



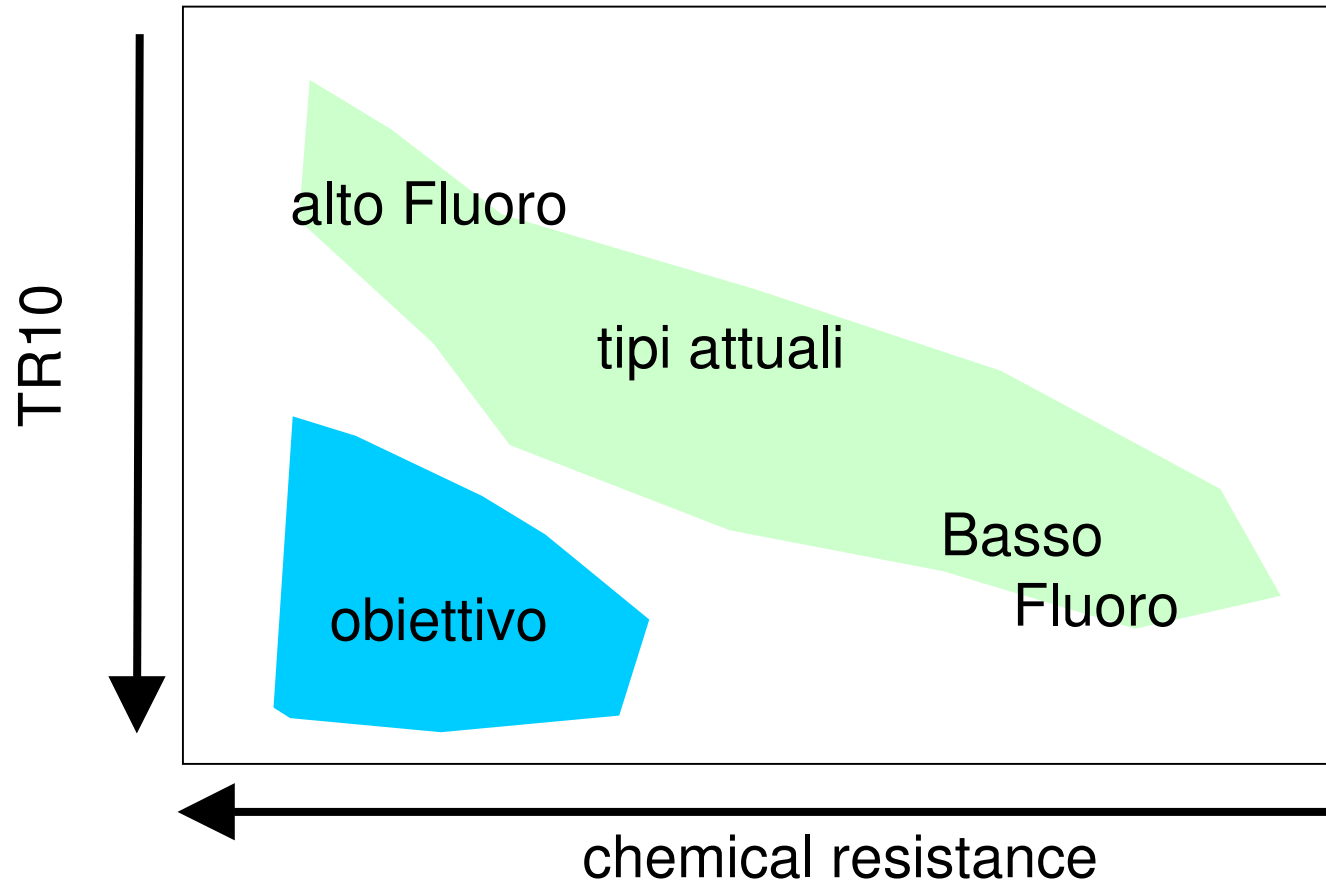
# **New generation of FKM compounds for low temperature resistance**

**Raffaele Ferro**



# The challenge

- Can we have good low temperature properties and high chemical resistance as well?



