

## Smart-Sourcing resource expertise in process manufacturing to achieve operational excellence and gain the competitive edge

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*The Chemical Process Industry (CPI) landscape has changed substantially over the past few years. While the growing worldwide market has increased the demand for products, the existing established manufacturers in the USA and Europe, face new challenges from, new capacities in the Middle-East and Asia-Pacific combined with increasing demands on the environment, health and safety front. In order to compete with the newer technology based facilities in these lower cost geographies, older facilities need to work at the highest possible efficiency levels and strive for operational excellence.*

*A new work flow has been developed and successfully adopted by a few companies (early adopters) in the CPI, which utilizes, a spectrum of multi disciplinary specialists, high tech analysis and simulation tools and leverages a lower cost geography to cost effectively interpret and analyze the large volumes of information collected by the digital systems controlling manufacturing facilities. This work flow forms part of a separate business process focusing on continuous asset performance improvement, where smart-sourcing of the above expertise from a remote location, is an integral part.*

*Such a business process has been successfully set up and incorporated at several chemical and petrochemical facilities, to monitor daily operations, weed out errors in data, study operational inefficiencies, aid in root cause analysis, optimize operating conditions and sequences, improve energy efficiencies, optimize cleaning cycles, optimize capacity utilization, constantly benchmark with internal, external and theoretical best and in general drive towards Continuous Operations Performance Improvement, with very positive results.*

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**Steve Fodo:** *Steve began his association with Ingenero in 2004 as an Advisory Board member and has been instrumental in having the off shoring of process engineering accepted by major petrochemical companies in the US. Steve's prior petrochemical experience includes serving as the Vice President – Treasurer and Business Development of Westlake Chemical Corporation, a US based commodity chemical manufacturer; as an Advisor to Titan, a Malaysian chemical company; as a Senior Advisor to Credit Lyonnais Bank, Energy Division; as Treasurer of Citgo Petroleum, a Tulsa based refiner and marketer of gasoline; and as Treasurer of Gulf Oil – USA, formerly an integrated Energy Company.*

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## **The Changing World**

The rapidly growing economies in the Middle East and Asia have given a boost to the worldwide demand of products from the Chemical Process Industry (CPI). All of a sudden we have several billion people participating in the global economy. This is the good news for the existing established players in the CPI in Europe and the USA.

However, there are several new facilities being constructed in the Middle East and Asia, where they have a natural advantage in terms of lower factor costs, like energy in the Middle East and human resources in Asia, compared to those in the developed world. Also, a lot of the newer facilities will be utilizing newer process technologies. All this adds to the challenge the established players in the CPI face in order to remain competitive. The stricter environmental, health and safety norms in the EU and the USA will only further increase this challenge.

In order to effectively compete and extend the life of their operations, these companies will have to utilize new work paradigms that leverage contemporary communication technologies to improve their efficiencies. Such paradigm shifts are often difficult to effect. Trying to continue doing business as before, stretching existing business practices to the changing environment, may not be a good enough solution.

## **The present day technology revolution**

The turn of this century has experienced a technology revolution, not unlike the Industrial Revolution experienced at the turn of the last century. The step jumps in computing hardware along with the internet along with the host of technologies that enable easy access to it and computers around the globe and an easy way to communicate using the internet is a technology that is fast changing the way the world does business. Its biggest impact: Globalization.

What has globalization done? It has allowed access to suppliers in regions that may have been difficult to reach earlier. Companies now have a wider selection of suppliers they can select from to source their requirements. Companies that do not take advantage of this and continue to source all their needs from vendors in their immediate vicinity may find themselves not as competitive. Likewise, access to markets is now possible, even without having a physical presence. You can be selling goods to people half way across the globe, without even meeting or speaking to them. Globalization has also made remote resources available. Those resources, which have traditionally been local in nature! Globalization has suddenly introduced a population of about 3 billion people to the available work force.

However, in order to tap this work force, new business processes have to be defined, new work flows need to be put in place, new business practices have to be followed that may entail a paradigm shift from current ways of doing business.

This is not atypical of changes resulting from technology breakthroughs. As history has shown time and again, such breakthroughs do not happen very often and the introduction of the technology by itself does not boost productivity. Utilization of the technology to boost productivity requires new ways of doing business. Applications often dawn upon the majority of the people as hindsight, as in the case of the Xerox machine<sup>2</sup>.

