Drag Reducer Use For Pipeline Debottlenecking
The Challenge

- Main 40” pipeline unavailable due to a major accident.
- Client’s supply needs still to be met.
- Parallel line by-passing the accident area available.
- Available line capacity : 12 MT/year
- Expected needs : 18 MT/year
24” Pipeline Capacity / Design

- Maximum Flowrate: 1200m³/h
- Maximum Pressure: 57 bar
- Length: 260 km
- Pumping Facilities: 2
- Pump design: 2000m³/h
24” hydraulics at 1200m3/h

- 2 pumps in Fos, 2 pumps at SSB
- Pressure at Fos : 54bar
- Pressure at SSB : 47 bar
Next step

• Hydraulic study at 1800m3/h
  – Required in order to establish that a higher flowrate wouldn’t increase the risks on this pipeline and find solutions if yes
  – Assessment of the achievable flowrate using Drag Reducer

• Provider search, with ability to provide product and service in a short delay
Provider/Equipment

- ConocoPhillips was able to provide service and equipment immediately
- Technical support and response
- 2 facilities equipped
24" hydraulics at 1600m3/h

DR injection rate : 0.086 per thousand

• 2 pumps in Fos, 1 pump at SSB
• Pressure at Fos : 47 bar
• Pressure at SSB : 29 bar
24" hydraulics at 1950m³/h
DR injection rate: 0.082 per thousand

- 2 pumps in Fos, 2 pumps at SSB
- Pressure at Fos: 43 bar
- Pressure at SSB: 35 bar
Tuning

• The injection rate has to be tuned in order to achieve the best Flowrate/Injection rate ratio. For a given flowrate increasing the injection rate is pointless.

• The Product efficiency is closely related to the crude viscosity.

• For a steady 1600m3/h flowrate the injection ratio doubled from october to december due to lower temperatures and related increased viscosity.
For the same average flowrate:

- Average injection rate of 65 l/h in October
- Average injection rate of 118 l/h in November
- Average injection rate of 140 l/h in December
- Average injection rate of 143 l/h in January
Achievement

• Significant 24” line capacity increase.
• 25% up to 50% flowrate improvement.
• Near 20% pressure reduction for a given flowrate.
• Increased energy efficiency (30% reduction)

• Achieved capacity : 17 MT/year (limited at 16.3 for unrelated administration authorization)
Cost

Not much time to discuss costs with the provider. Even in that situation we were offered a good service level with decreasing supply costs. In our case, these decreasing costs don’t appear clearly as the injection ratio increased in time.

- Cost per ton in October: 0.39 €/ton
- Cost per ton in November: 0.59 €/ton
- Cost per ton in December: 0.75 €/ton
- Cost per ton in January: 0.84 €/ton