## MARKET NEEDS

### Automotive

- Lower Sealing Temperature (cold environments)
- High pressure generates Tg shift → GDI engines require FKM with lower Tg compared to standard solutions
- Increased chemical resistance (biofuels) maintaining Low T performance

### Aerospace

- Low T Service combined with high thermal resistance
- Low T combined with Fuels and HTS oils compatibility

**FKM for low  
Temperature  
Sealing**

### Oil & Gas

- Drilling in cold environments
- ED Resistance
- Chemical Resistance

**...and good processing  
compounds!**



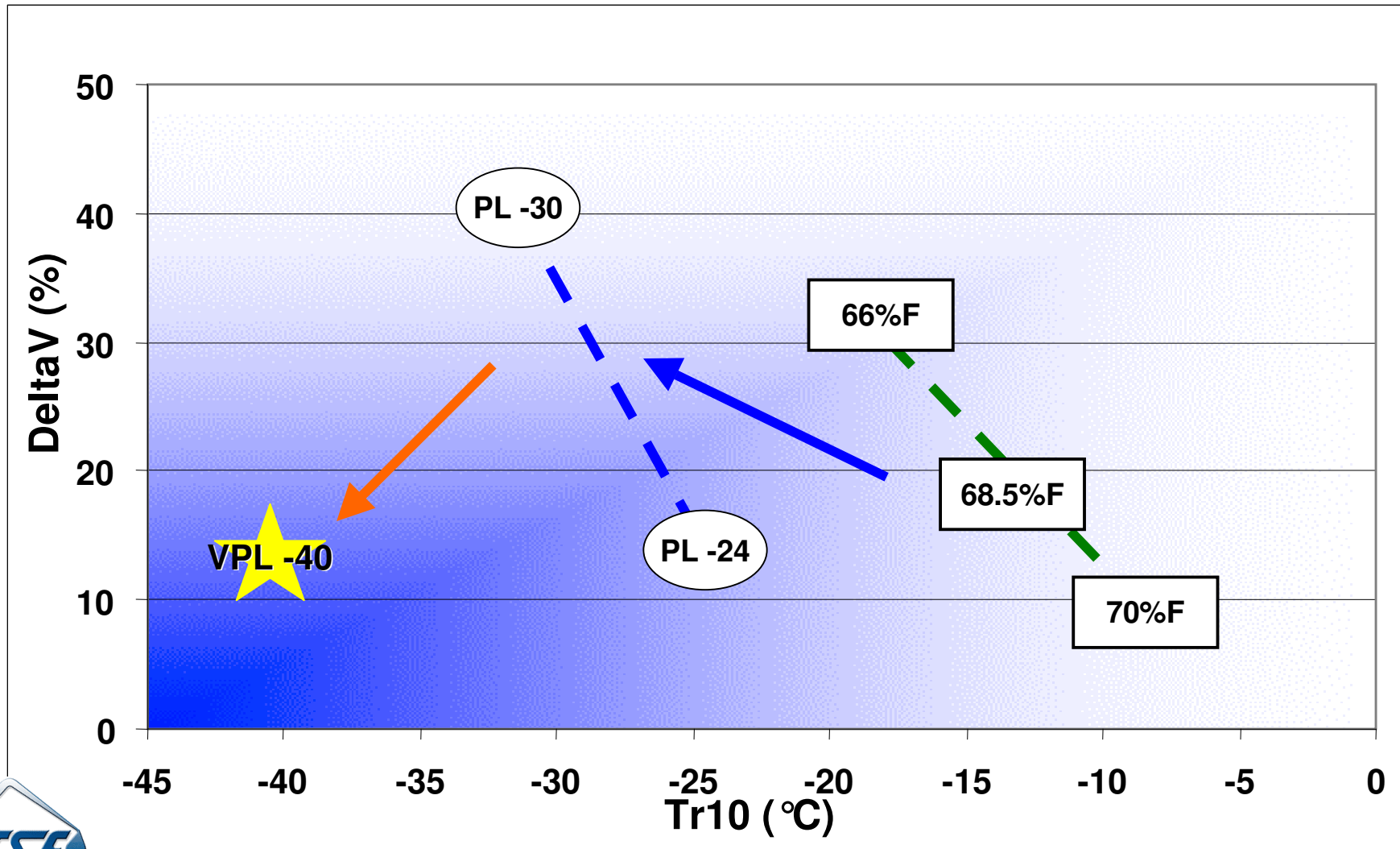
# A new Tecnoflon® FKM family and new TSF compounds for low temperature sealing

