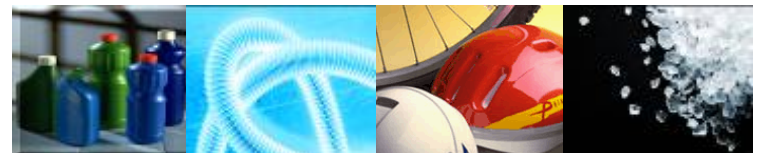


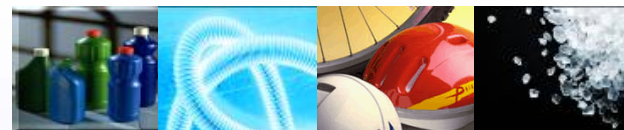
INEOS Technologies

A New Face to the Innovene PP Process

Dr. Daniel Rondelez
Director of Polyolefins R&D
14 June 2010



The new face of Innovene PP Technology



- Innovene PP Today – a great foundation
- Improved Economics
 - Larger reactor design to accommodate large scale plants
 - INcat P100: improved introduced cost
- Extended Product Range
 - **INstage** process option
 - **INcat** advanced catalysts

Innovene PP + INstage + INcat

Innovene PP

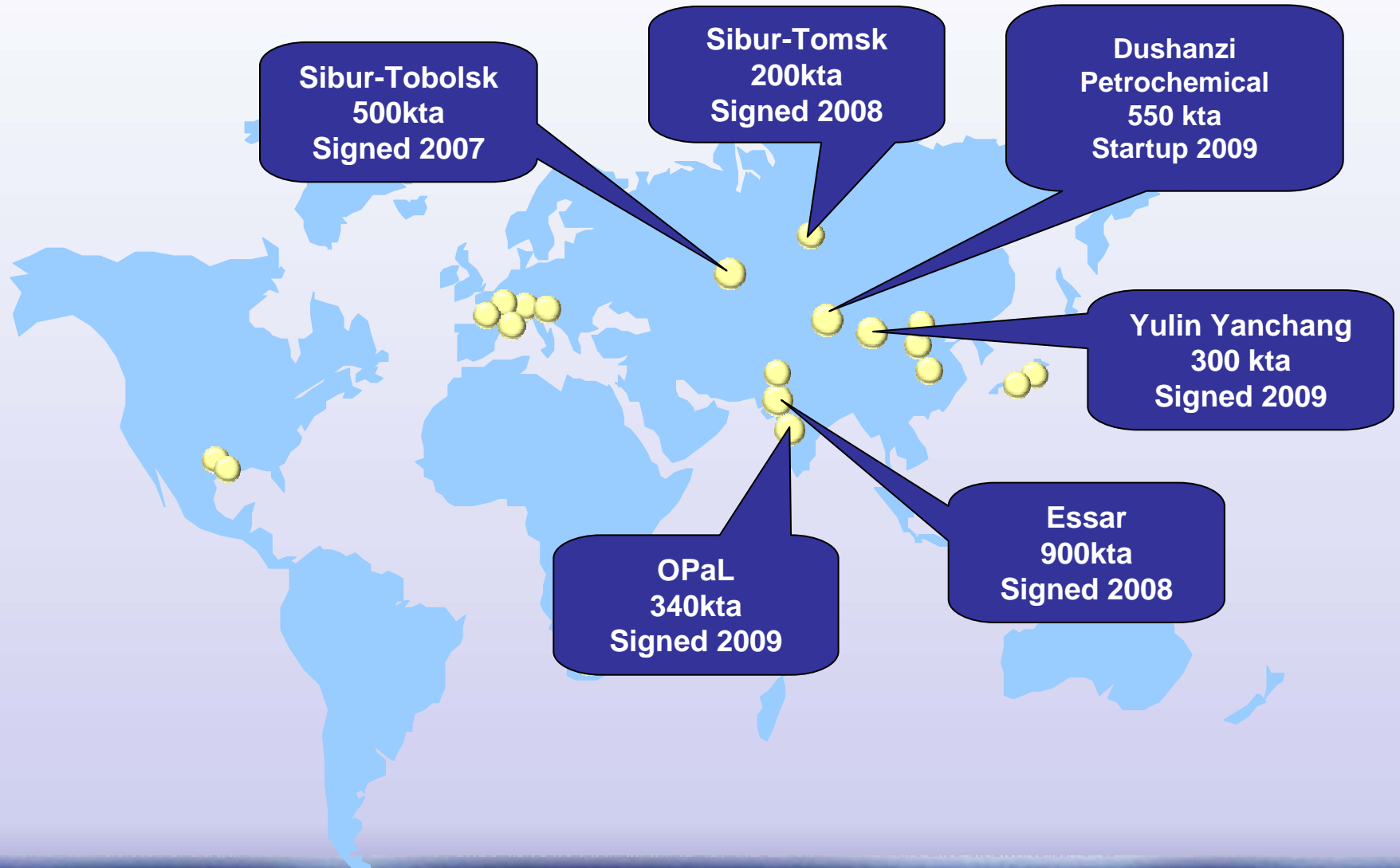
A strong foundation



- **Plug flow**
- **Uniform rubber incorporation**
- **INcat CDI**
- **Simple and easy to operate**
- **High reliability**
- **Low capital and operating cost**

