

## New InTouch Control with Intelligent Vision

Intelligent vision systems make automated organic chemistry technician a reality. The scope for combining state-of-the-art technology with the development of an automated organic chemistry technician is vast. Machine vision is a good example of this, where the latest improvements in camera capabilities, including memory and resolution, offer research chemists access to new analytic methods for improving product quality. And that's just for starters! New applications of intelligent vision now mean that investigations of downstream processing operations within the chemical industry are more manageable.

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Dr Bashir Harji,  
Cambridge Reactor Design*

Where pharmaceutical and other chemical industries are concerned, the four most fundamental downstream processing operations are filtration, extraction, distillation and crystallisation. Of these, both filtration and extraction have so far been demonstrated as amenable to machine vision in the Robot Assistant system manufactured by Cambridge Reactor Design (CRD)[1], using the Intelligent Vision capability available as part of InTouch software[2].

“Our basic philosophy is to make our clients lives as easy as possible by offering a multidisciplinary skill-set to deliver the solutions they are seeking,” says Dr Bashir Harji, CRD’s managing director.

Robot Assistant is a mechanical organic chemistry technician capable of performing a range of repetitive processing operations. The unit works 24x7, has a load carrying capability of 3kg, moves repeatedly and reliably to within 0.1mm, recognises motion, takes video images - and does not talk back at or argue with management personnel!

Machine vision is used in a variety ways within the system. As well as capturing images of key procedures and generating information on rate of change, the data gathered is used for critical real-time decision making, whereby the next steps in the process are determined via automated feedback loops.

The downstream unit operations Robot Assistant addresses are rarely thoroughly investigated as the tests are cumbersome and slow to carry out, and problems with the process may only become apparent on transfer to manufacturing scale. The Robot Assistant offers process R&D groups both the capability and the capacity needed to gain full process understanding, to challenge the limitations to the scale-up of downstream processing methods and so to design robust industrial processes.

As well as facilitating continuous process improvements, Robot Assistant also provides information that determines the impact of the process on productivity, the environment and waste treatment costs, facilitating the choice of the most cost effective, environmentally friendly option. For example, by investigating



robot in action



#### automated operations

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a range of solvent options, a solvent with a suitable boiling point to give a good recovery cycle yield with minimum contamination of water and air can be chosen, thus decreasing environment and waste treatment costs.

“The response of the pharmaceutical companies to robots performing downstream processing operations has been encouraging,” says Dr Harji. “CRD has an exclusive agreement to provide a global pharmaceutical company with five robotic platforms worldwide and these are already contributing to drug development.”

InTouch software was chosen for the Robot Assistant because it offered a comprehensive solution. It is easily integrated with all the required input/output hardware, offers a guaranteed method for controlling an articulated robot arm and allows users to interpret their downstream process with any number of graphical representations. For example, variability in temperature, time, mixing, pH control and solvents used in the downstream process can all be displayed visually. And, of course, the intelligent vision elements are fully incorporated.

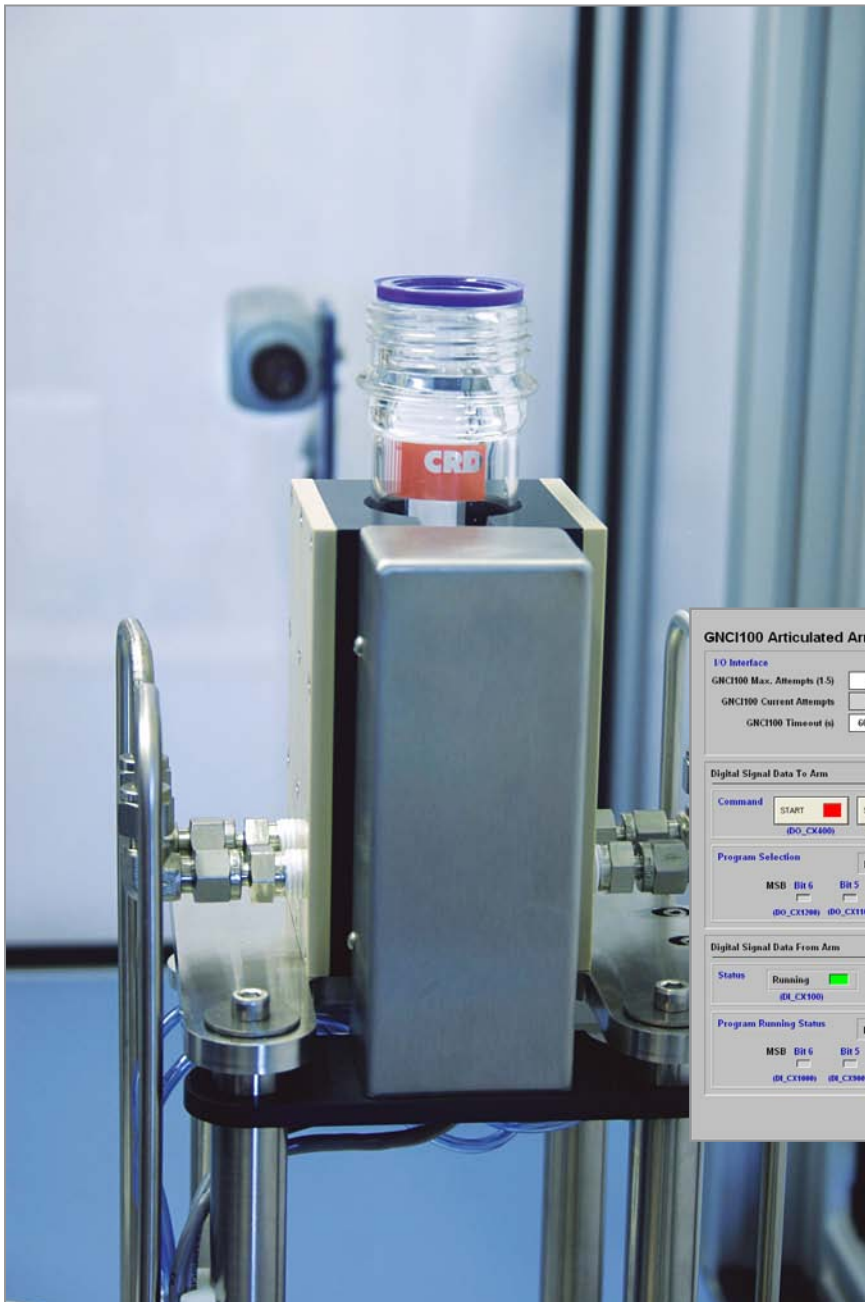
Dr Harji points out that the InTouch software is Federal Drug Administration (FDA) compliant,

