

# ***FSI Machine Vision Training Programs***

## **Machine Vision & NeuroCheck Technical Training Course (#MVC-201)**

This is our main and most popular NeuroCheck® course, which covers how to do automatic inspection applications using NeuroCheck-powered machine vision. This is a 1 2/3 day, “industrial strength” non-commercial course. Commonly used topics are covered in greater depth, and the more advanced or specialized topics are covered as overviews. There is substantial focus on the use of NeuroCheck software, and highly condensed sections cover other areas that are crucial to project success. Topics include:

- Brief general overview of machine vision technologies, architectures, evolution and purposes.
- An overview and framework for successful machine vision project implementation. Strategies for mission and application definition that successfully fulfills the mission while avoiding unnecessary cost escalation. Feasibility studies, application review, review of scope questions and related implementation, and project management.
- Basic setup and navigation of NeuroCheck® software for implementing machine vision applications.
- NeuroCheck® software tools and their use, including image acquisition, asynchronous image acquisition, using NeuroCheck®’s 54 standard filters or custom filters for image processing, creating / applying look-up tables to images, image thresholding, defining, processing, sorting, screening, counting regions of Interest, template matching, thresholding, bar code reading, deriving object-level mathematical results (elsewhere), gauging color processing, Neural Net color classifications, Neural Net processor use, and Neural Classifier use. Creating and passing results of checks as ROI objects, image-level math, and other tools.
- Other NeuroCheck® system features which are utilized for machine vision applications. Password and multi-level security profiles. Creating and exporting spreadsheets and other output files and data, networking, Check Routine Wizards, operating modes (manual, test, live and automatic) and their uses. Configuring the user interface / automatic mode screen. Use of XML self-documentation capabilities.
- Brief introduction to OLE (Object Linking & Embedding) and NeuroCheck OLE capabilities.
- Brief introduction to Plug-Ins, and NeuroCheck Plug-In capabilities. If requested in advance, a section on how to install, enable and access plug-ins will be added.
- Implementation of example machine vision applications: Presence verification to check for proper assembly and forming of parts, character recognition, print quality inspection, robot guidance, pattern recognition, gauging, color analysis, surface analysis, and flaw detection.
- Overview of principles and implementation concepts for triggering, and high-speed image acquisition. Overview parallel processing. If requested in advance, a detailed section on parallel processing is added.
- The 4 methods of discrete I/O control: global, check level, tool level and combining flow control with I/O tool insertions.
- NeuroCheck software & license media and administration.
- Introduction to NeuroCheck capabilities for unusual (non-default) program flow control, including non-sequential passage/linkage of input and output objects from and to tools, and conditional branching.



- Hardware overview of machine vision systems powered by NeuroCheck. Includes various approaches utilizing FSI pre-tested systems and pre-tested building blocks where compatibility issues have already been resolved. Overview of relevant image acquisition / camera specifications and selection including resolution, speed, and comparison of performance and operational characteristics of monochromatic, color and line-scan image acquisition. Brief overview of image acquisition, I/O hardware functions, plant-floor enclosure ratings, and relevant specifications.
- Machine vision lighting purposes, principles and implementation. This briefly distills and covers the key points of this important and extensive topic. It covers the objectives of machine vision lighting, and how they are often the opposite of just “lighting it up”. Next is an introduction to the fundamental illumination scenarios, their uses and how they are created. This includes the geometry of the workpiece, the imaging equipment and the lighting equipment, and the geometric relationship between these three. Review of types of light sources that are inside lighting products, and the types and terminology of lighting products. Finally, examples are given which combine all of the above principles.
- Machine Vision lens types and selection. Standard and specialized lenses. Brief overview of this extensive topic.

An extensive notebook, NeuroCheck CD, and a training course CD with example images, problems and solutions are provided to each participant.

The duration of the MV-201 course is one full day, followed by 2/3 of a day.

### **Hands-On & Specialized-Topic NeuroCheck Training (Course #MVC-204)**

This is a ¾ day course with hands-on NeuroCheck programming practice for approximately 10 basic applications. Includes extra coverage of those areas that are of greatest interest to the attendees. Also includes practice on other aspects of setup. Pre-requisites are MVC-201 and for full hands-on participation, a notebook computer with a CD drive; otherwise partial hands-on participation is still available.

A NeuroCheck CD, and a training course CD with example images, problems and solutions are provided to each participant.