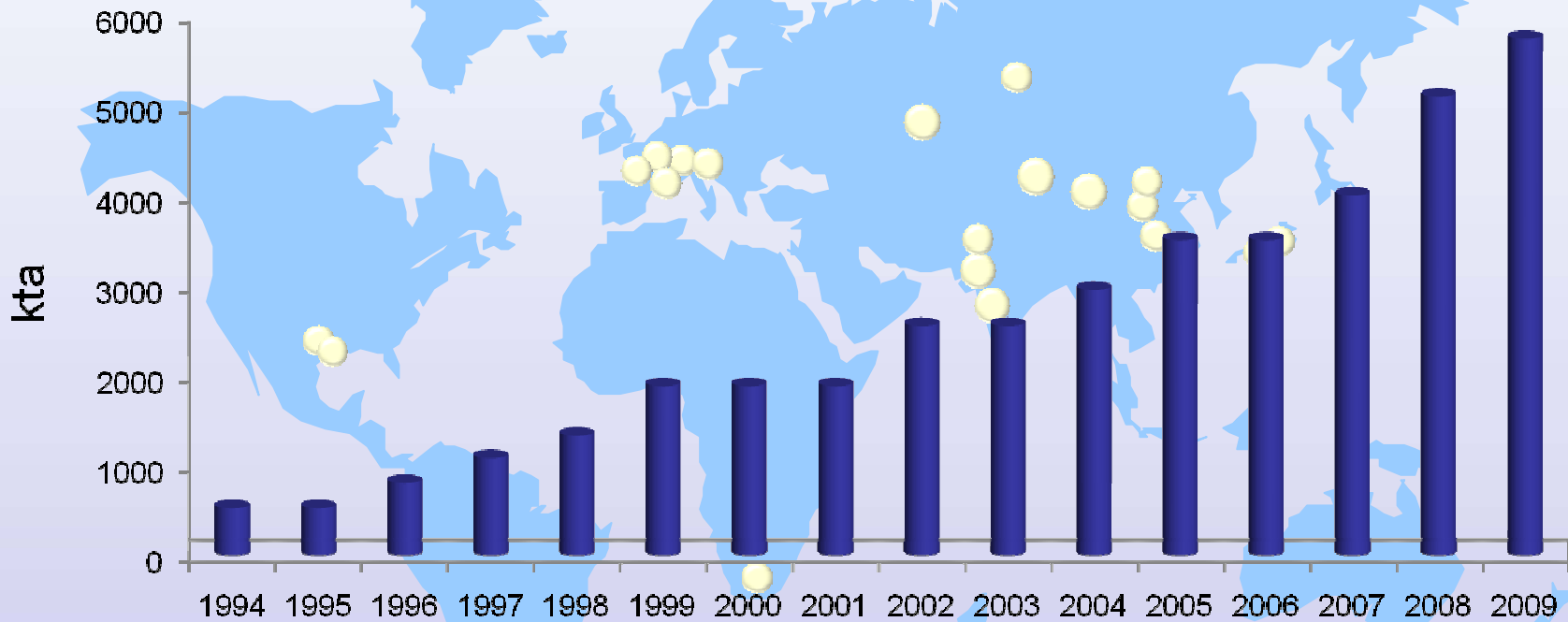
Innovene PP

Recent Successes



Innovene PP Worldwide

Recent Successes



Innovene PP

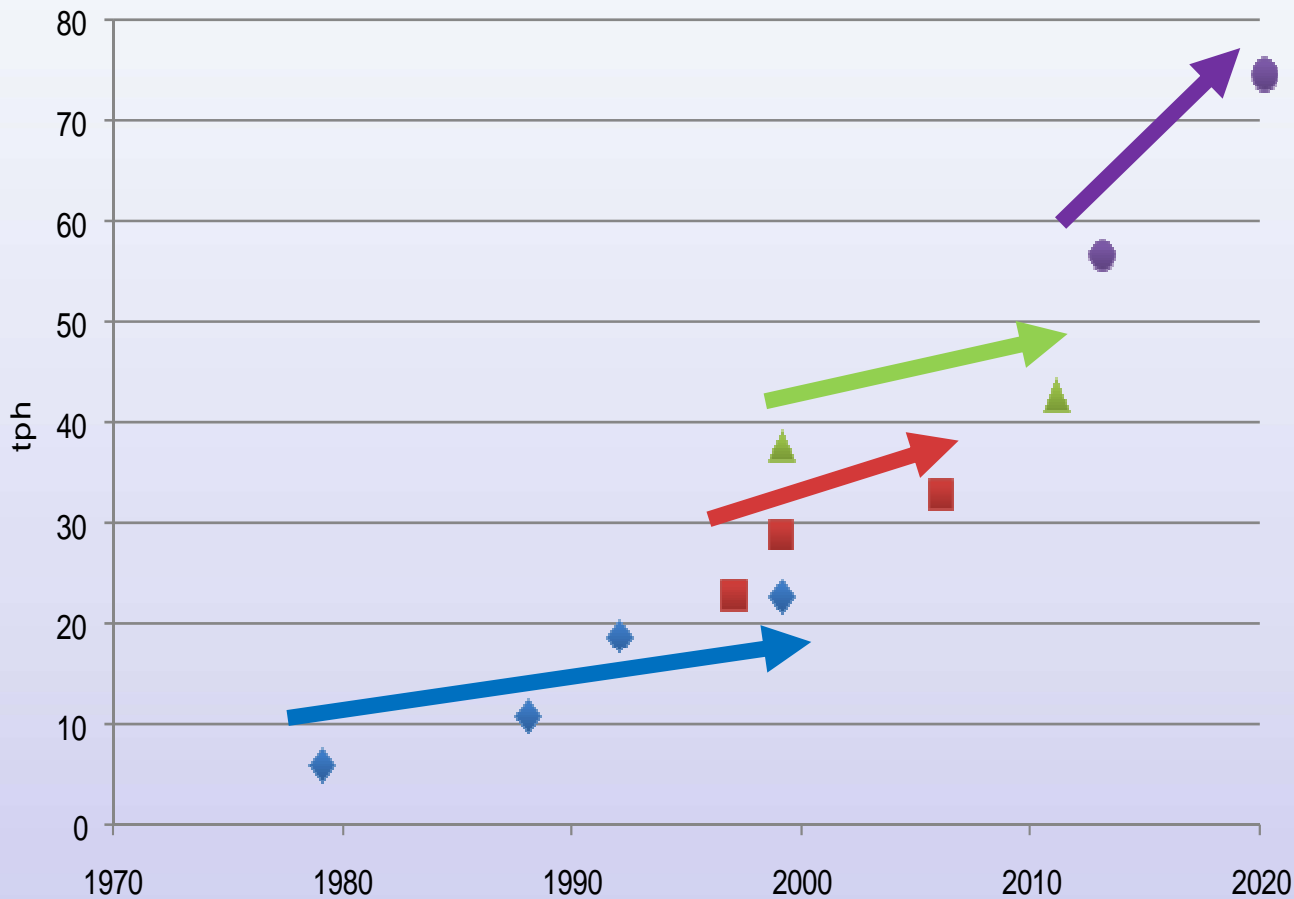
Building on the Foundation



- **Large scale** capacity (600 ktpa)
- New general purpose catalyst **INcat P100** for improved economics
- **INstage** technology for enhanced product coverage
- **INcat** advanced catalysts