<b>Tecnoflon®</b>	VPL 85540 (45 MU) VPL 55540 (25 MU)	<i>TSF compounds PXL T</i>
<b>TR10 (°C)</b>	<b>-40</b>	<i>Developed for compression and injection molding</i>

The new technology allows improved low temperature and chemical resistance



# Swell in M15 after 168h @ 23 °C



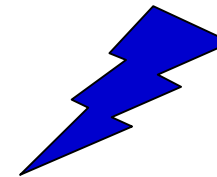
# RHEOLOGY

<i>Tipycal compound 70 Shore A black</i>		compound PLT (-30 °C)		compound PXLT (-40 °C)
Polymer viscosity ML (1+10) @ 121 °C	MU	54		45
Compound viscosity ML (1+10) @ 121 °C	MU	58		47
MDR 6 minutes @ <b>160 °C</b>	ML	lb*in	1,7	1,1
	MH	lb*in	27,5	26,2
	Ts2	min	0.9	0.9
	T50	min	1.8	1.9
	T90	min	3.6	3.7

# Physical properties

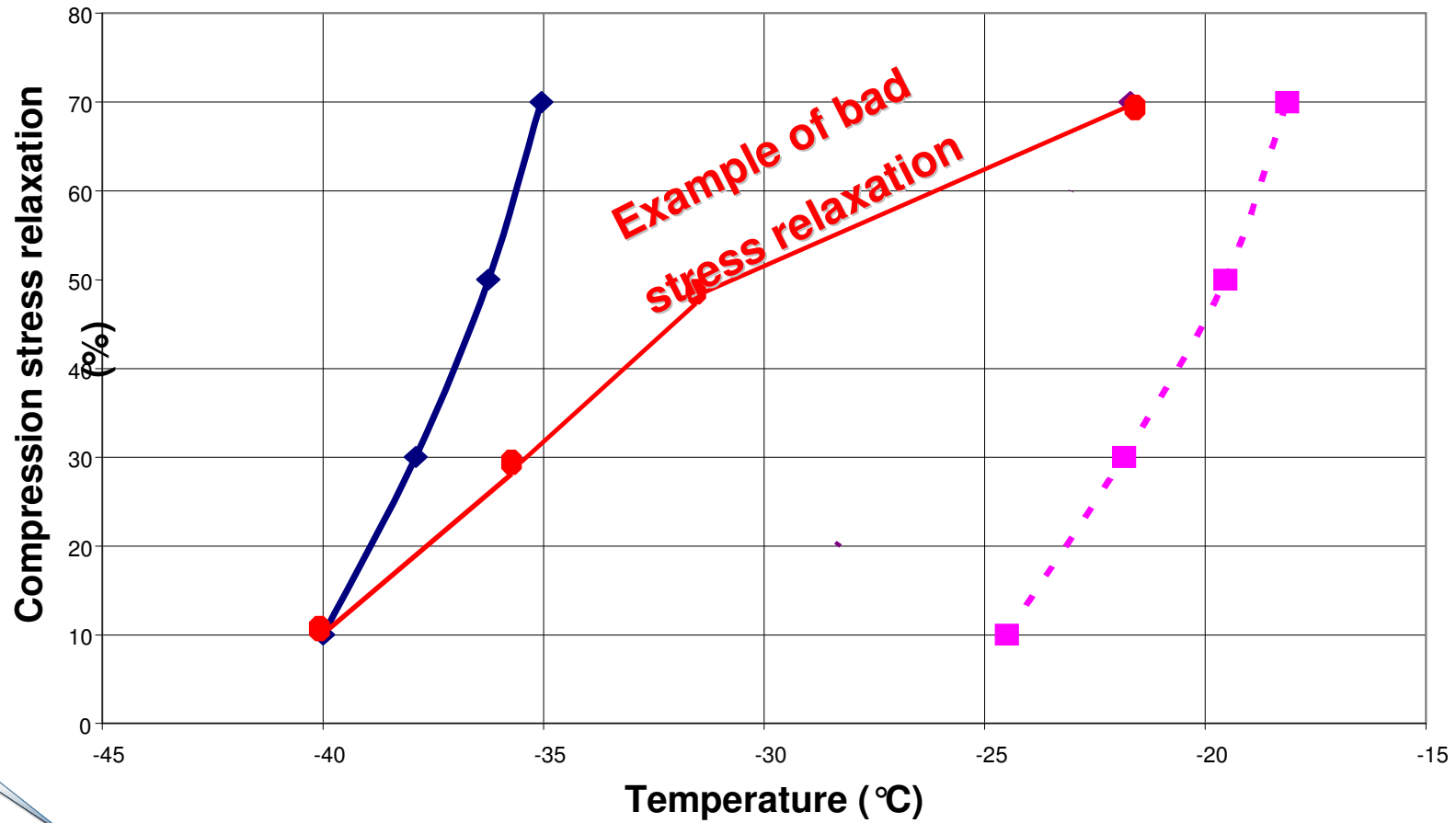
<i>Compound</i> <i>70 Shore A black</i>		<b>PLT</b> <b>-30 °C</b>		<b>PXLT</b> <b>-40 °C</b>
<b>Shore A</b>	<b>pts</b>	69		67
<b>tensile</b>	<b>MPa</b>	20.8		15.0
<b>Modulus @ 100%</b>	<b>MPa</b>	4.8		6.2
<b>elongation</b>	<b>%</b>	248		186
<b>C-Set 70h @ 200 °C</b> O-Rings #214, 25% comp.	<b>%</b>	<b>23</b>		<b>21</b>

