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PERP Report 2016S3: Nylon 6 and Nylon 6,6

"Nylon 6 and Nylon 6,6" is one in a series of reports published as part of the 2016 Process Evaluation/Research Planning (PERP) Program.

Report Overview

Polyamides, often also referred to as nylons, are a major class of engineering thermoplastic resins that are used in the production of fibers, films and molded articles. Nylon 6 and nylon 6,6 are the most important and highest-volume types and are the focus of this report. Nylon 6 is made by the ring-opening polymerization of caprolactam while nylon 6,6 is from the polycondensation of HMDA and adipic acid.

The nylon industry today is considered fairly mature, with the latest technology developments providing only incremental improvements in process efficiency, reactor design and product quality. Inter-material competition from polyesters and polypropylenes has dulled supplier interest in investing even modest resources in developing new products or grades. However, nylon compounders have been focusing on offering reinforced resins with tailored performance needs for specific applications (e.g. metal-replacement components in automotive).

The automotive segment accounts for the largest share of polyamide demand as an Engineering Polymer, due to the global high demand for light weight vehicles.

This PERP report provides an overview of the production, commercial technology, market and economics of nylon 6 and 6,6 polymers, including nylon 6,6 monomers and nylon compounds. The following issues are addressed in the report:

- What are the major nylon production routes and how do they differ?
- What nylon technologies are available for license?
- What is the current market environment for nylon?
- Who owns and what is the capacity of nylon plants operating in major regions of the world today?
- What advantages do nylon 6 and 6,6 resins offer in regards to end use applications, and material properties?

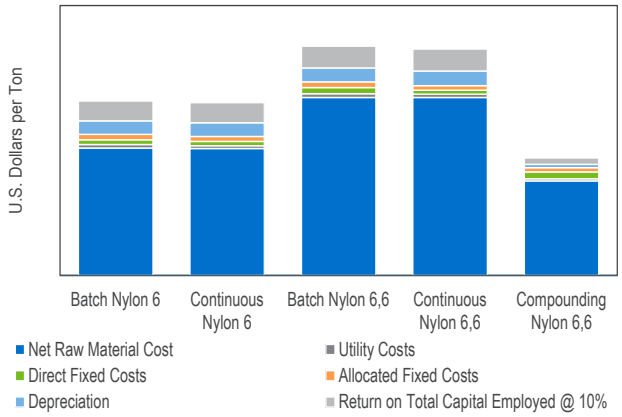
Commercial and Developing Technologies

The majority of existing units for nylon 6 and 6,6 are continuous polymerization systems. The batch process is generally used only for the production of specialty grades with unusual molecular weights or master batch polymers with special additives. This PERP report covers the conventional production technology and economic aspects of nylon 6 and 6,6 resins as well as talc-filled nylon 6,6 compounds.

Process Economics

Detailed cost of production estimates for commercial nylon 6 and 6,6 technologies on a USGC, W.E. and China basis are presented. A comparison between nylon 6 and nylon 6,6, produced by both batch and continuous processes, provides insight into the advantages and disadvantages of each technology. Mineral-filled nylon 6,6 via a twin-screw extruder is also evaluated.

COMPARATIVE COST OF PRODUCTION OF NYLON 6 AND NYLON 6,6 TECHNOLOGIES



Commercial Market Review

Global nylon consumption in 2015 rose to about 7.3 million tons, driven by the increasing demand from the automotive sector and fibers/textile applications. Vehicle emission standards and the demand for lighter automobiles are likely to continue driving the growth trend for nylon over the forecast period. Other key end-use markets include electronics & electrical, industrial yarns, packaging and consumer goods.

This PERP report provides an overview of the supply and demand of nylon on both a global and regional basis, and includes a capacity listing for each region.

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Corporate Headquarters
Tel: +1 415 369 1000
101 2nd St Suite 1000
San Francisco
CA 94105-3651
USA

Americas
Tel: +1 914 609 0300
44 S Broadway, 4th Floor
White Plains
NY 10601-4425
USA

Europe, Middle East & Africa
Tel: +44 20 7950 1600
1 King's Arms Yard
London EC2R 7AF
United Kingdom

Asia Pacific
Tel: +662 793 4600
22nd Floor, Rasa Tower I
555 Phahonyothin Road
Kwaeng Chatuchak
Khet Chatuchak
Bangkok 10900
Thailand