



NIWeek
WORLDWIDE GRAPHICAL SYSTEM DESIGN
CONFERENCE



Using a Standard Vision Platform to Quickly Create Custom Solutions

NI Week 2013 – Vision Summit – Tuesday, August 6th

Introduction

Qualimatest SA and National Instruments

Introduction

- Qualimatest SA is a Swiss company, specializing in vision applications
 - Founded in 1989 – 17 employees
 - Active in 4 main industries: automotive, watch, medical devices and railways (trains)
 - ISO9001 certified organization (CSIA in 2003)
- National Instruments is our strategic technical platform
 - All projects based on LabVIEW
 - Most of Vision Solutions based on Vision Builder for Automated Inspection (Vision Builder AI)
 - Select Alliance Platinum Partner (since 2000)
 - Member of the NI Vision Specialty
- For people who want to know more about Switzerland:
<http://youtu.be/YG9GOKyS33M>

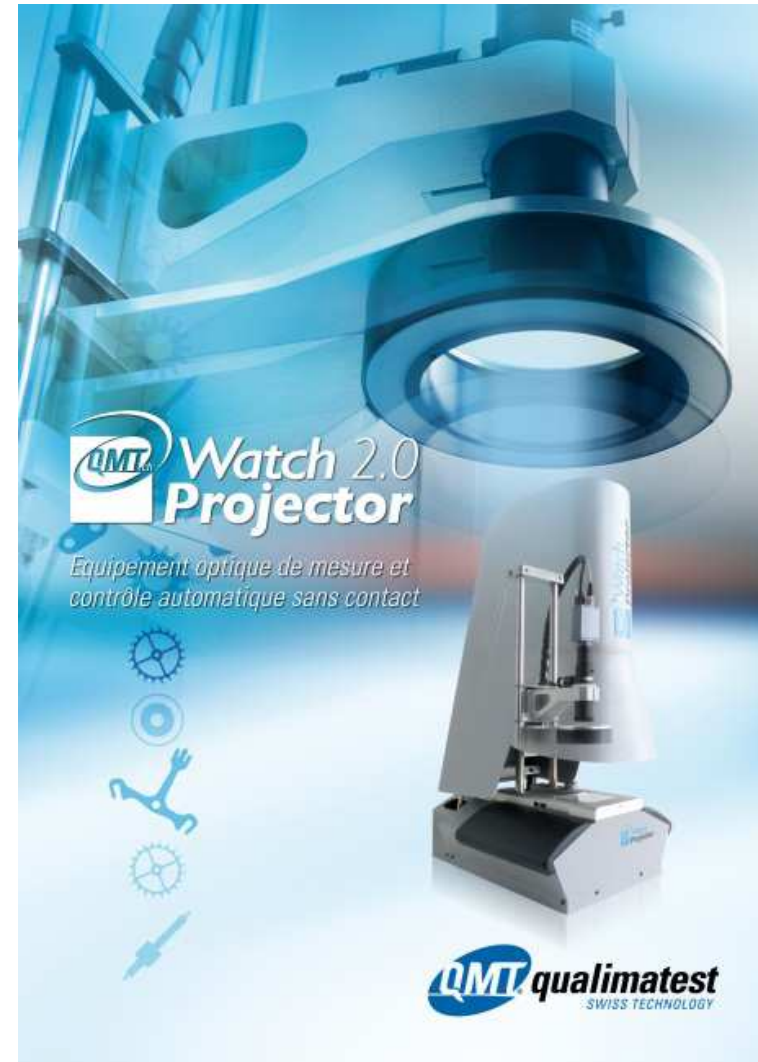


Examples of Qualimatest Applications

- Sorting machines



- WatchProjector

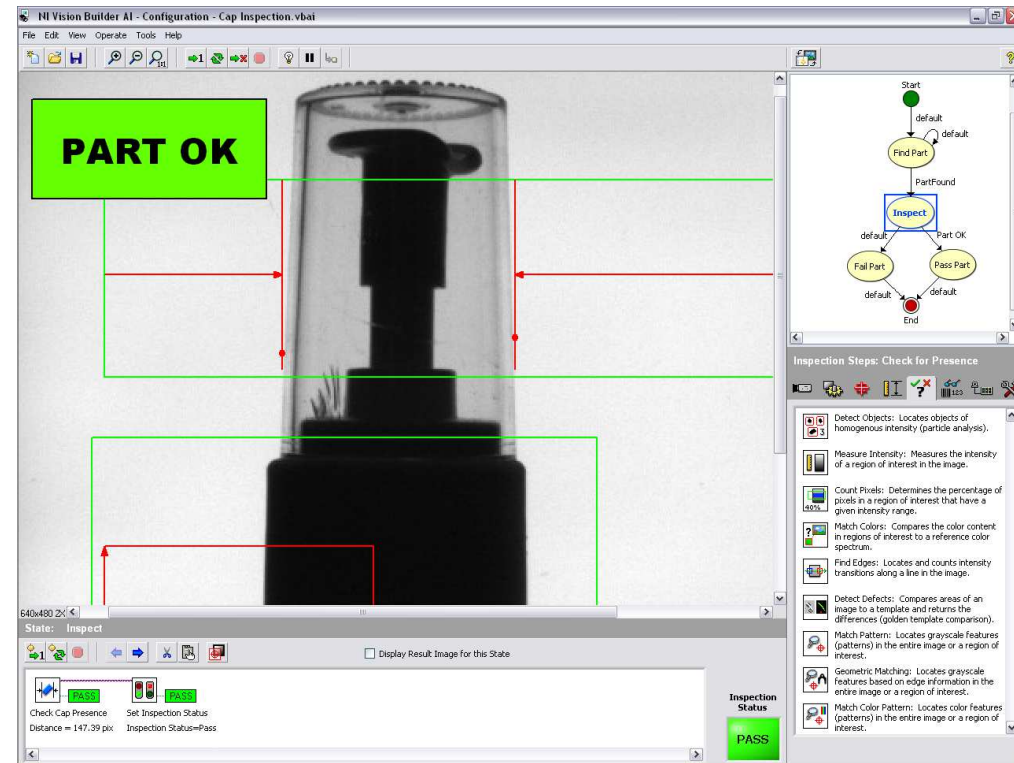


QMT Vision Inspector Platform

Vision Builder AI as a QVIEngine

Vision Builder AI Benefits

- Easy-to-use interactive environment
- No programming (fast to set up)
- Acquire and process images
- More than 100 machine vision tools (pattern matching, data matrix, ...)
- Pass/fail decisions
- Several communication possibilities (trigger, results display, ...)



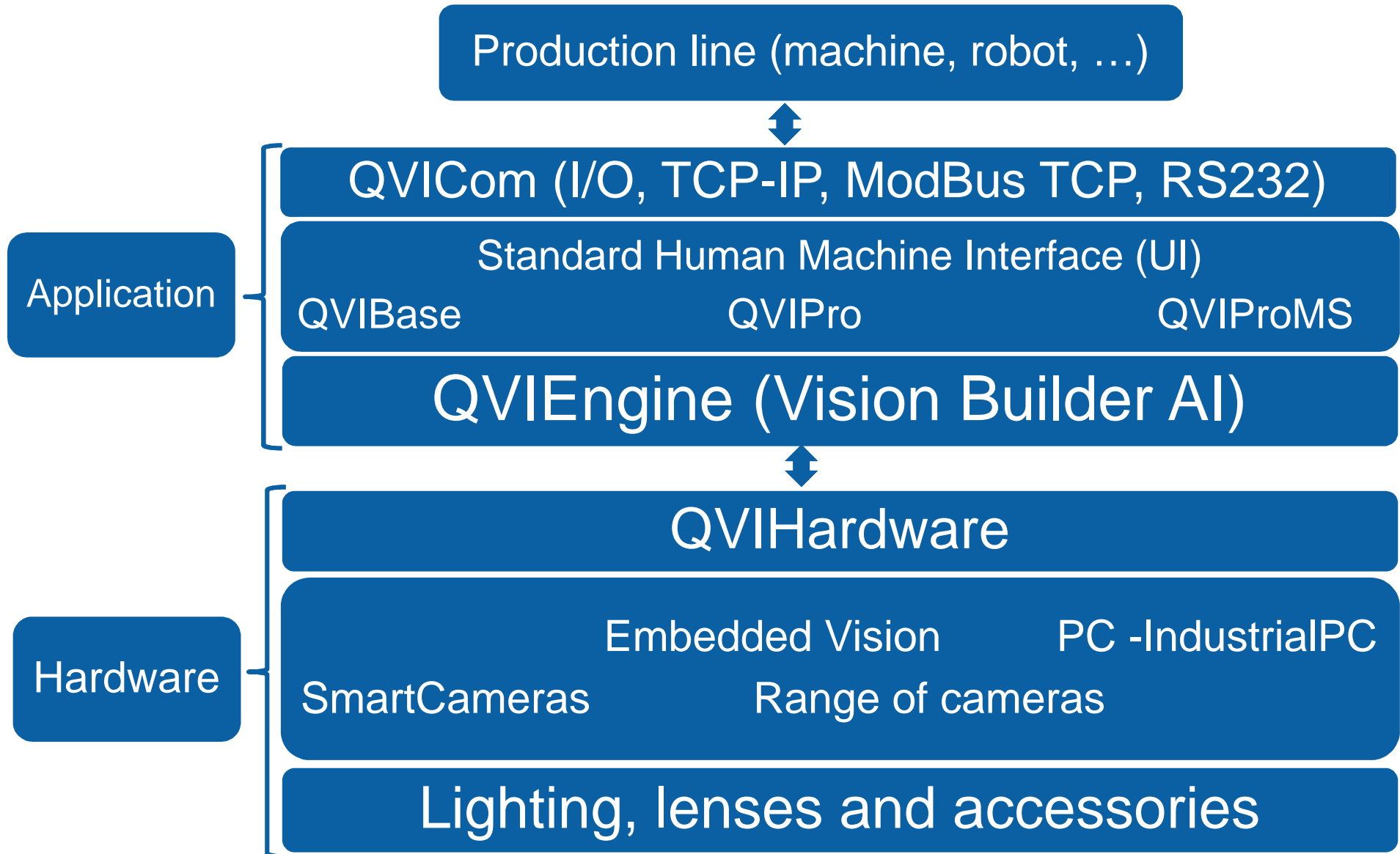
Most things are possible with Vision Builder AI...

