

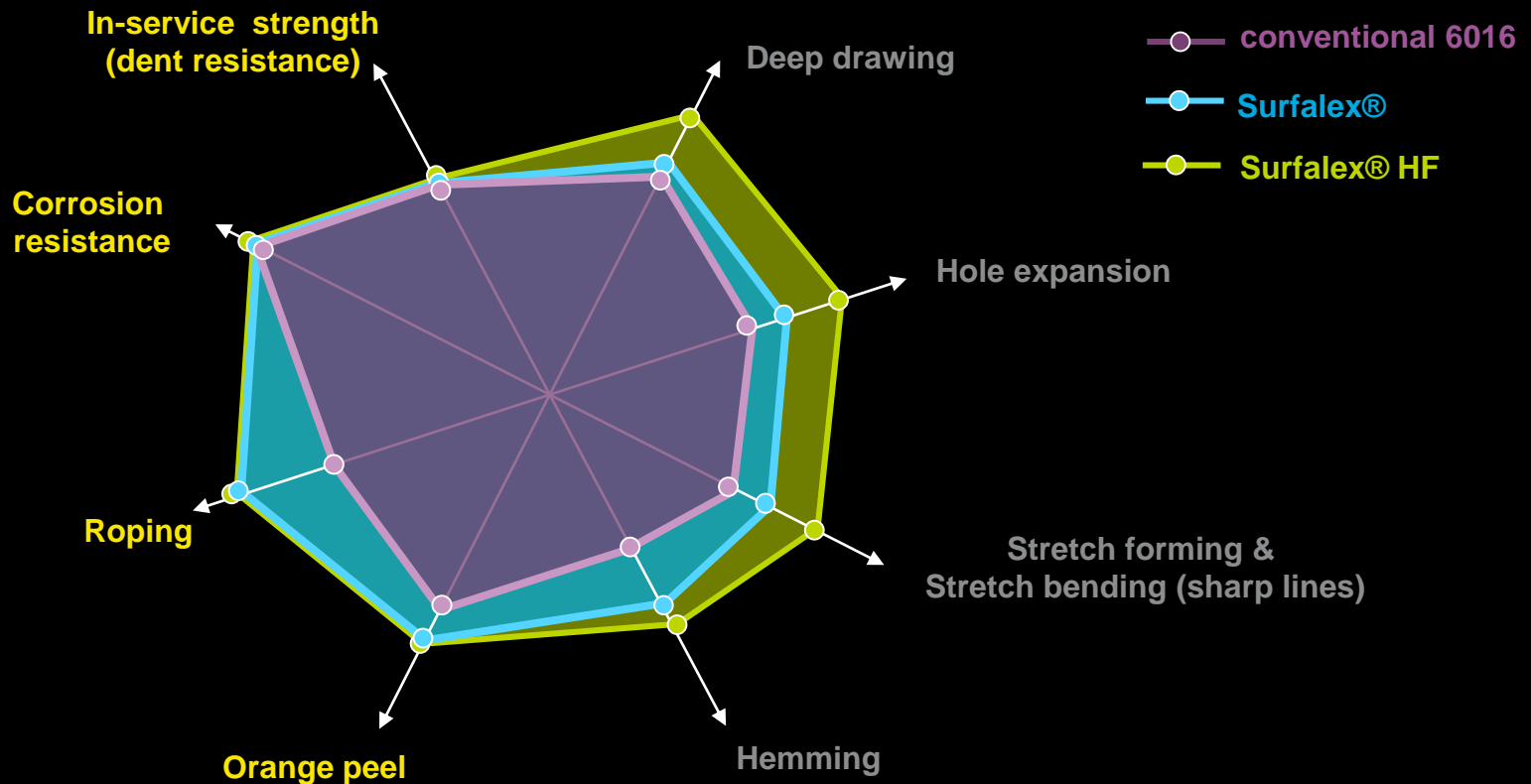
Surfalex® HF

A new aluminium skin alloy



New aluminium skin alloy: Surfalex® HF

Surfalex® HF gives an improved formability of 10-15% vs. incumbent skin alloys, without compromising any other requirement of outer skins