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<sup>2</sup> Xerox had a consulting firm do a market survey to study the market for its copy machine. The results showed that there was no place for such a machine as the system of carbon copying was already in practice and people did not envisage it being replaced. A survey done today would show very different result - given the benefit of hind sight.

The history of the Industrial revolution has indicated that, technology revolution:

- ✓ Changed the way work was being done
  - Changes to business processes
  - Changes to old habits & paradigms
  - Development of new work flows that utilize the technologies effectively
  - The change took time to get adopted by all, normally following the following stages of adoption:
    - The early adopters
    - The early majority
    - The late majority
    - The laggards
- ✓ Requires top management drive for early adoption
- ✓ The nimble adopters survived and thrived

Smart-Sourcing makes the current day technology revolution operative.

### **New paradigms driven by Globalization**

In response to the changing world, businesses have been responding with strategies to address the new challenges and better utilize new found opportunities, on the market, supply and operations. On the market side, existing businesses are increasingly repositioning themselves, re-branding, acquiring companies, introducing newer internet based channels to market, in order to access new markets. On the supply side, companies who have not as yet installed ERP systems (the late majority) to integrate their supply chain are doing so and the early adopters are utilizing the internet and e-sourcing sites to improve their cost of goods sold positions. On the operations side, larger players are going in for mergers and acquisitions or building new facilities in lower cost geographies, to improve manufacturing cost positions. Companies are looking at possibilities of improving efficiencies through the R&D route.

A strategy that was looked at to improve operating efficiency which has been very successfully applied in the areas of Finance, Banking, Airlines, IT, design engineering, by several companies in the mid 90's by the early adopters is now being adopted by the early majority. Work flows were developed by companies either internally or by third party companies to be able to package and offshore or outsource part of their work process to companies in lower cost geographies. Apart from cost advantages, the focused and more detailed work in these areas helped improve intrinsic efficiencies as well. There are several examples of such companies that one would come across if one reviews some of the work being done in these areas in India, China, East Europe, etc. There are several examples of Smart-sourcing of resources from India. Citibank and HSBC have large centers processing transactions for their worldwide operations based out of India taking advantage of the availability of trained English speaking resources and the lower cost. Companies like Dow, Shell and Phillips have set up large R&D centers in India. Companies like Shell and Chevron outsource a significant portion of their IT work, to centers in India, both third party and internal. Engineering companies have been getting a portion of their design work done in India for several years now.

A work flow process has now been developed in the operations and maintenance area of manufacturing in the CPI. This work flow process is now part of a separately defined business

process, focused on continuously improving the efficiency of their existing assets. Several of the early adopters have found this to be a successful strategy.

## **Operating paradigms in CPI manufacturing**

The 80's and 90's saw the implementation of digital control systems and structured databases (DCS and Historians) at manufacturing facilities in the CPI. Prior to the installation of such systems there were a large number of engineers employed to just collect this data from diverse sources and compile them into usable information. There was obviously a limit to how much could be collected and compiled. With the installation of the DCS systems and historians a lot of this work process was automated. This was followed by a paring down of staff in this area.

The business process following the collection and compilation of the information is key, since this is where the information is interpreted, converted into knowledge and hence into actions which are implemented and give results. With the installation of the DCS systems and databases a lot more information was made available, but most organizations did not make changes to handle this greater volume of information. With the result there was no real change in the information being utilized from when there was a lot of manual data collection. A poll carried out in 2002 in N. America indicated that about 80% or more of the information generated was just being archived and never looked at. There is a wealth of information in this 80% that if utilized can help improve performance.

However, this process of utilization of the information, interpretation, conversion to knowledge and action requires a team with multi-functional expertise and access to sophisticated analysis and simulation tools, especially in the CPI. The type of focused resources necessary to analyze and utilize this data, are typically not available at most process sites, in the CPI. As a result the focus of most operations is to run the process in a stable way, meet production targets (which may be below what is the best possible) and conform to regulatory norms. A larger team with more expertise with access to and trained on a bevy of tool kits, will have to be set up and maintained in order to plough through the available information and glean benefits. This cost of doing this (up front and ongoing) is usually a deterrent and hence has not been implemented at most companies so far.