The Birth of QMT Vision Inspector

... how do you choose all of the components of a vision system?

The collage includes various hardware components: a ring of red LEDs, a camera module, a lens, a camera body, and a computer monitor displaying a software interface. It also features logos for 'CAMERA Link', 'FireWire', and 'JIG VISION'. A central timing diagram shows the sequence of events for a vision cycle, including 'Reboot QMT', 'Charg Programme', and 'Cycle 1' and 'Cycle 2'. A flowchart illustrates the inspection process, starting with 'Acquire Image' and leading to 'Inspect Gear', 'Inspect Pulley', and 'Unknown Object'. A diagram at the bottom shows the relationship between a 'Kernel' and an 'Image'.

QMT Vision Inspector Architecture



QVICom for Standardized Communication

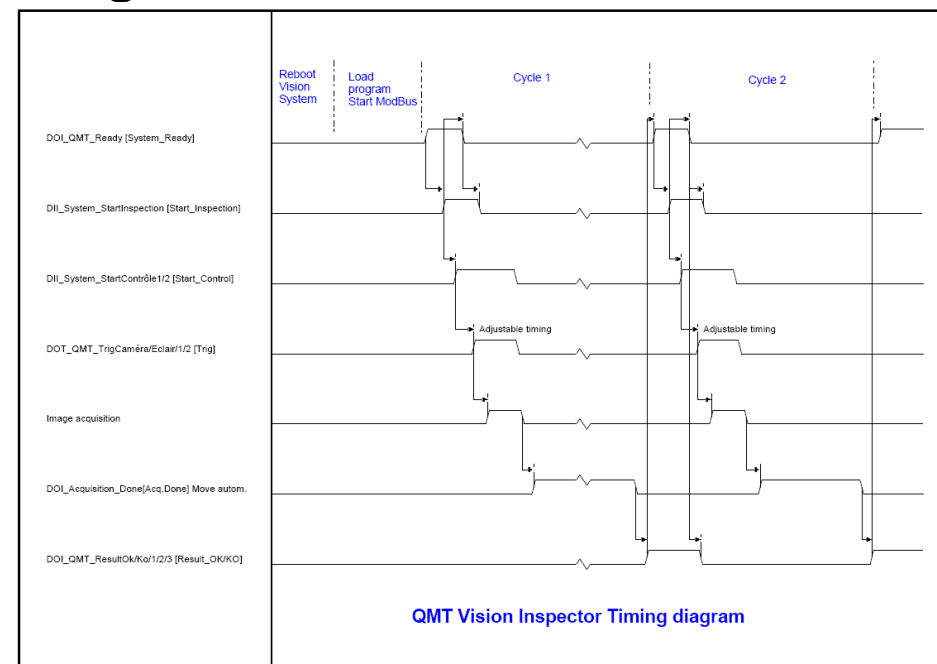
QVICom

Standard UI

QVIEngine

QVIHardware

- External I/O: triggering, state machine, results
- TCP/IP and RS232: state machine, results
- Internal I/O: synchronization between cameras, lighting, encoders
- ModBus TCP/IP: parameter management
- Integration of vision results and photos in a final machine interface
- Read/write access to all vision parameters through ModBus TCP



Standard UI

QVIBase, QVIPro, QVIProMS

QVICom

Standard UI

QVIEngine

QVIHardware

- Target selection
- Easier image selection whatever the target
- Multi-lingual UI

The screenshot displays the QVIPro software interface. The top header includes the QMT qualimatest logo and the text 'QVIPro La plateforme de vision industrielle de Qualimatest'. The main area is divided into several sections:

- Production:** Shows 'OF en cours : prod_ref_1, Référence : PI_Ind_ref_1'.
- Images:** Lists several image acquisition and processing steps.
- Statistiques OF:** Displays production statistics:

1889	Nb pièces total
496	Nb pièces bonne(s)
1393	Nb pièces mauvaise(s)
73.7427	Taux de rebuts [%]
- FAIL:** A prominent red button indicating a failed inspection.
- Mesure:** A table of measurements:

Mesure	Unité	Valeur
a D	°	179.1
a C	°	179.4
G p	°	89
D p	°	94
- Image Processing:** Four panels showing the original image, the detected target, the original image with a circular region of interest, and the processed image with a circular region of interest.