In-service performance

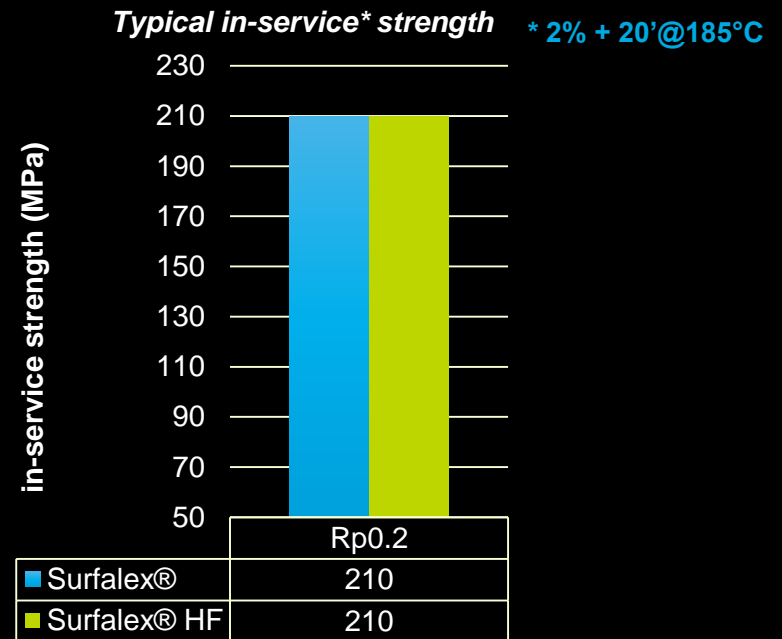
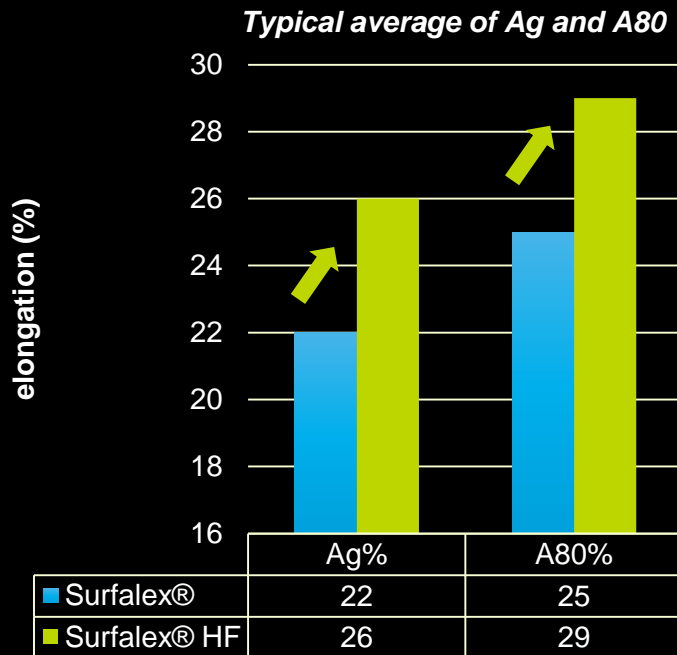
Ability to form the part

New aluminium skin alloy: Surfalex® HF

- Composition range within AA6016:

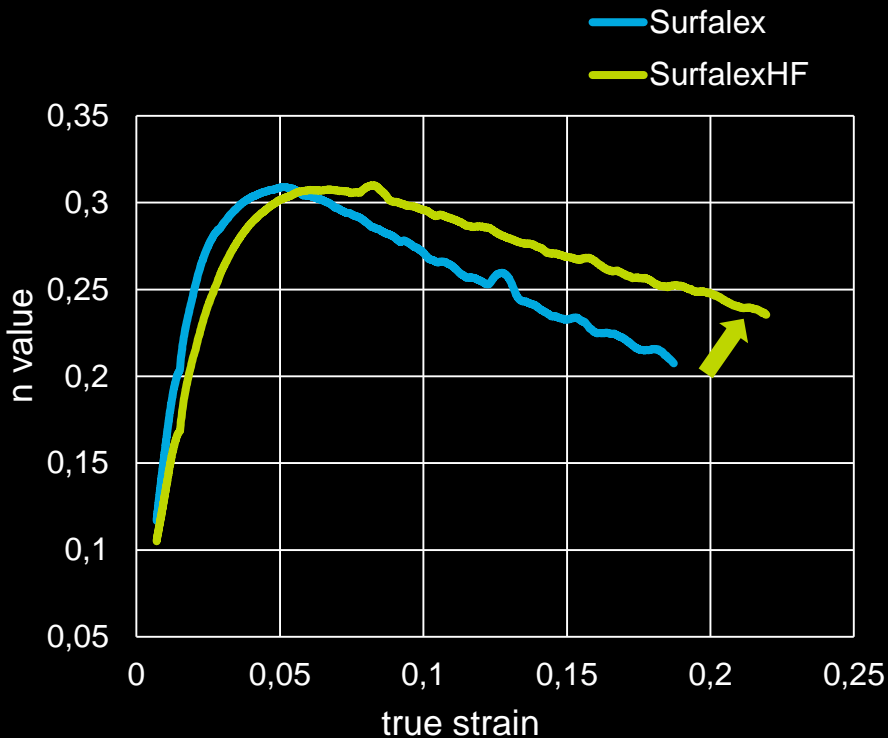
Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti
1,0 – 1,5	<0,50	<0,20	<0,20	0,25 – 0,60	<0,10	<0,20	<0,15