**Sealing properties are not worsened !!**



TR 10

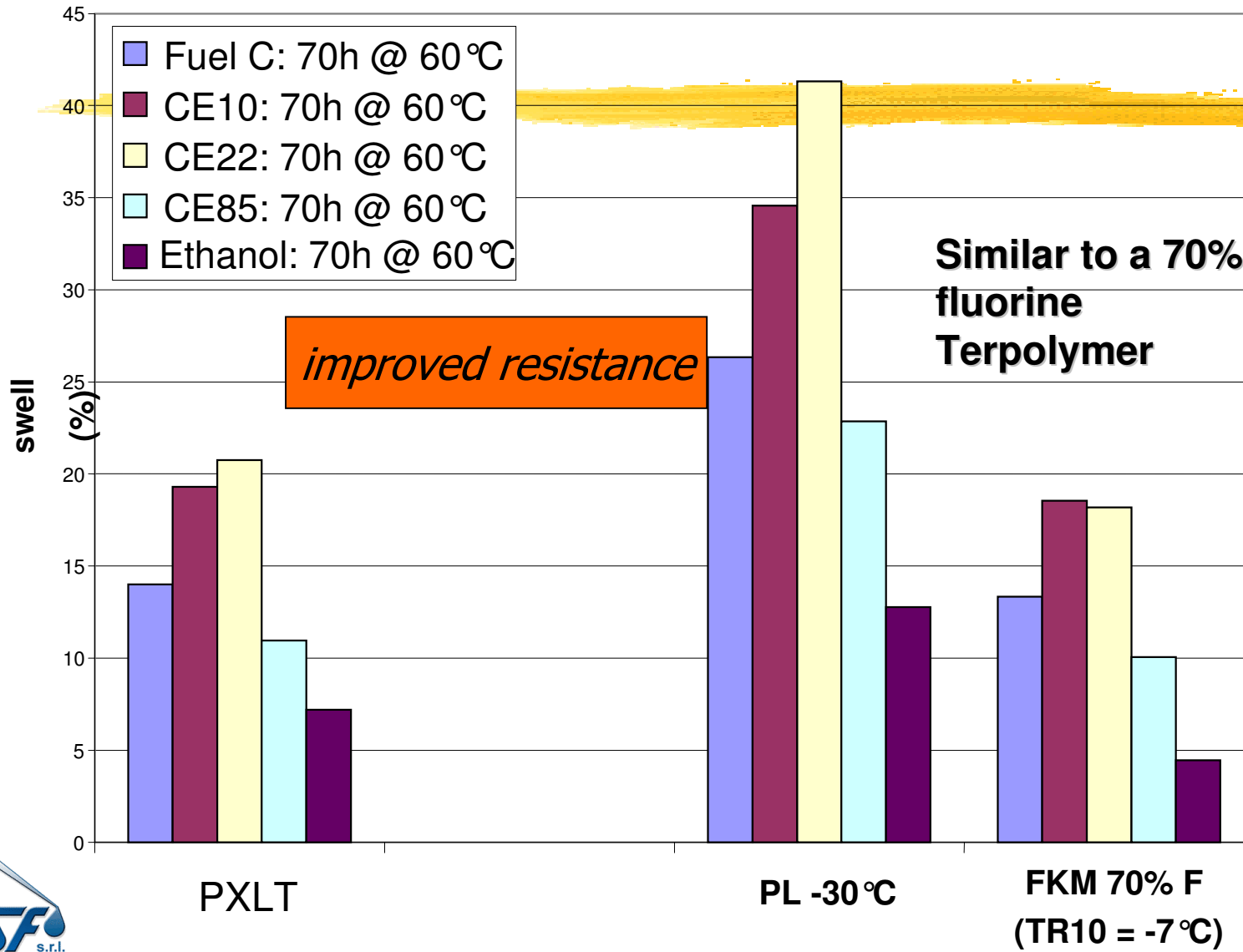
Tr10 e Tr 70 are very close thanks to an appropriate handling of chemistry