Innovene PP

Evolution of PP Single Reactor Capacity



12-foot reactor: 600 kta



10-foot reactor: 350 kta



9-foot reactor: 250 kta



8-foot reactor: 175 kta

Innovene PP

Large Scale Reactor – Available Now



- A “simple” mechanical scale-up of the current Innovene PP design
- Design ready for PDP development
- Already offered for two confidential projects
- Capability of up to 75 t/h in a single reactor
- Full range of Innovene PP homopolymer and random copolymers
- Can be coupled with a second reactor for impact copolymer products



Innovene PP

INcat P100 for leading introduced cost

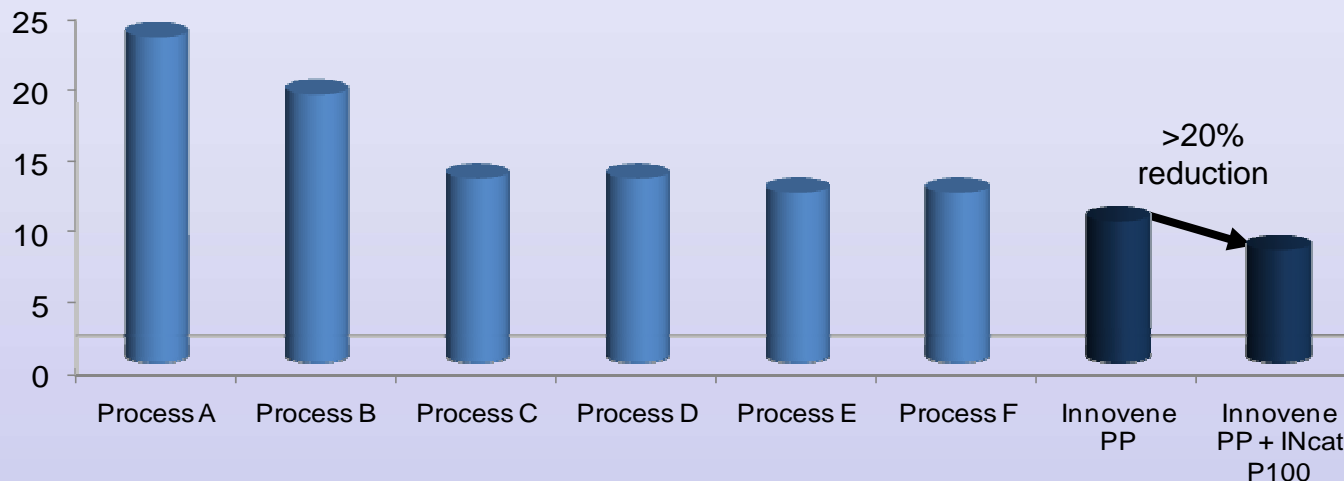


INcat P100

- broad coverage general purpose catalyst
- drop in technology
- leading introduced catalyst cost
- advanced stage of development

Potential for 800k\$/year variable cost reduction or 5m\$ NPV(10%) over 10 years on 400kta plant

Catalyst + Chemicals Variable cost (\$/tonne)

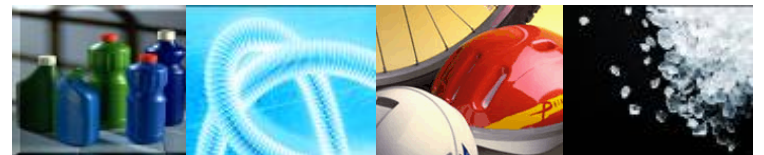


Catalyst and chemicals variable cost data for 400kta HP-only plant. Data from Nexant POPS report, August 2008. INcat P100 data from INEOS

