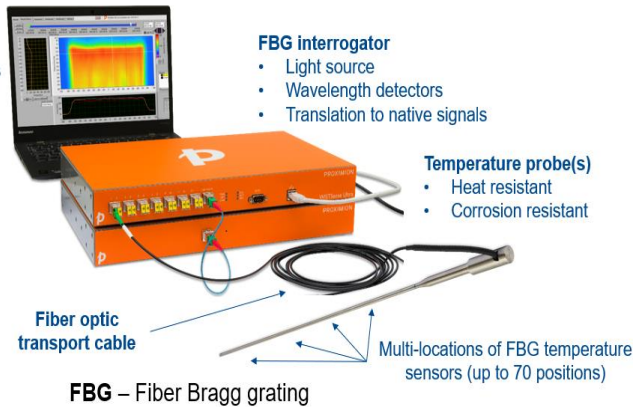


APPLICATION NOTE

Polyethylene Process Optimization through Temperature and Pressure Measurement using Proximion Optical Fiber Sensing

User interface

- Temperature probe algorithms
- Visualization software



FBG interrogator

- Light source
- Wavelength detectors
- Translation to native signals

Temperature probe(s)

- Heat resistant
- Corrosion resistant



- Multipoint sensing in EX atmosphere with either:*
- 70 measurement points (up to per fiber) using one intrinsically safe and disturbance free optical fiber, or
 - 8 electric transmitters with numerous disturbance prone and EX sensitive electric wires?

The manufacturing of various polyethylene grades from ethylene gas involve using equipment such as primary and secondary compressors, autoclave (including motor, bearings and stirrer) or tubular process reactors, high and low pressures separators (gas, wax and oil), extruders etc. Some of this equipment operating under extreme pressures (up to 3600 bars), or close to such equipment, and higher temperatures (up to 300°C). Conditions that put very high demands on the sensors, measurement probes, transmitters and wiring for temperature and pressure measurements. Sensors that need to be installed in EX areas and be remotely monitored i.e., insensitive to electro-magnetic fields and possible to wire over long distances.

In addition, it is a wish to drastically increase the number of measurement points with short response time to enable to correlation of CFD simulations of the process with the real behavior and enable more reliable and fast feedback to DCS and safety systems. Thus, it seems to be ideal to start considering using fiber optic temperature and pressure monitoring by applying the fiber optic sensing technology coming from Proximion AB.

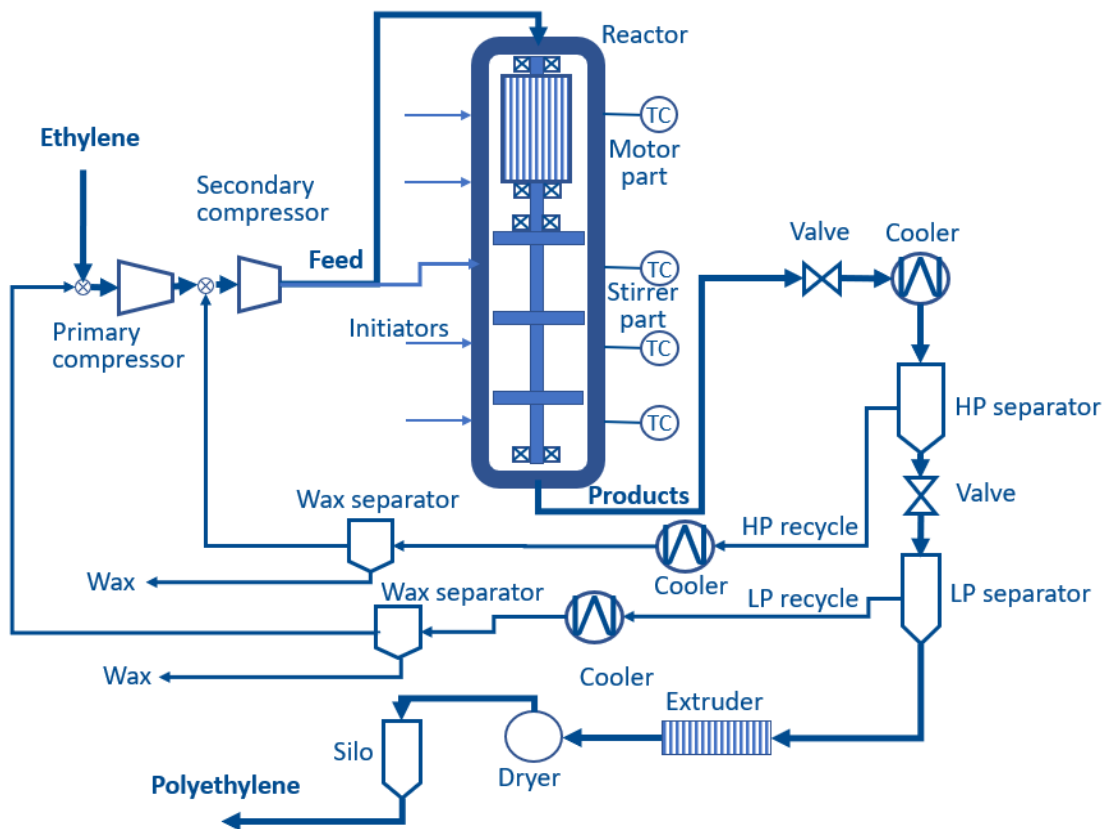
Proximion AB (www.proximion.com), part of the global technology group Hexatronic that specializes in fiber communications, has developed and commercialized fiber optic temperature sensing for temperature array measurements. In addition, they are involved R&D for force, pressure and proximity measurements by optical fibers for new developments. The technology is based on the fiber Bragg grating (FBG) sensing method that utilize an optical fiber with large number of inscribed measurement points within the 9-micron core of the fiber. Basically, these FBGs work as temperature sensors that are sensitive to the changes in the refractive index of the optical fiber caused by the local temperature field at a specific point.

The Proximion technology, utilizing its own proprietary inscribing method, has been applied by for example ABB (continuous casting), SAAB and SKF (bearing temperatures and loads) in products and is today in field use or under field testing with these and other clients. The technology enables temperature measurements that have been very cumbersome with traditional methods up till today. In summary the technology offers for the polyethylene industry:



> APPLICATION NOTE Polyethylene Process Optimization through Temperature and Pressure Measurement using Proximion Optical Fiber Sensing

- Numerous measurement points (strain/temperature) per fiber/probe (array process mapping possible)
- Fast response times (down to 0.1s for temperature and faster for loads etc.)
- EX safe (fulfil EN 60079-28:2015, if required)
- Insensitive to electro-magnetic fields
 - Easy cabling e.g. next to power cable
 - Work within motor windings
- Measure over kilometers (miles) of distance
- One, or few connections, vs. hundreds for traditional arrays of thermocouple or strain gauge installations
- Long-term high temperature measurements (up to +650°C continuously)
- Long-term cryogenic temperatures measurements e.g. within LNG
- Measure under extreme pressures
- Work within the process flows (corrosion resistant probes and fibers)
- Enable harsh work environments (robust sensor, connect, feedthrough and cable designs)
- Freestanding or connected to DCS or PI systems



THE COMPANY

Part of the huge Hexatronic Group, Proximion AB designs and manufactures customized, high performance fiber optic sensor systems for use in numerous harsh environment applications proximion.com



Proximion AB
Skalholtsgatan 10
SE-164 40 Kista, Sweden

phone: +46 8 750 48 88
info@proximion.com
www.proximion.com

A PART OF HEXATRONIC GROUP
 hexatronic