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Title	**Master cost competitiveness – ride the next wave in commodity chemicals.**
Summary	Co-attributed to VP Rob Howard and Senior Principal BC, Dr. Jimmy Zhu, this byline calls for producers to focus on improving cost competitiveness, as many emerging commodity chemicals markets, such as China, are experiencing growing pains. Thus, manufacturing cost competitiveness is the next strategic imperative to determine survival. This article showcases how producers can master manufacturing cost competitiveness.
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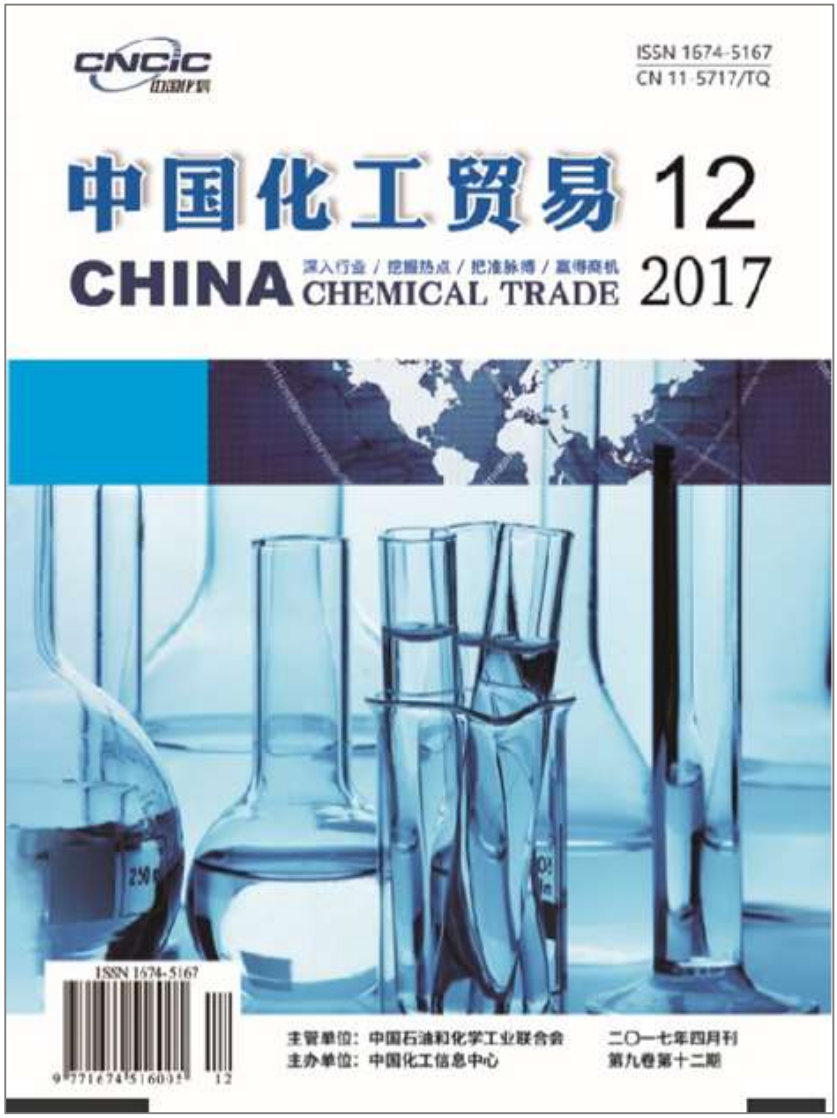

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降低成本、提升竞争力，抢占下一波化工大宗商品商机

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摘　要：为提升大宗商品竞争力，促进企业的快速发展，本文提出了以下五点策略，具体包括保证工艺安全、制定高效计划、促进改进生产结构、提升工厂可靠性和控制盈亏底线，旨在降低成本、提升竞争力，抢占下一波化工大宗商品商机。

关键词：大宗商品；成本；竞争力

目前，许多新兴化工大宗商品市场（如中国）正在经历着越来越剧烈的萧条期。但是随着亚太地区中产阶级正在快速崛起，他们的消费需求正在不断增长，对化工大宗商品的市场需求也将不可避免地回升，因为化工大宗商品对消费和工业部门的经济发展至关重要。化工大宗商品厂商需要把重心从原来的业务增长转向降低成本、提升竞争力。他们需要降低运营成本，提高生产绩效，而不依靠资本投资。制造成本竞争力将成为区分市场领导者与落后者并决定企业生死存亡的新战略。因此，为了提高可靠性和安全性，降低原料成本和能源成本十分重要。因为原料和能源这两项成本占化工大宗商品成本结构的60~80%。为了帮助生产厂商降低制造成本、提升竞争力，我们建议实施以下五个战略，其中包含了必要的步骤：