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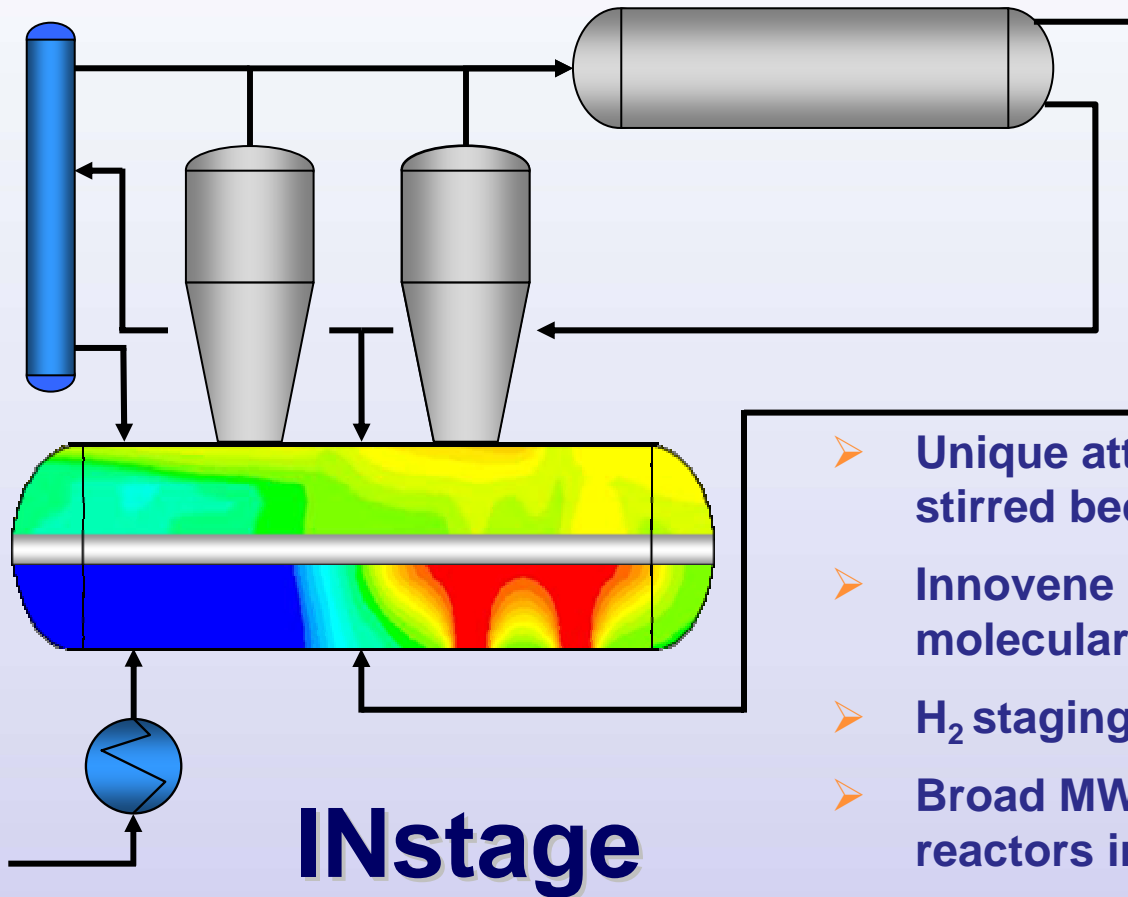
INstage