Standard UI

QVIBase, QVIPro, QVIProMS

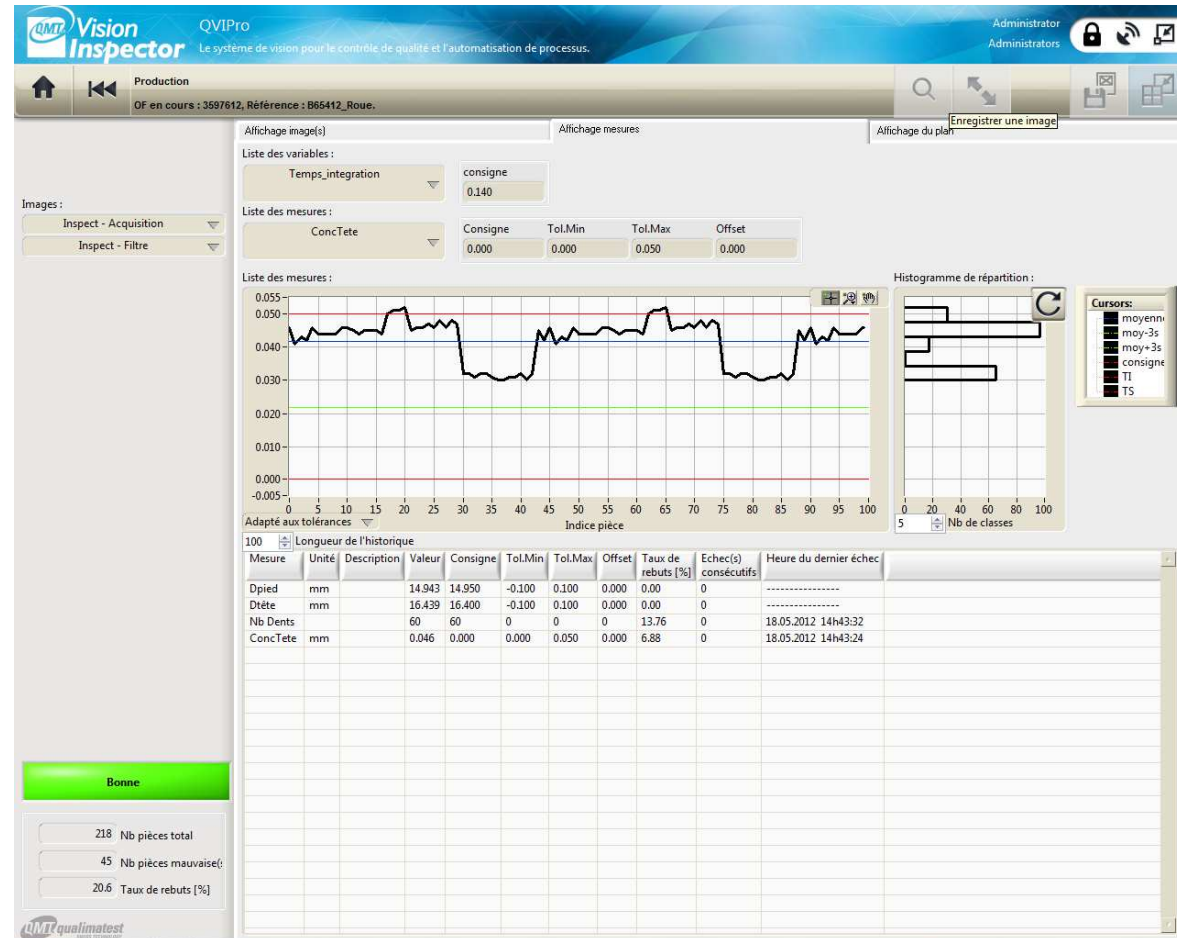
QVICom

Standard UI

QVIEngine

QVIHardware

- Variables, measurement selection
- Real time results logging
- Statistics calculations
- Reports, backup/restore



QVIEngine

Vision Builder AI Enhancements

QVICom

Standard UI

QVIEngine

QVIHardware

- “Family” notion: different references linked to only one inspection
- Reference management included: creation, duplication, deletion, rename, templates
- Modification by using only variables, one set for each reference

QVIEngine Reference Management interface showing a list of references (NB40GE, EVSQMT, 697213, 697213_I1R1, 697213_I1R2, 687132, COMMUNICATION_MODBUS_EVS) and a table for Measures and variables.