1 工艺安全至关重要

化工装置的不安全操作可能导致高昂的成本，如造成伤亡、破坏环境、监管罚款和刑事处罚。生产厂商必须通过提高工艺的安全性来降低操作风险。作为最基本也是最有效的安全生产的最佳实践，“系统完整性超压保护”能确保临界压力释放系统具有足够的规模以保护设备，特别是当装置处理量增加或运行模式随时间变化时尤为重要。“减压危害识别”有助于发现减压导致临界低温，可能威胁工厂的安全。“安全运行窗口管理”是定义和主动监控整个工厂的全套安全运行参数的最佳实践。包括陶氏化学（Dow Chemical）在内的一些公司已经采用了艾斯本在安全方面的工程和制造解决方案，通过加深对危害的了解、改进设计和操作方法来降低运行风险。

2 高效计划优化十分重要

原料的选择对成本结构的影响超过任何其他因素。“原料优化”用于筛选各种原料及产品组合，计算转化率、能源消耗和利用的最佳实践，以获取最大利润率。“一体化炼厂/石油化工计划优化”将综合考虑炼油厂原油选择和炼油厂操作参数，以及这些参数对同一地点的石油化工厂的成本的影响，进而实现整体计划优化。包括利安德巴塞尔（LyondellBasell）、韩华道达尔（Hanwha Total）和北欧化工（Borealis）在内的多家公司已经采用了艾斯本先进的计划优化解决方案，在各种复杂的市场条件下，能优化其工艺装置生产和实现最优卡边操作。

3 通过有效测量来实现成本控制

成本控制需要及时、有效地测量工厂的详细成本驱动因素。“自动关键绩效指标（KPI）计算”是创建带有实时操作数据的KPI的最佳实践，其目的是持续测量成本结构驱动因素。“实时质量监控”是不断计算和显示产品质量相关的KPI的最佳实践。“绩效仪表盘板”可在单个可见的仪表板中显示所有与成本相关的KPI并与目标相对照。包括巴斯夫（BASF）、沙特基础工业公司（SABIC）和卡博特（Cabot）在内的多家公司已经采用了艾斯本的生产制造执行系统来降低能耗，提高产品质量并提高资产利用率。

4 持续理解和改进

通过对工艺装置流程－包括性能、产能和工艺约束的深入了解对于改进成本结构至关重要。过程模拟建模的应用是完成该任务的基础。建立“模型库”是开发工艺装置关键系统的过程模拟模型，深入理解生产工艺过程因果关系的最佳实践。“模型增强型故障排除”以模型库为基础，应用过程模拟模型来帮助诊断生产问题，并找出需要调整的操作以解决工艺约束问题。“工艺改进识别”应用过程模拟模型来找出需要进行微调的改进设计，以改善成本结构。“生产优化”在工艺装置中较大的区域应用过程模拟模型，以实现工艺装置内部和不同工艺装置之间的成本驱动因素综合折衷优化。包括陶氏化学、BP Chemical和LG化学在内的多家公司已经采用了艾斯本的工艺工程解决方案，通过改进操作和采用低投资设计方案来改善成本结构。

5 有备无患

装置意外停车可能会大大增加运营成本，并侵蚀其他领域的收益。不断提高工厂可靠性是持续改进成本结构的前提。“设备性能监测”是用于监测工艺设备性能（如热交换器结垢）的最佳实践。“可靠性及可用性建模”根据工厂各组成部分的可靠性和可用性来评估整个工厂未来的效能的最佳实践。“预测性和规范性分析”用于预测即将发生的设备故障，并提供纠正建议以避免或减少可预见的故障。包括INEO在内的一些公司已经采用了艾斯本在可靠性方面的工程、制造和资产管理解决方案，通过提高工厂的可靠性来改善成本结构。

6 控制盈亏底线

领先的化工大宗商品生产厂商通过应用安全、可靠性、生产计划优化、操作管理和工艺改进方面的行业最佳实践，将运营成本降低5%至10%。上面介绍的各种战略方法具有投资相对较少，可采用模块化部署，也可作为整体改进计划的一部分。这些方法可应用于各种化工生产厂商，包括老厂、新投产的工厂以及已运行了一段时间的化工厂。鉴于当前的行业挑战，提升制造业在成本上的竞争力将成为新兴市场生产商未来几年的重要任务；制造业在成本上的竞争力将对其市场份额、产能利用率和财务业绩产生重大影响。以技术支撑最佳实践来降低成本、提升竞争力不仅是业务改进的有力杠杆，也是决定哪些生产厂商最有可能在下一波化工大宗商品商机中脱颖而出的重要因素。

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Appendix:

Master cost competitiveness – Ride the next wave in commodity chemicals.

Is it truly darkest before dawn? Currently, many emerging commodity chemicals markets, such as China, are experiencing growing pains. Accustomed to easy double digit capacity and demand growth in a market worth trillions of dollars, industry players are realizing that the heady days of the past are now gone, at least for the immediate future. Business headwinds include slowing demand growth at a time when many new plants are still being commissioned, leading to lower utilization and increased competition. Emerging market producers also face a looming wave of new, cost advantaged capacity in North America that is well poised to disrupt the global commodity chemicals marketplace.