As a result of the above, in most process manufacturing operations it is found that,

- Both the Plant Operating Staff and Technical Support Staff are drowning in a sea of data that they do not have the bandwidth (time and tools) to analyze
  - Budget constraints and economic conditions preclude hiring more people dedicated to analyze this data for manufacturing improvements
  - The level of focus and unequivocal attention required to such a business process is seldom possible, with a technical services team, with the constant distractions from ongoing operations and capital projects
  - Such analysis requires a team of multi-functional people, much like an orchestra

The end result is that several possible **cost reductions** and other **operational improvements** go **undetected** and emphasis defaults to fire fighting.

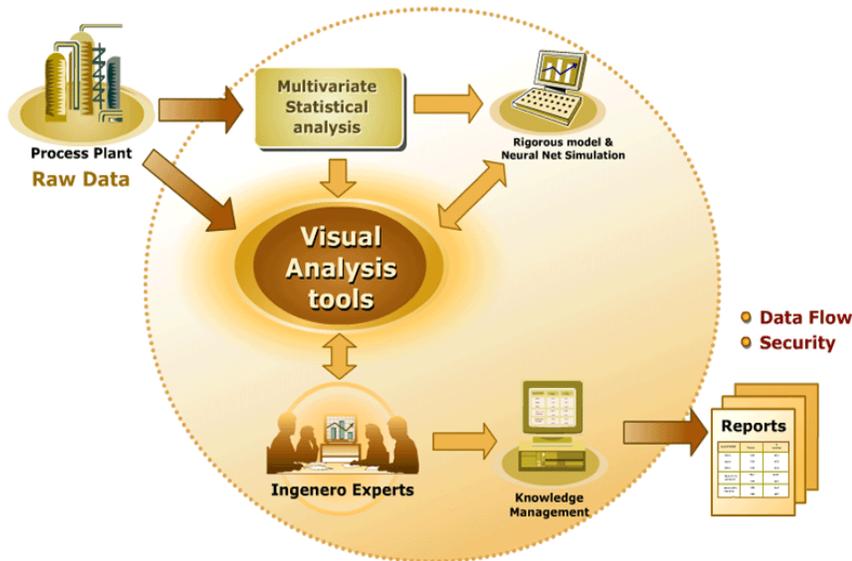
## New work flow paradigm for CPI manufacturing operations

Now with the new work flow and solution, where a bulk of this business process can be smart-sourced from a remote location, with access to trained and lower cost resources, the short term cost vs benefits (short and long term) and the short ROI, it becomes a very interesting proposition. This process enables the asset performance to be improved continuously, while the normal functions of meeting production targets (normally improved), stable operations and regulations are being met.

The Intelligent Process Operations Guidance (IPOG) solution, is an example of a new innovative smart-sourcing paradigm. This has been implemented successfully by several early adopters so far. The IPOG solution leverages the Internet and allied technologies and utilizes global resources effectively.

The structure of the IPOG solution is shown in Figure 1 below. Several analysis tools like simulation, statistical tools, visual analysis tools are tied together into an integrated process. A team of experts and analysts form an integral part of the IPOG solution.

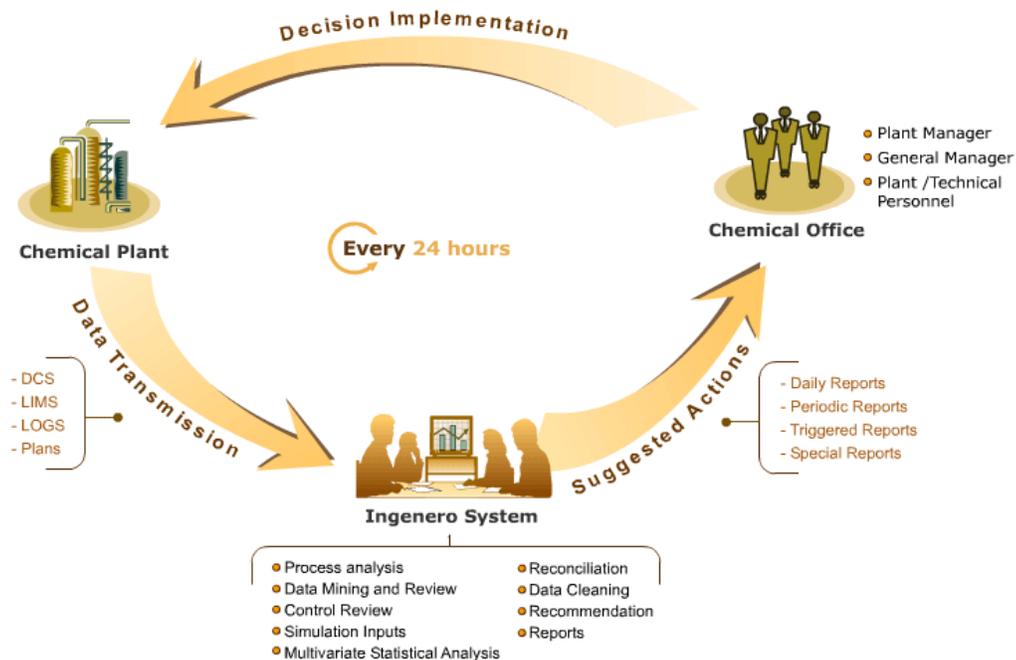
**Fig 1: Structure of the IPOG solution**