For enhanced product capability



Innovene PP + INstage

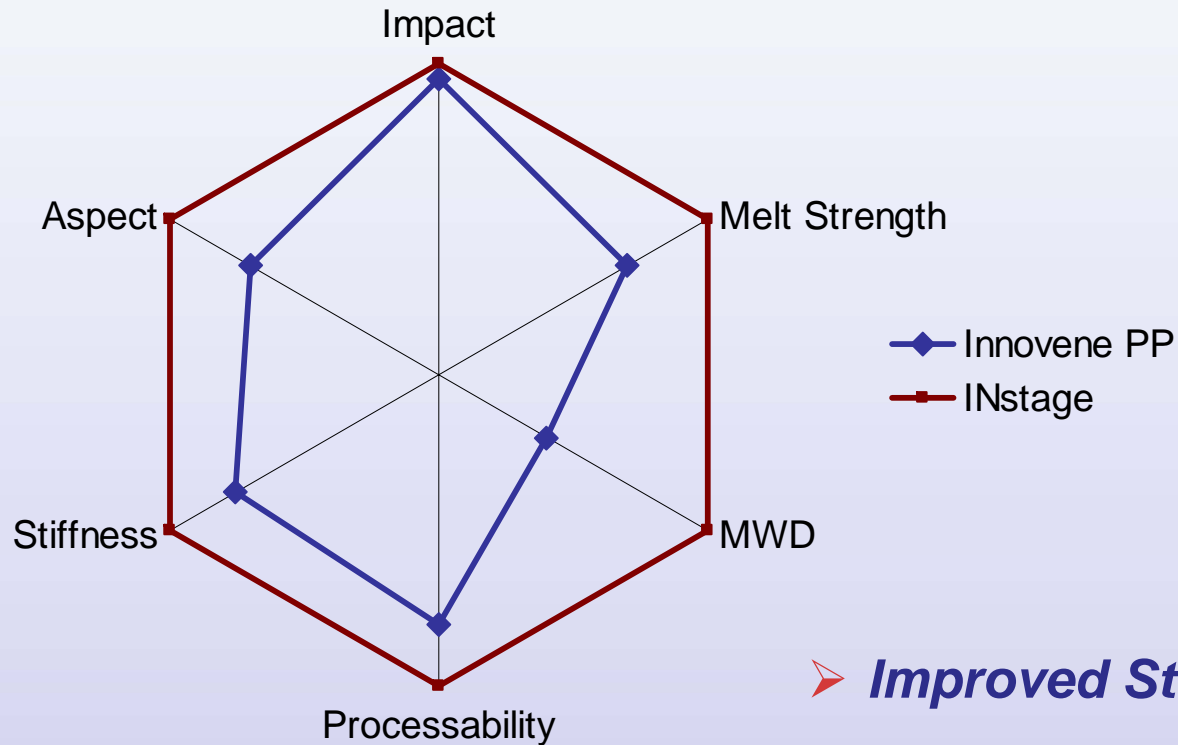
How it works



- Unique attributes of the horizontal stirred bed reactor technology
- Innovene PP products with broad molecular weight distribution
- H₂ staging in a single reactor
- Broad MWD ICPs when using two reactors in series
- Compatible with existing and future INEOS catalysts

Innovene PP + INstage

New Product Coverage



- *Improved Stiffness*
- *Improved Melt Strength*
- *Improved Processability*

Innovene PP + INstage

Current Status



- Proof of concept established at pilot plant and plant scale
- Scale-up design package in development with existing licensee for implementation in 2011
- Innovene PP reactor technology preserved
 - bolt-on process improvements
 - on/off operating philosophy
- Available as a retrofit or new build option
- Synergies with INcat catalyst family
- Extensive, ongoing HPP/ICP product testing in the field



Innovene PP + INstage

Flexible solutions and ease of operation



Flexible Implementation of INstage

- Retrofit existing plant
- Design new plant to accommodate later
- Full INstage implementation at project kick-off

