running NeuroCheck instances will be shown by a green LED light in the project sequence.

For fully automated operating add a link to the file
 „C:\Program Files\NeuroCheck 6.1\Tools\MultiStartManager\NcMultiStartManager.exe“
 to the Windows auto start folder.

Now you need to edit this link to add command line parameters to the Multi-start
 Manager:



/NOGUI This command line option makes the Multi-start Manager start without its graphical user interface. It will only launch the configured sequence of NeuroCheck instances with their linked projects.

/DELAY:10 This command line option delays the startup of the first project in the sequence (10 seconds in this example).

/TIMESPAN:30 This command line option defines the time span the Multi-start Manager will wait between that start of two NeuroCheck instances. If you use network cameras in your projects, it may be necessary to increase the time span to 60 or even 120 seconds.

6. Special configurations

(1) Hilscher field bus multiple assignment

Using one Hilscher bus card per NeuroCheck instance works without difficulty.

Please observe the following notes when you need to use a single Hilscher bus card in several NeuroCheck instances at the same time:

- Make sure you use the latest driver version.
- Make sure to define separate I/O areas.
- On start of NeuroCheck software, the drivers will be initialized. During this, all output bits of the bus card will usually be reset to zero. This will interrupt the established communication of the instances started previously. To prevent this, please configure the setting „Reset output on initialization” in section „Communication parameter” of the device properties in the NeuroCheck device manager to „False”, for each project.
- Some dialogs of NeuroCheck software will also reset the output bits, particularly dialog “Remote Control” and dialog System > Test > Fieldbus Communication. Please avoid using these dialogs during commissioning and operation.

(2) NeuroCheck security profiles

The configuration of the NeuroCheck security profiles will be saved to the dongle and to the file „NC61CFG.SP.CFGX” located in the subdirectory „Configuration” of the project directory. Using NeuroCheck security profiles is thus not recommended in combination with a multi-instance project setup (several projects in parallel). It is not possible to manage different configurations of the security profiles in the dongle at the same time.

It is possible however to transfer the identical configuration of the security profiles to all NeuroCheck project instances manually. To do so, please configure the security profiles in one of the projects first. Close all NeuroCheck instances. Then copy the file mentioned above to the according directories of the other projects.

7. Appendix: Remarks and Restrictions

(1) Disclaimer

NeuroCheck GmbH is not liable for any damages arising directly or indirectly from the simultaneous, parallel operation of multiple instances of NeuroCheck software on a computer, nor for any damages arising from adhering to or ignoring the information provided by this document, nor from information missing from this document.

(2) System resources access

The resources of a computer (e.g. processor, RAM, hard disk controller) are managed by the operating system. Individual processes can influence the distribution of resources only to a very limited extent. It seems, for example, that the operating systems will give a higher priority to the process instance whose window is currently selected. Therefore, it is not possible to predict the run time of a NeuroCheck project or guarantee the maximum run time for execution in automatic mode. For run-time-critical applications we recommend testing the inspection processes on the target systems.

(3) Using components developed by third parties

If components by third parties are instantiated from the NeuroCheck software (e.g. special external image processing libraries), multiple parallel calls could violate the licensing conditions of these third parties. The NeuroCheck GmbH explicitly discourages this usage and cannot be held liable for violations in this context.

(4) Start of NeuroCheck by external applications

In some cases customers have developed external applications that access NeuroCheck software by utilizing the Windows operating system. How the identification of the desired NeuroCheck instance takes place is not clear.

(5) Effect of keyboard entries

Keyboard entries usually affect the Windows application that currently is in focus. For special configurations, in particular the setting "Listen to system function keys" on page Control Panel > Interaction in the NeuroCheck Software Settings dialog, such keyboard entries will affect all NeuroCheck instances, this can result in unintended behavior.

(6) Effect of Windows® access settings

Changing Windows default settings are affected by the Windows application that most recently changed them. This applies in particular to all settings on page "Windows Access®" in the NeuroCheck Software Settings dialog, this can result in unintended behavior.

(7) Identification of desired NeuroCheck instance on screen

In order to avoid confusion when operating multi parallel instances of NeuroCheck software on one screen, especially in automatic mode, the inspection systems should be labeled clearly and uniquely in the Control Panel and in Process View. Since the file name of the inspection program loaded is displayed in the title bar of the Control Panel, we recommend selecting unambiguous file names for the inspection programs of each project.

(8) Diagnosis in case of problems

In case of problems with one of the inspection systems, diagnosis is much more difficult when using parallel instances. However, you can rely on the diagnosis files in the sub-folder \System Output\ of the respective project. Nevertheless, the means for finding the cause of problems related to hardware access and timing problems are limited.

(9) "NeuroCheck61.ini" file

Since NeuroCheck saves some information to a global INI file, this information may not be applicable to one or several NeuroCheck instances, especially "FirstRun" and "LastShutDown".

(10) Window positions

Since the position and size of many dialogs of NeuroCheck software is stored globally in a file, the windows may not appear at the intended position. For Control Panel and Process View windows please configure fix window positions in the Software Settings dialog.