## Effective application of the IPOG Solution

The IPOG solution is a necessary business process that combines analysis tools with human experts. It is most effective when it is utilized in a continuous manner as shown in Fig 2, where the global data network connectivity is leveraged to station the bulk of this business process at a remote central site and service multiple plant sites.

**Fig 2: Effective utilization of the IPOG solution**



## Key components

The key enablers of the IPOG solution are:

- The team of multi-functional experts continuously performing engineering calculations and doing a focused analysis of the data without the normal distractions found in an onsite workplace
- The remote connectivity to the data collection systems at the plant
- Utilization of simulation, statistical analysis and visualization and other data analysis tools

## Benefits from the IPOG Solution

Application of the IPOG Solution provides the following benefits:

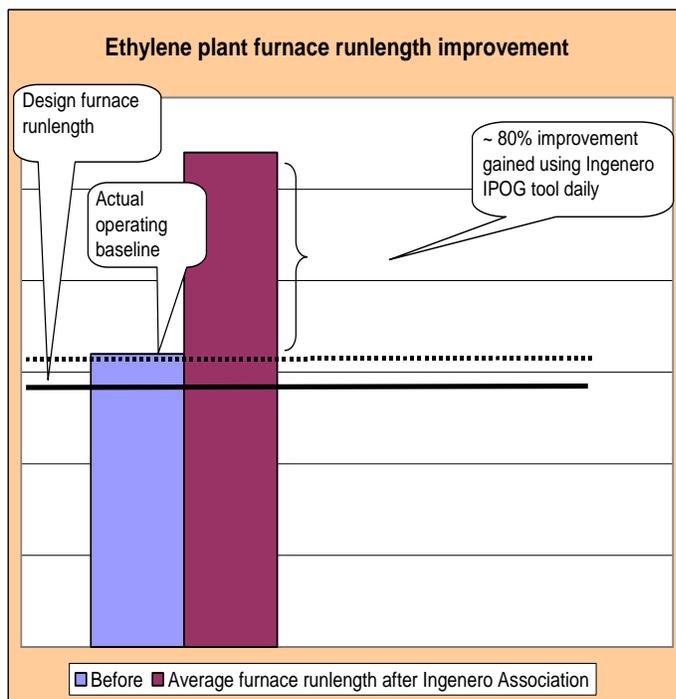
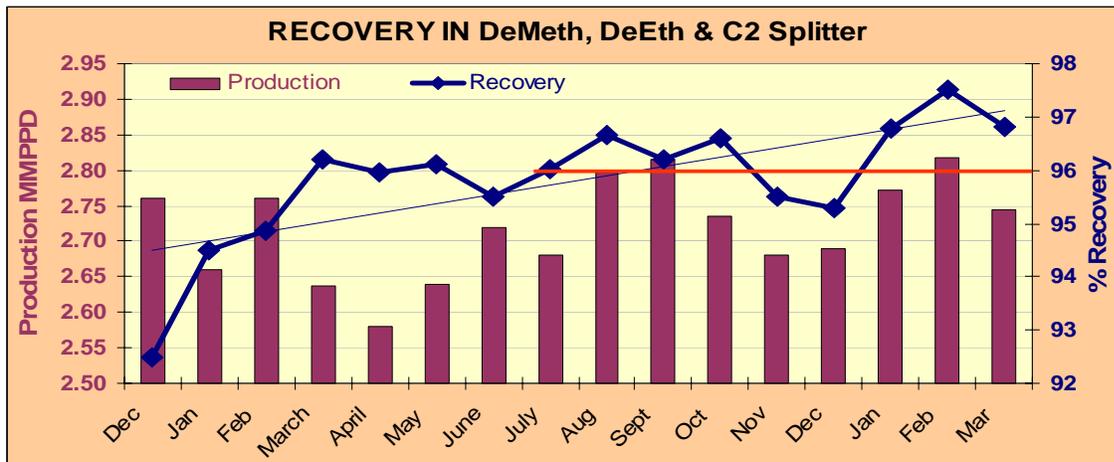
- Captures “missed” operational improvements
  - Lower production costs (energy, raw material) through incremental efficiency capture
  - Higher throughput/production
- Enables operation at technical limits
- Cost avoidance
  - Equipment monitoring; reduced repair/downtime
- Soft benefits
  - Increased safety via “second set of eyes”
  - Enhances return on existing technology investments
  - Increases employee value
- Focus on value added tasks