### **Introduction to Machine Vision (Course # MVC-101)**

MVC-101 is a short, basic introduction to the concepts and terminology of machine vision. It is typically run for about 45 minutes just prior to the MVC-201 machine vision / NeuroCheck training course.

This is a beginner course intended for persons who have had no exposure to machine vision.

### **General Product Introduction and Programming Concepts Overview (MVC-102)**

This is a 3 to 4 hour seminar which presents an introductory overview of all areas important to the success of a machine vision application from inception through long term ownership.

Includes an example project taken through inception, specification, solution, programming, startup, and long term ownership, with the specific “nuts and bolts” of each step.

Machine vision equipment, technologies, tools, terminology and concepts are also covered.



### **CVS-100 Vision Systems Training Program (Course # MVC-150)**

This is a 3 to 4 hour course on our CVS-100 series, which is our NEMA X stainless steel enclosed DSP-based vision system.

The course covers the CVS-100 hardware and software. The goal is to cover all product-specific information required to implement projects and solve applications using the CVS-100.

It also includes a very brief introduction to the general concepts and terminology of machine vision. However, it does not cover general machine vision technical topics such as lensing, lighting, and imaging concepts.

### **Solution Provider Commercial Training (Course #MVC-202)**

This is a 1 to 2 hour course that is typically run after the "Machine Vision and NeuroCheck technical training course". In general, NeuroCheck-specific and FSI-specific commercial topics are covered, as well as general commercial topics on vision project administration and management for success.

### **NeuroCheck Plug-In Course (#MVC-291)**

This is a 2 day course.

Content:

- Creation of Plug-ins
- Utilization of Already-Developed Plug-Ins

Pre-requisites:

- Completion of MVC-201
- Fluent on writing DLL's with C++ (only a brief review of key areas on this is included)
- Instructor approval (based on above 2 items)
- Bring Notebook computer with C++ loaded, and CD ROM drive

### **NeuroCheck OLE Course (#MVC-292)**

This is a 2 day course.

Content:

- Design of custom front ends for NeuroCheck using OLE.
- Linking NeuroCheck to OLE enabled objects using NeuroCheck

Pre-Requisites

- Completion of MVC-201
- Knows Visual Basic (version 6) programming with OLE automation (only a brief review of key areas of this will be included)
- Instructor approval (based on above criteria)
- Bring Notebook computer with Visual Basic Version 6 loaded and CD ROM drive

Planning details: Same as plug-in course.

### **Suggested / Popular Courses for NeuroCheck-Powered Machine Vision Training**

The most common and popular way to obtain NeuroCheck training is to take course # MVC-201, and (often) to follow it by MVC-204.



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## **On-Site Machine Vision, NeuroCheck or Application-Specific Training**

Ask us for a quotation for on-site training. Customization is available for the cost of the required advanced work.

### **Course Schedule**

MVC-101	7/8/08	9/9/08	November 2008
MVC-102	7/11/08	9/12/08	November 2008
MVC-150	6/17/08	12/9/08	June 2009
<b>MVC-201</b>	<b>7/8/08-7/9/08</b>	<b>9/9/08-9/10/08</b>	<b>November 2008</b>
MVC-202	7/9/08	9/10/08	November 2008
<b>MVC-204</b>	<b>7/10/08</b>	<b>9/11/08</b>	<b>November 2008</b>
MVC-291	8/8/08-8/9/08	2/5/09 - 2/6/09	August 2009
MVC-292	8/10/08-8/11/08	2/7/09 - 2/8/09	August 2009

### **Registration & Details**

Please contact your FSI Machine Vision representative or FSI for detailed pricing and registration information. Here is a general overview:

Each course has a minimum and maximum number of attendees. If the minimum number has not registered by 25 days before the course (60 days for MVC-291& MVC-292) the course is not held, and all registrants are notified immediately and offered several options including a full refund. The deadline for signup is 1 week before the course, but we encourage you to sign up much earlier to help assure that the class will be held. Sign-up is via a purchase order and pre-payment. There is a charge for late cancellations, including cancellations on free classes.

Overview of pricing:

MVC-101, MVC-102, and MVC-150 are free.

MVC-201 & MVC-204 are economically priced.

MVC-291 & MVC-292 have substantially higher pricing.

MVC-202 is a free add-on to MVC-201.

On-site training is quoted based on your requirements.