Name	Description	Type	Unit
img		S	

Name	Description	Type	Unit
Var1		N	
Var2		N	

QVIEngine

Vision Builder AI Enhancements

- Plugins developed by Qualimatest
 - Decision making
 - Select only relevant results (easy to understand for operators)
 - Tolerance management through the HMI

QVICom

Standard UI

QVIEngine

QVIHardware

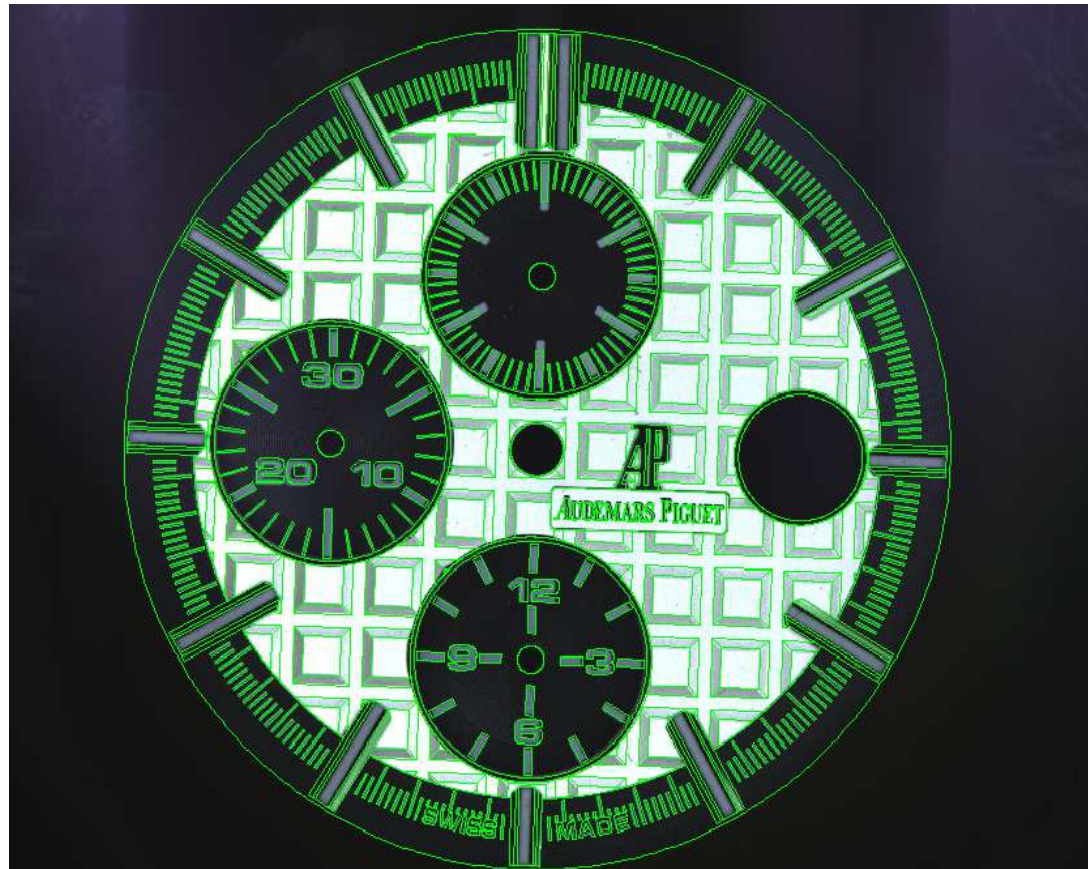
The screenshot displays the 'NI Vision Builder AI - Configuration - demo.vbai' window. The interface is divided into several sections:

- Gestion de mesure:** Contains a tree view on the left with 'Angle (degrees)' selected. The 'Opérations' column shows 'Pass'.
- Système prêt:** A configuration panel for the selected measurement. Fields include:
 - Nom de la mesure: Mes01
 - Commentaire: (empty)
 - Unité: °
 - Consigne: 60
 - Tol.Min: -10 (Valeur minimum: 50)
 - Tol.Max: 10 (Valeur maximum: 70)
 - Offset: 0 (Résultat actuel de la mesure: 65)
 - NbDécimales: 0
- Diagramme:** A flowchart on the right showing a sequence: Start -> Choice -> Acquisition -> Inspect -> Decision.
- Inspection Steps: Une image?:** A list of step descriptions, including 'Acquire Image' and 'Simulate Acquisition'.
- State: Decision:** A bottom section with a 'PASS' indicator and a 'Display Result Image for this State' checkbox.