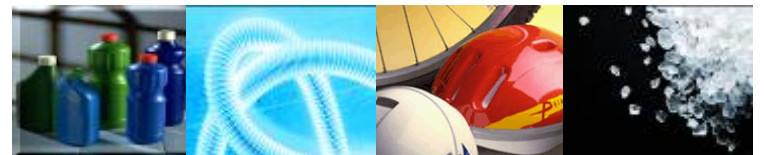
Ease of Operation

- Easily turned on or off
- Compatible with existing INcat catalysts

INEOS Technologies

INcat

Expanding the Innovene PP Product Range

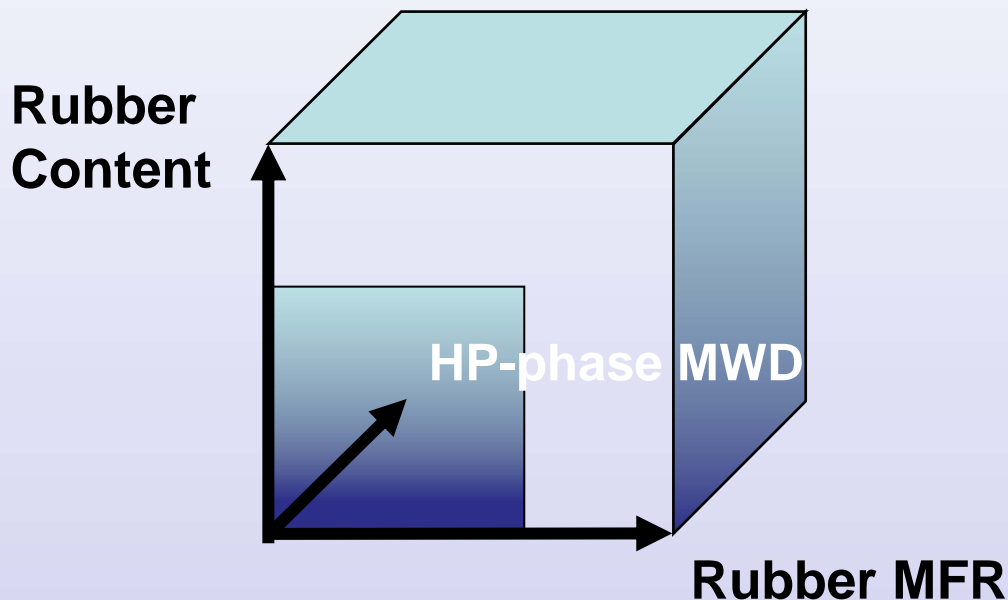


Innovene PP + INcat

Product range expansion for Innovene PP



Advanced polypropylene products with new INcat catalysts



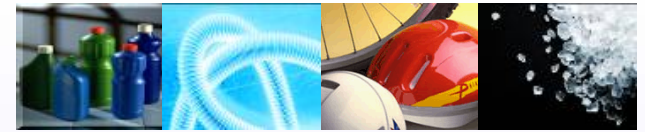
INcat CDi – the foundation
INcat P100 – leading economics

INcat P260 – high rubber
INcat P570 – broad MWD

INcat catalysts by INEOS

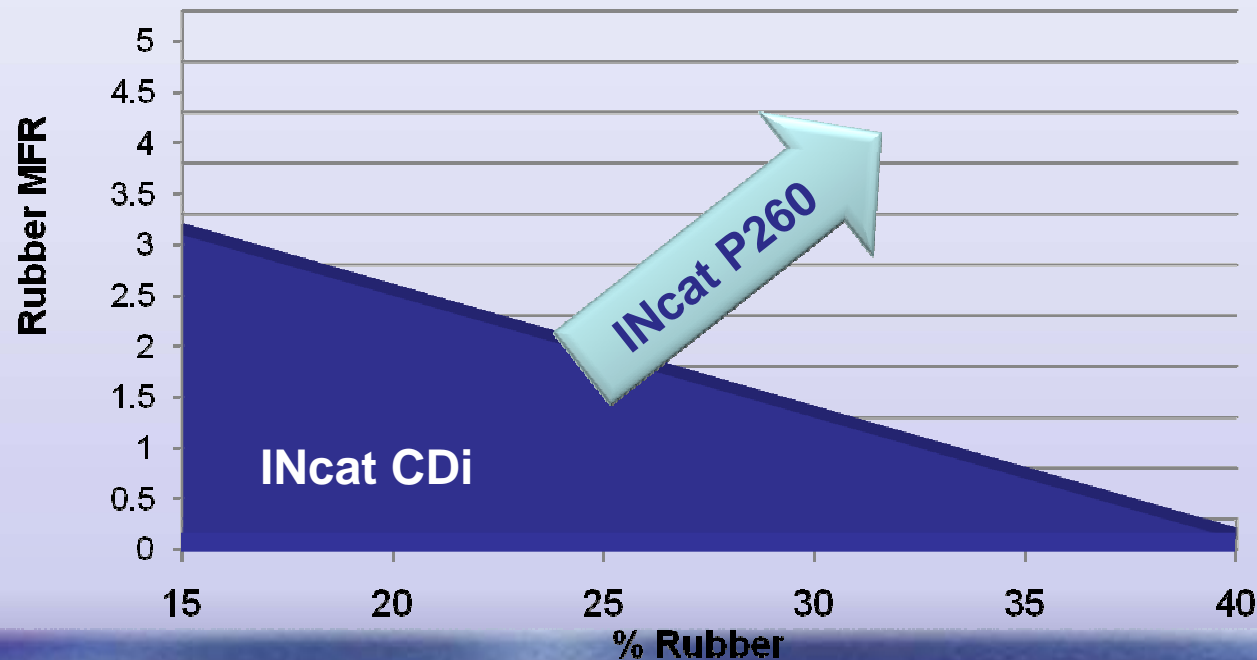
Innovene PP + INcat P260

High rubber tolerance catalyst – enhanced toughness



INcat P260

- a new high rubber tolerant catalyst
- drop-in technology
- no prepolymerisation – high particle integrity and operational simplicity
- entering commercialisation phase