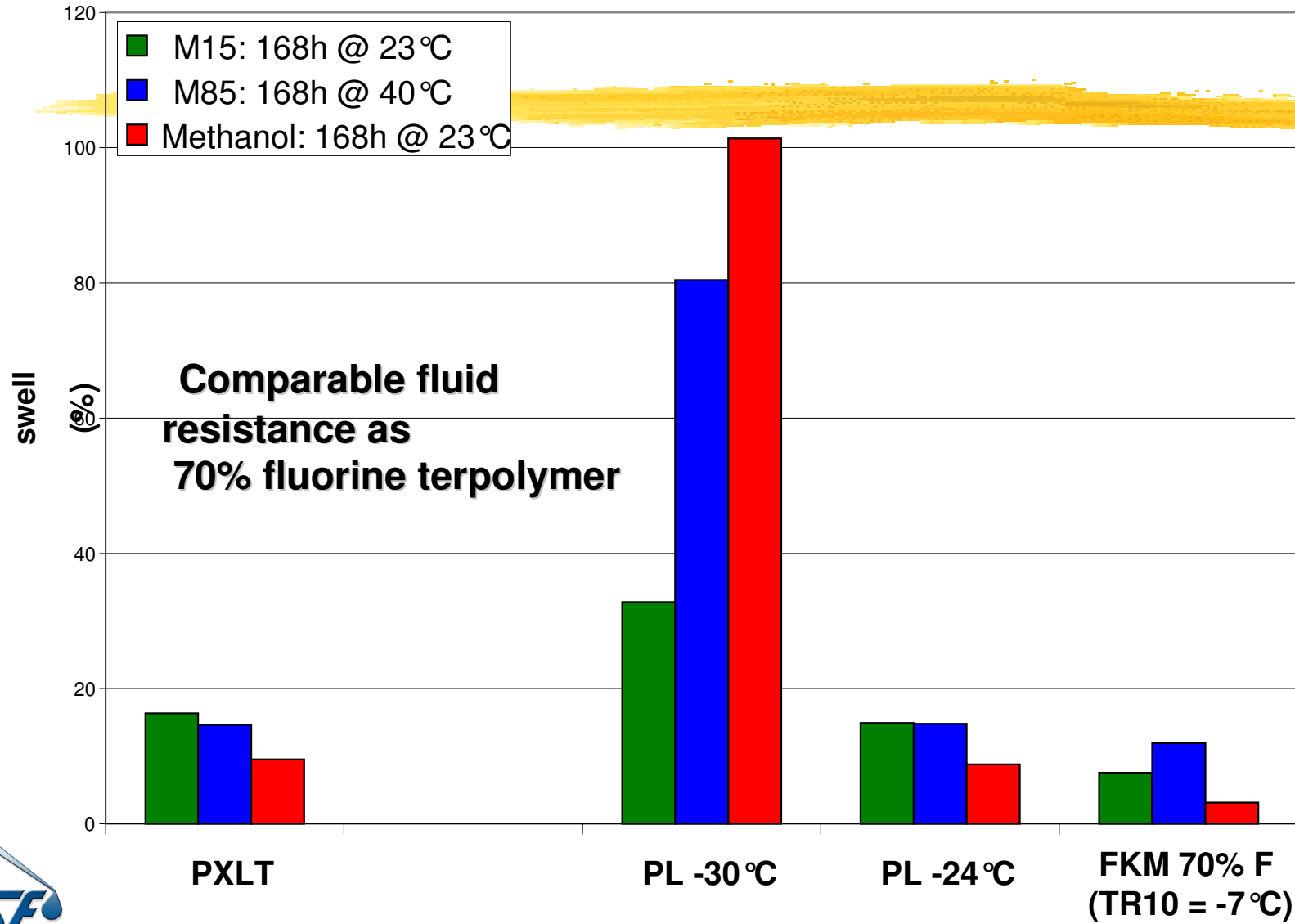
—◆— PXLT

—■— PL -24°C

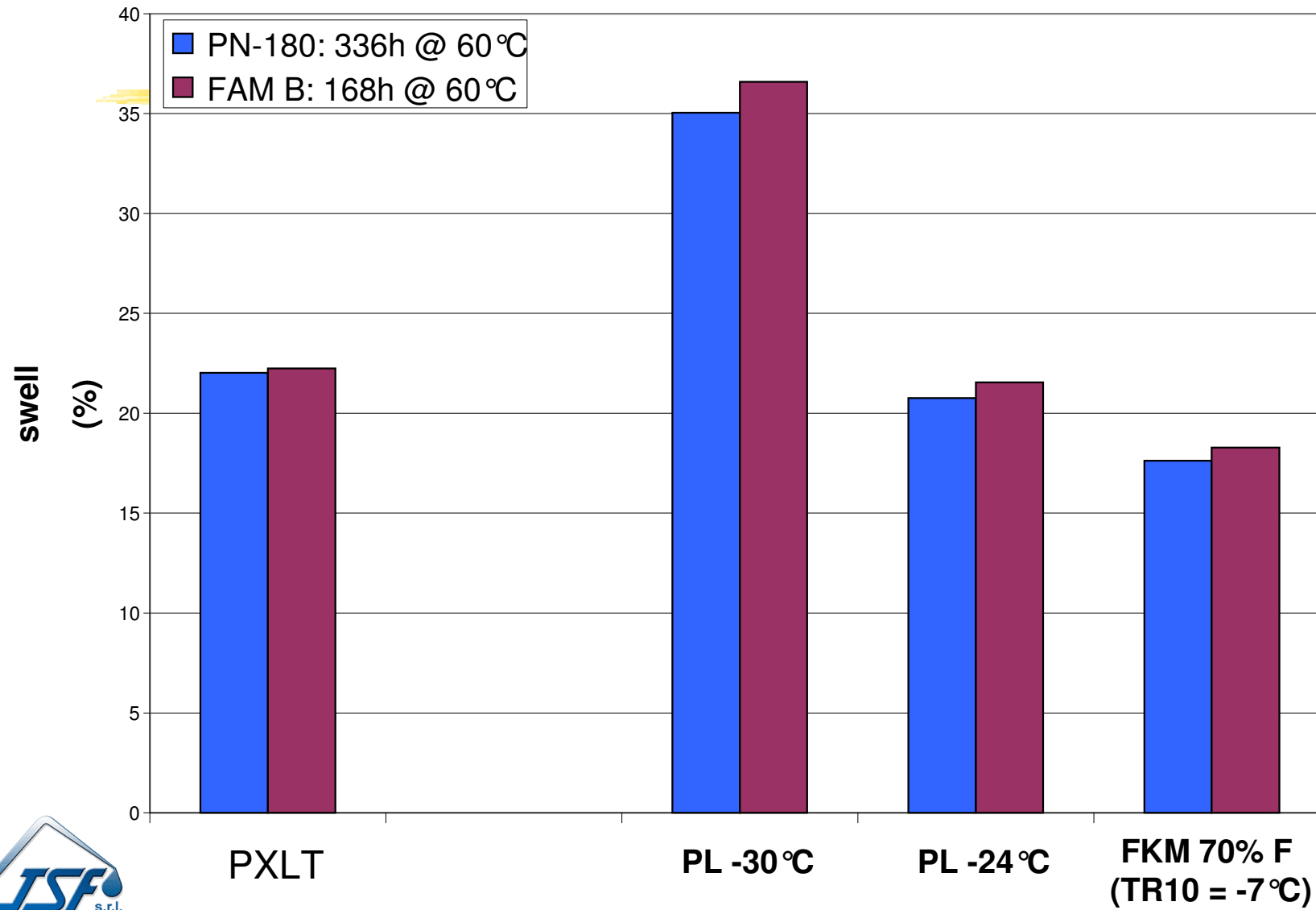