QVIEngine

Vision Builder AI Enhancements

- Plugins developed by Qualimatest
 - CAD overlay
 - Automatic placement of the CAD on the image
 - Suited for form controls (the operator makes the decision)



QVICom

Standard UI

QVIEngine

QVIHardware

QVIEngine Vision Builder AI Enhancements

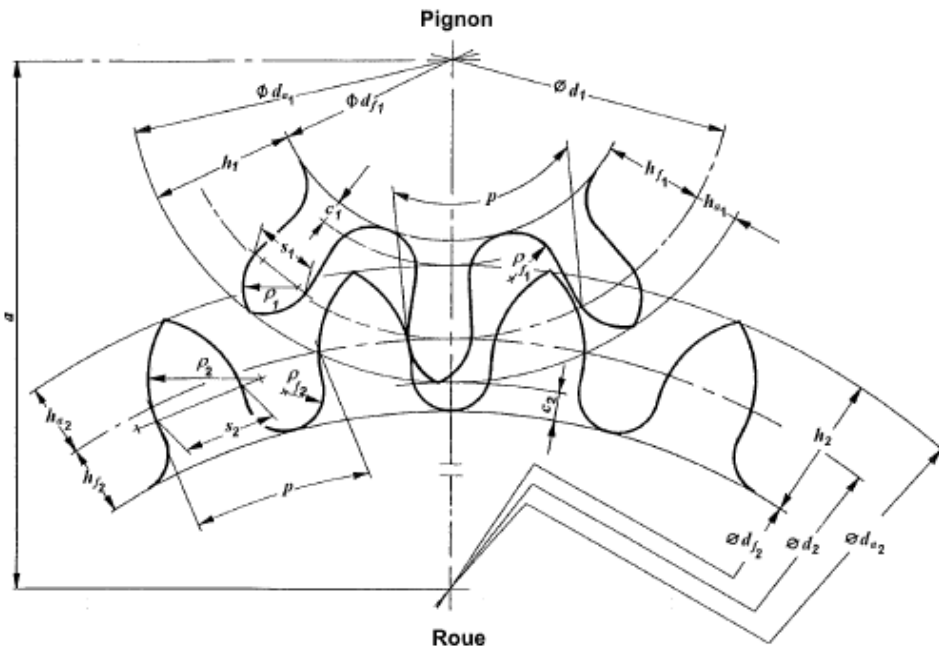
QVICom

Standard UI

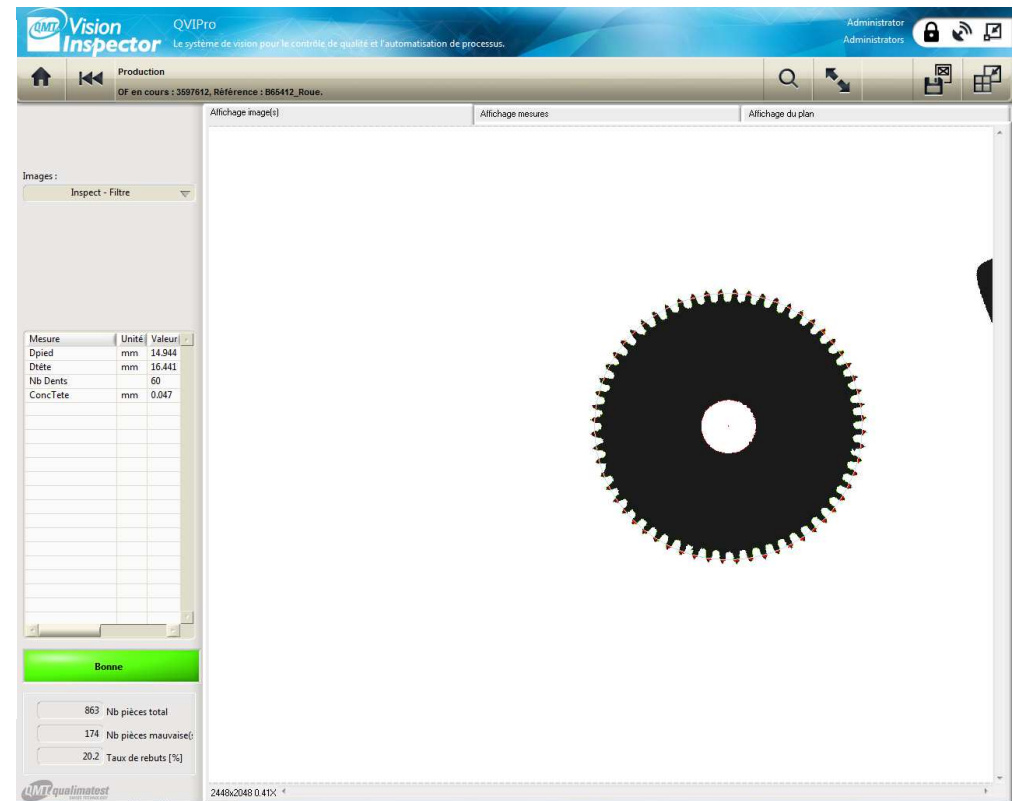
QVIEngine

QVIHardware

- Plugins developed by Qualimatest
 - Standard Wheel (specifically for watch industry)
 - Gives all results according to relative norm in one Vision Builder AI step