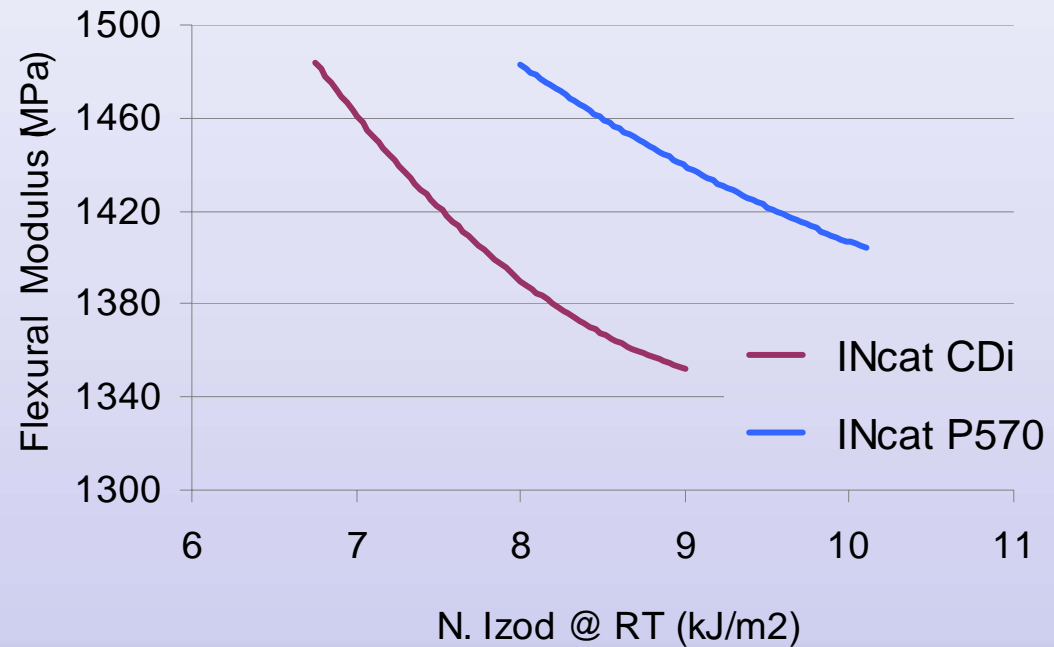
Innovene PP + INcat P570

Enhanced performance through molecular weight broadening



INcat P570

- broad molecular weight catalyst
- drop-in technology
- enhanced processability
- improved product property balance
- commercially available today



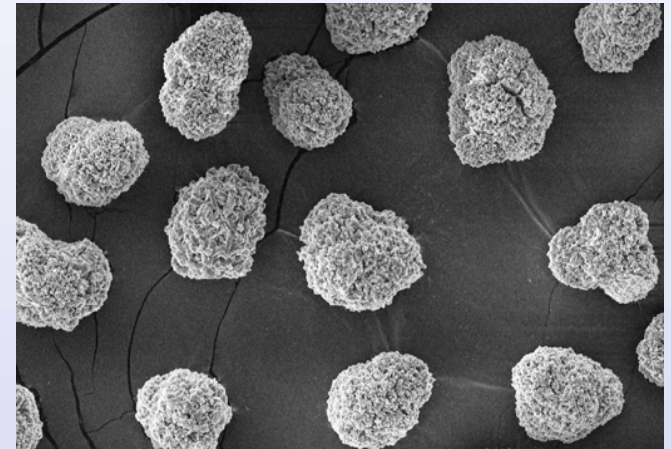
Innovene PP + INcat Catalysts

Quality and Performance with Leading Value



Future developments focusing on:

- narrow molecular weight
- targeted crystallinity
- non-phthalate donors
- step changes in product properties



INcat catalysts by INEOS

tailored solutions for the PP market

Innovene PP + INstage + INcat

Building on the foundation



Improved Innovene PP Economics

Up to 600 kta with new reactor and INcat P100

Improved Product Offer

INstage

Broadened MWD in a single reactor

Can be retrofitted to existing plants

New plants can be built to add INstage in the future

INcat

New catalysts for general purpose and broadened MWD

High rubber tolerance catalyst

The new face of Innovene PP



Innovene PP

INstage

INcat

tailored solutions for polypropylene

INEOS Technologies