



# Technology Fact Sheet

For Further Information Contact:  
Media: Jan Sieving +1 832 513 1111

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## Kazakhstan Petrochemical Industries Using Polypropylene Technology from Lummus Novolen Technology

- Owner :** Kazakhstan Petrochemical Industries Inc. LLP (KPI)
- Location:** Karabatan, Atyrau Region of Kazakhstan
- Process:** Polypropylene
- Capacity:** 500,000 metric tonnes per annum (MTA)
- Production:** Homo, random and impact polymers for standard and specialty applications
- Technology:** Novolen® advanced gas-phase polypropylene technology
- Description:** The Novolen polypropylene process uses one or two vertical, stirred bed, gas-phase reactors. Homopolymers and random copolymers are manufactured in a single reactor or in a two reactor parallel operation, depending on the required capacity and product range. The parallel operation of two reactors allows the production of bimodal grades suitable for advanced BOPP film applications. If the production of impact copolymers is required, two reactors are connected in series: in the first reactor, propylene homopolymer or random copolymer is polymerized; in the second reactor, rubber is added by polymerizing an ethylene/propylene mixture.
- CB&I Advantage:** Novolen provides an economically advantageous technology, which will enable KPI to produce the most modern products to effectively serve its local and export markets.

### Benefits:

FEATURES	BENEFITS
Economically advantageous production of homopolymers, random and impact copolymers with the use of only one highly active catalyst system; possibility of producing Novocen™ metallocene products	Lowest operational cost coupled with high reliability and access to modern grades such as bimodal grades for BOPP

Exceptional lot-to-lot and within-lot uniformity	Necessary for film and fiber applications, which need consistent and tight specifications
Exclusive powder deactivation; solvent-free process	Very low taste and odor level for highly demanding applications (e.g., food packaging)
Simple process features and easy operation, highly reliable agitated gas-phase technology	Highest on stream time; among the lowest operating and maintenance costs in the industry; exceptionally fast shut down and restart times
Optimized reactor/process control	No requirement for an Advanced Process Control system; rapid grade changes
Lowest hydrocarbon inventory in the reactor system	High intrinsic safety; no requirement to use a blow down system and minimum flare requirements

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