Extract : Norm NIHS SN 282 001



QVIHardware

- Includes the whole range of standard vision components that Qualimatest use

- Systems:



- Cameras:



- Lenses:



- Lighting:



- Cables: FireWire and Camera Link cables designed by Qualimatest

QVIHardware

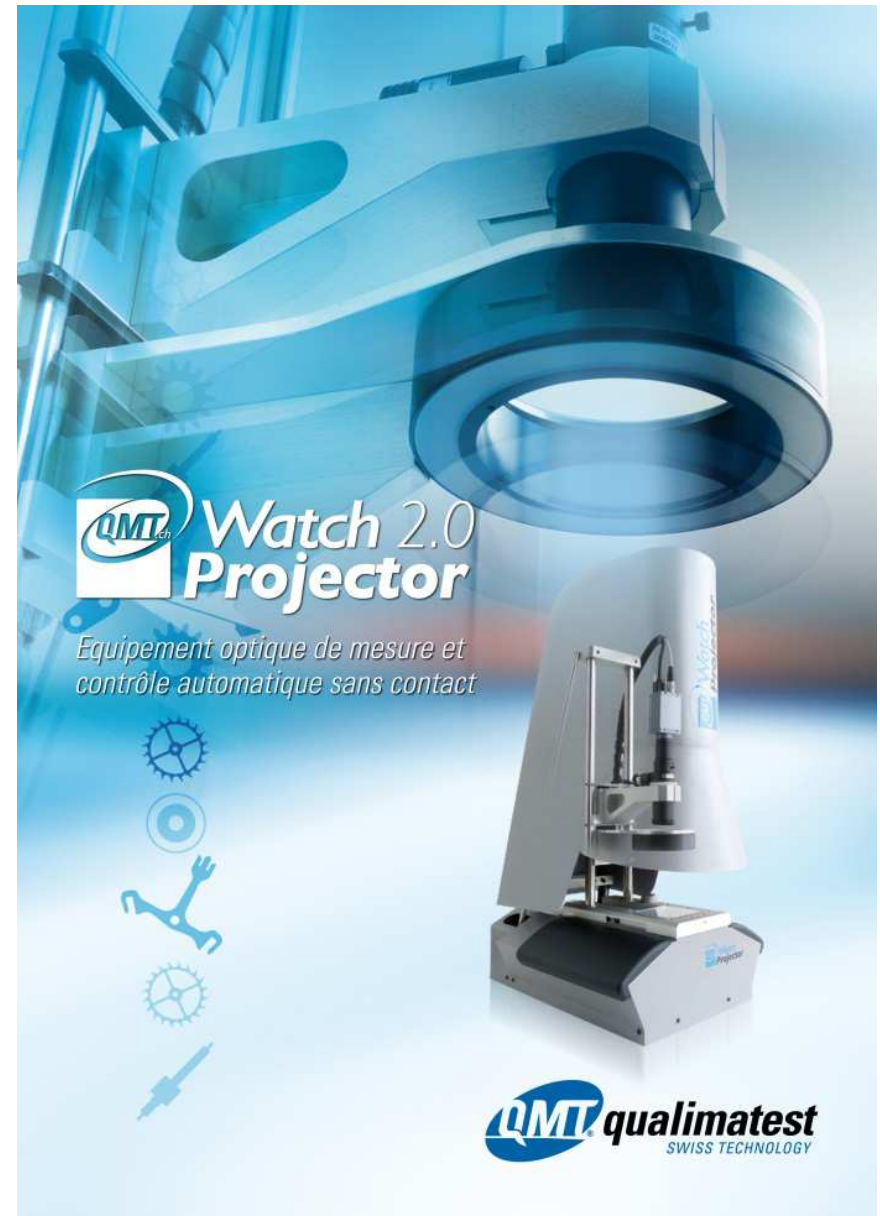
- All QVIHardware components are:
 - Documented (marketing, technical datasheets, ...)
 - Integrated into our internal database (prices, specific conditions, preferred distributors, ...)
- Using QVIHardware ensures our final customers of:
 - A mastered solution
 - A reliable solution
 - A long term solution

Typical Applications

Successes with QMT Vision Inspector

WatchProjector

- Optical equipment for measurement and automatic control
 - Based on the same architecture as QMT Vision Inspector
 - Parts are manually positioned
 - Suited for components smaller than 60 mm diameter