This business process is ideally outsourced to a remote low cost geographic location, where the necessary skills are available, thereby circumventing the need for new resources, skill sets or job descriptions, in-house. Such a system can be very easily made totally compatible with existing work processes and staffing levels. The benefits from such a structuring of the business process exceeds the cost of setting the process by an order of magnitude.

## Performance Improvement Examples

The type of performance improvements resulting from the IPOG Solution, offered by Ingenero, is illustrated by a couple of real life examples illustrated below in figures 3 and 4.

**Figure 3: Bulk chemicals manufacturer performance improvement example**

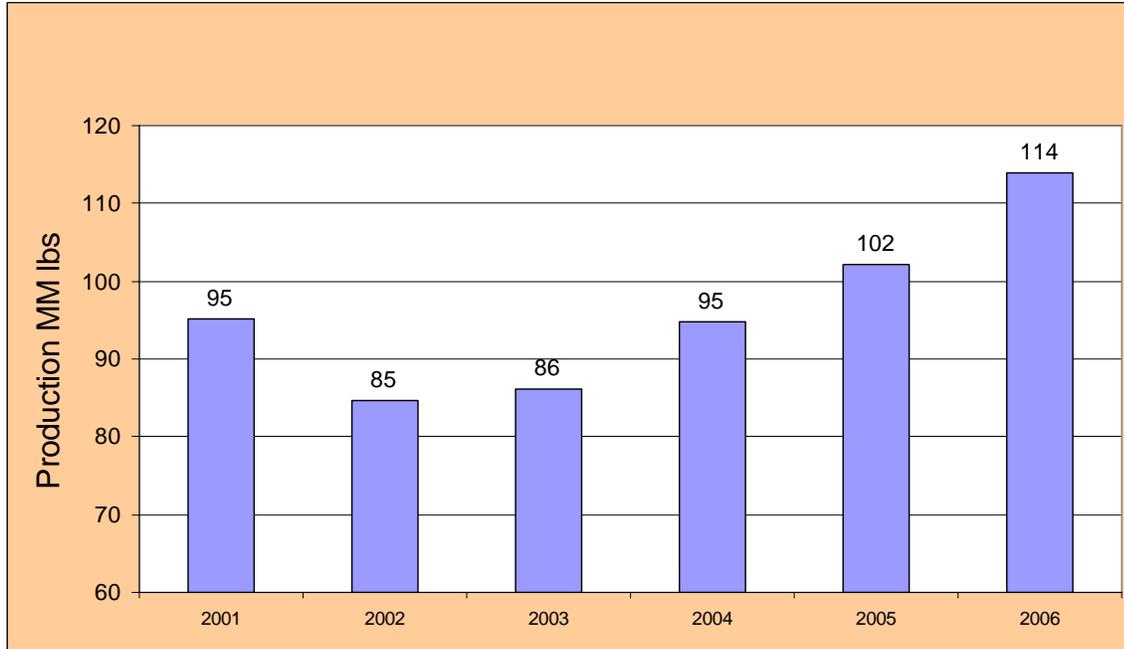


**US\$ 4.5 Million  
Additional value delivered**

- Improved energy consumption
- Improved recoveries & yield
- Improved production
- More stable operation

**Fig 4: Performance improvement at an Intermediates manufacturer in N. America**

**US \$ 2.2 Million additional value delivered**



**IPOG  
solution  
adopted  
in 2004**