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# **Assessing the suitability of holonic control to the commodity petrochemical industry**

**by**

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### **Abstract**

Holonic systems enable unprecedented levels of agility, flexibility and responsiveness. To the discrete manufacturer this presents a clear opportunity to pursue the holy grail of mass customisation.

The focal point of this dissertation is to establish the suitability of holonic systems to the basic chemicals sector. Its business drivers are fundamentally different from those of the mass-customised discrete manufacturer and it is therefore an area in which no research has previously been carried out.

After researching the concept of holonic systems (including modularity and intelligent agency), its application in the discrete manufacturing environment, as well as the basic make-up of the chemical processing industry, a technology strategy assessment framework is constructed.

A commodity petrochemical producer is analysed. A number of benefits presented by holonic control systems over traditional control systems is identified and include more optimal bottleneck management and structuring of overall process variability, more pervasive load balancing and constraint control, improved management of product, process and operator health, more effective utilisation of the available manufacturing flexibility, as well as more effective production accounting and understanding of the manufacturing process.

It is also shown that the holonic control system supports the potential future strategic posture of make-to-order and therefore presents a sustainable solution to the manufacturer.

Future research should focus on establishing an holonic architecture as well as performing functional-detailed studies into the application of holonic systems in the chemical processing industry.

**Keywords:** holonic control, modular, intelligent agent, commodity chemical processing industry, decentralised, agile

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