Sorting Machines

- All based on QMT Vision Inspector, the only required adaptations are mechanics frames and Vision Builder AI inspections
 - QMTInspect-R
 - High cadency 100% automotive parts controls

http://www.youtube.com/watch?v=ebrs9aoCM-Y&feature=player_embedded
 - QMTInspect-PL
 - Measures and sorts diamonds depending on their dimensions
 - http://www.youtube.com/watch?feature=player_embedded&v=kUzMI2Luxvg



Business Impact

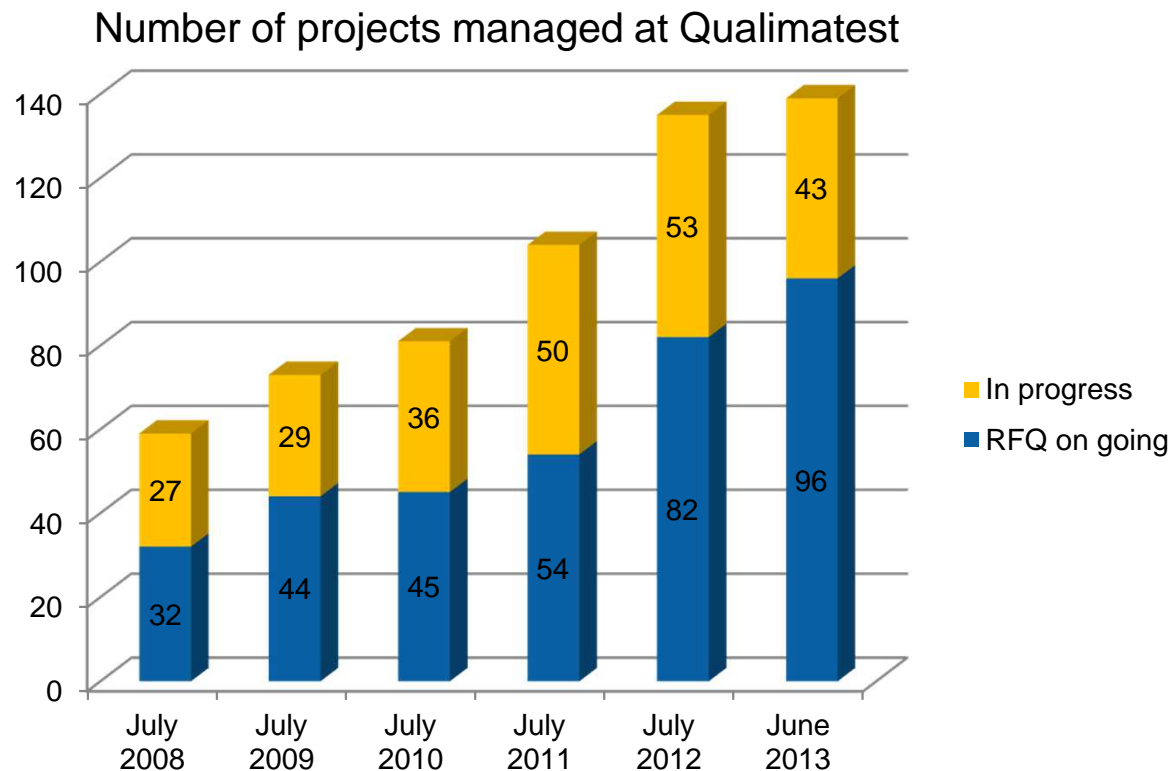
QMT Vision Inspector as a key factor on integration revenue

Business Impact

- Thanks to QMT Vision Inspector platform:
 - The re-use of material is automatic
 - 80% of our purchase orders based on 10% of our suppliers/distributors
 - Time to delivery is reduced and under control
 - 5 weeks for a single vision system (typical delay)
 - The possibilities of using Vision Builder AI are dramatically increased
 - Industrialisation with an easy, multiple-reference management system
 - Results coming from multi-target on sorting machines
 - Custom-made plugins turn it into a unique solution

Business Impact

- More than 200 systems delivered with QMT Vision Inspector during the last 3 years
- 50 projects by project manager
 - As an average, request for quote and in progress included



Conclusion

Conclusion

- Based on QMT Vision Inspector, our vision systems:
 - Are quickly designed
 - Suited to all of our strategic industrial application fields
 - Profit from existing functionalities of Vision Builder AI
 - Leave nothing to chance because of standards-based solutions
 - Guarantee a reliable system to our customers
 - Allow us to easily manage and develop either standard or specific custom solutions
- Feel free to visit our web site : www.qmt.ch
- Thank you for your attention!

Stay **Connected** During and After NIWeek

 ni.com/niweekcommunity

 facebook.com/NIWEEK

 twitter.com/#!/niweek

 youtube.com/niglobal