will recognise information supplied from the Robot Assistant’s log, and is designed to be tamper proof. The log is fundamental to the system in that it tracks the robot and what it is doing at any moment in time, giving a secure audit trail.

“A master computer has Wonderware InTouch software installed, while slave computers enable us to control the intelligent vision systems and analytical sample preparation workstations,” says Dr Harji. “The workstations take samples and offer the right level of dilutions so the samples are ready to be analysed by the appropriate analytical system e.g. Gas chromatography (GC) or high pressure liquid chromatography (HPLC).”

“By using InTouch software there is a ready made software solution that is easy to implement to quite complex processes, which is a far cry from the traditional route of trying to write code using complex high-level languages,” says Dr Harji. “Also the availability of intelligent icons to reflect the ongoing performance of a real time robotic process makes it easy for users to interpret where they are during the course of continual processing. All that is needed is one Ethernet connection to the control system; one cable does it all.”

It’s clear that by combining clever hardware



machine vision

solutions, with novel machine vision applications, using InTouch software to integrate it all together, downstream processing operations within the chemical industry really can be more manageable - and the automated organic chemistry technician is a reality.[3]

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[1] CRD is a producer of integrated high throughput solutions and robotic platforms for the pharmaceutical and other businesses.

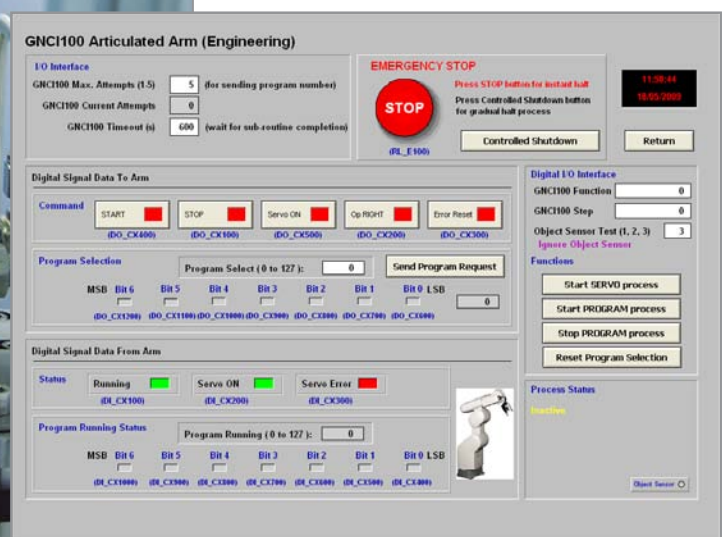
CRD was founded in Cambridge in 1989 with the remit of producing customised engineering projects for Cambridge and other UK universities. Services were expanded to UK and European companies with the company subsequently becoming a key developer of high throughput technology for Shell

International and Avantium Technologies. Today CRD is firmly established with a global customer base, also including the Energy Research Centre of the Netherlands, Dow, ICI, Nestle, The Royal Institution of Great Britain, and Total.

[2] InTouch software is provided by Wonderware United Kingdom, a trading name of Solutions PT Limited

[3] The solutions to coordination, handling and chemical performance have been designed in-house by CRD, and most of the parts have also been manufactured in-house.

The costs for Robot Assistant are in the range of £200,000 to £500,000 depending on the applications.



InTouch HMI screen

*Wonderware UK wishes to thank the following company for its valued contribution to this success story...*

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