# Chemical resistance in ethanol blends



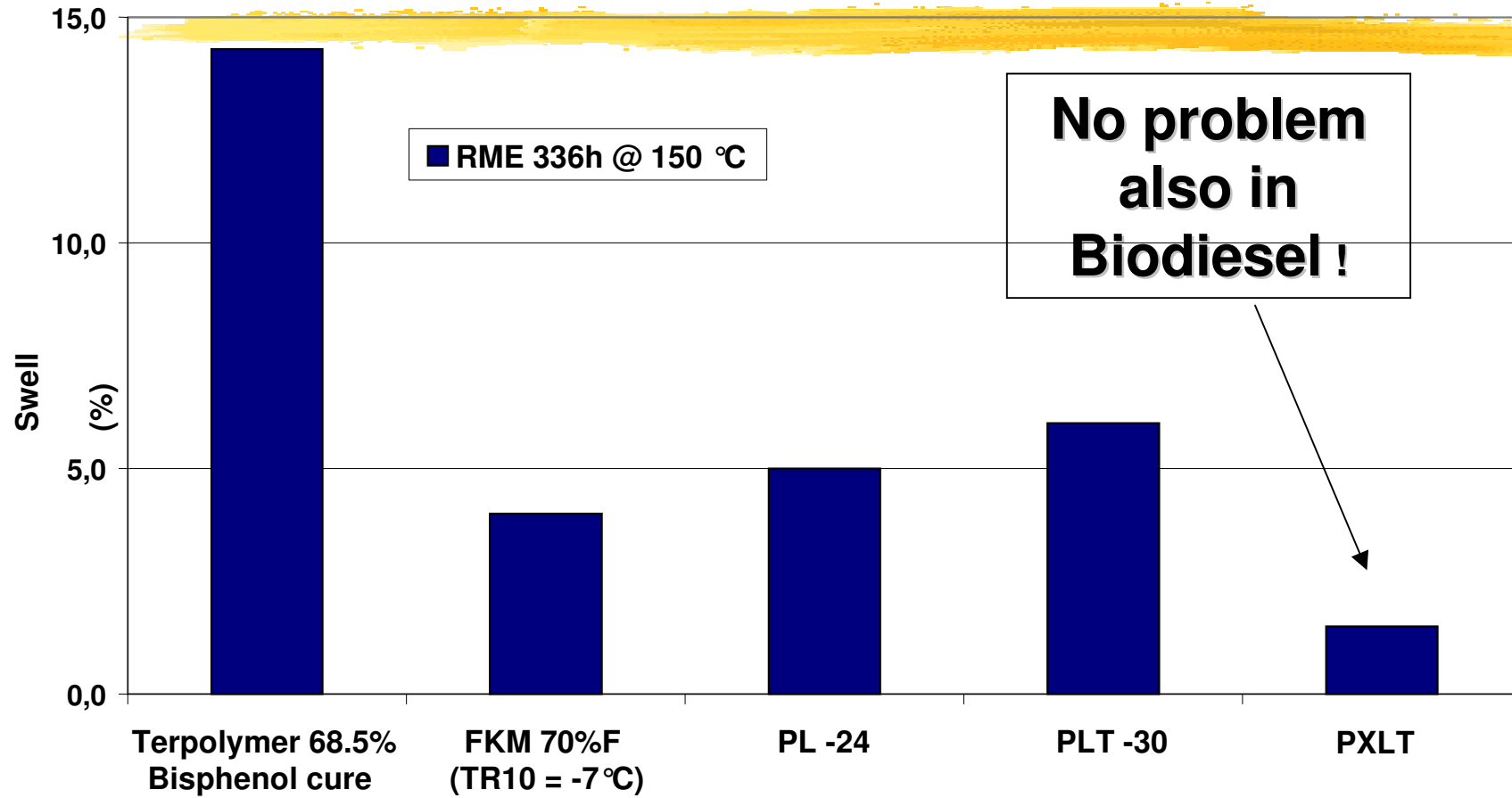
# Chemical resistance in Methanol blends



## Other fluid resistance



# Biodiesel



(TR10 = -13°C)