However, it is not all gloom and doom, as Asia Pacific is home to a burgeoning middle class population with increasing consumer needs. Demand will inevitably return for commodity chemicals, as they are essential to the economic development of both consumer and industrial sectors. Until then, commodity chemical producers need to shift their focus from growth to improving cost competitiveness. They need to lower operating costs and improve manufacturing performance without relying on capital investment. Manufacturing cost competitiveness will be the new strategic imperative that separates market leaders from laggards and determines survival. Thus, it is critical to address feedstock and energy costs, which represent 60-80% of the cost structure for commodity chemical producers, in order to improve reliability and safety. To help producers master manufacturing cost competitiveness, we have encapsulated the necessary steps in the following five-prong strategy.

First, process safety is paramount.

Unsafe operations of chemicals facilities can lead to immeasurably high costs, such as the loss of life, environmental damage, regulatory fines and criminal penalties. Producers must relentlessly lower operational risk by increasing process safety. A foundational safety best practice, Overpressure Protection System Integrity, ensures that the critical pressure relief system is adequately sized to safeguard the plant, especially when the plant throughput increases or operational modes evolve over time. Depressurization Hazard Identification is a best practice for identifying areas, where depressurization can produce critically low temperatures that threaten plant integrity. Safe Operating Window Management is a best practice for defining and actively monitoring the full range of safe operating parameters for an entire plant. Companies, including Dow Chemical, have applied safety-related engineering and manufacturing solutions from AspenTech to reduce operational risk through deeper hazard understanding, design enhancements and operational improvements.

Second, effective planning is crucial.

The selection of feedstock impacts cost structure more than any other factor. Feedstock Optimization is a best practice in screening a multitude of potential scenarios for feedstock selection, product mix, conversion, energy consumption and utilization to determine the highest margin operation. Integrated Refinery/Petrochemical Optimization extends feedstock

optimization to include refinery crude selection and refinery operating parameters that impact costs for co-located petrochemicals plants. Companies, including LyondellBasell, Hanwha Total and Borealis, have applied advanced planning solutions from AspenTech to optimize their facilities and operate closer to constraints, regardless of market conditions.

Third, measure to control.

Cost control requires timely, effective measurement of the detailed cost drivers in a plant. Automated Key Performance Indicator (KPI) Calculation is a best practice in creating KPIs with real-time operational data to measure cost structure drivers on a continuous basis. Real-Time Quality Monitoring is a related best practice, where product quality-related KPIs are calculated and displayed continuously. Performance Dashboarding is a best practice for displaying all cost-related KPIs versus targets in a single, visible dashboard. Companies, including BASF, SABIC and Cabot, have applied manufacturing execution systems from AspenTech to reduce energy consumption, improve product quality and increase asset utilization.

Fourth, understand and improve.

Deep understanding of a plant's process, including its performance, capability and limitations, is essential for improving cost structure. The application of process simulation models is fundamental to that mission. Establishing a Model Library is a best practice in developing process simulation models of key systems in the plant to improve cause and effect understanding. Model-Enhanced Troubleshooting builds on a model library, applying process simulation models to help diagnose production problems and determine operational adjustments to mitigate them. Process Improvement Identification applies process simulation models to determine minor design modifications to enhance cost structure. Production Optimization applies process simulation models across larger sections of a facility to balance cost driver tradeoffs within and between different process systems. Companies, including Dow Chemical, BP Chemical and LG Chem, have applied engineering solutions from AspenTech to improve cost structure via both operational changes and low investment design changes.

Fifth, expect the unexpected.

Unplanned downtime can significantly increase operating costs, destroying gains made in other areas. To make sustainable improvements to cost structure requires relentless focus on increasing plant reliability. Equipment Performance Monitoring is a best practice for monitoring equipment that is subjected to process fouling, such as heat exchangers. Reliability and Availability Modeling is a best practice for evaluating the future effectiveness of an entire plant, based on the reliability and availability of its individual elements. Predictive and Prescriptive Analytics form the basis of a best practice to predict impending equipment failures and advise on corrective actions to avoid or mitigate forecast failures. Companies, including INEOs, have applied reliability-related engineering, manufacturing and asset management solutions from AspenTech to improve cost structure via increased plant reliability.

Master the bottom line

Leading chemical producers have reduced operating costs by 5 to 10% through the application of industry best practices for safety, reliability, production planning, operations management and process improvement. Most of the best practices discussed can be implemented with relatively little investment and deployed in modular format or part of a holistic improvement program. They can also be applied to the full spectrum of chemical facilities, including older plants, newly commissioned ones and those in-between. With the current industry challenges, manufacturing cost competitiveness will be a priority for emerging market producers for the next few years and have a material impact on their market share, capacity utilization and financial performance. Mastering cost competitiveness via technology-enabled best practices is not only a powerful lever for business improvement – it also determines which producers are best positioned to ride the next wave of growth in commodity chemicals.

(About 1,000 words)