- Significant increase of elongations while maintaining the same in-service strength:

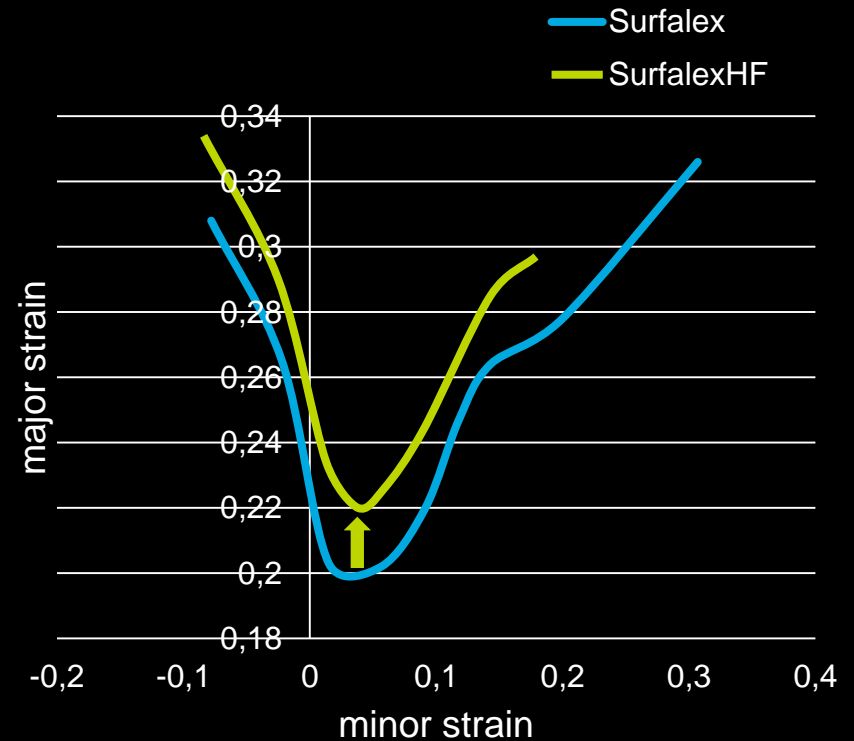


Optimized for forming of complex parts

- Higher strain hardening at high strains, for improved stamping and better ability to form sharp “character” lines

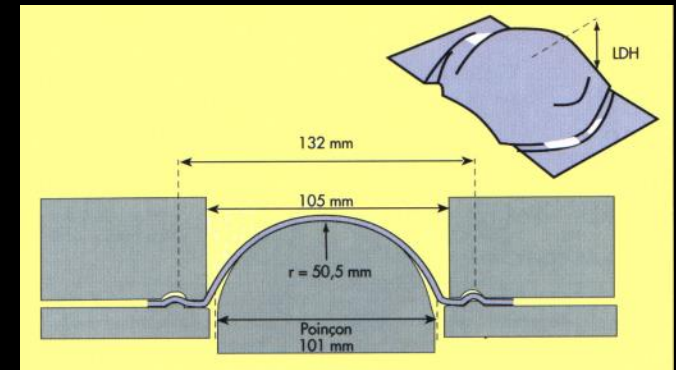
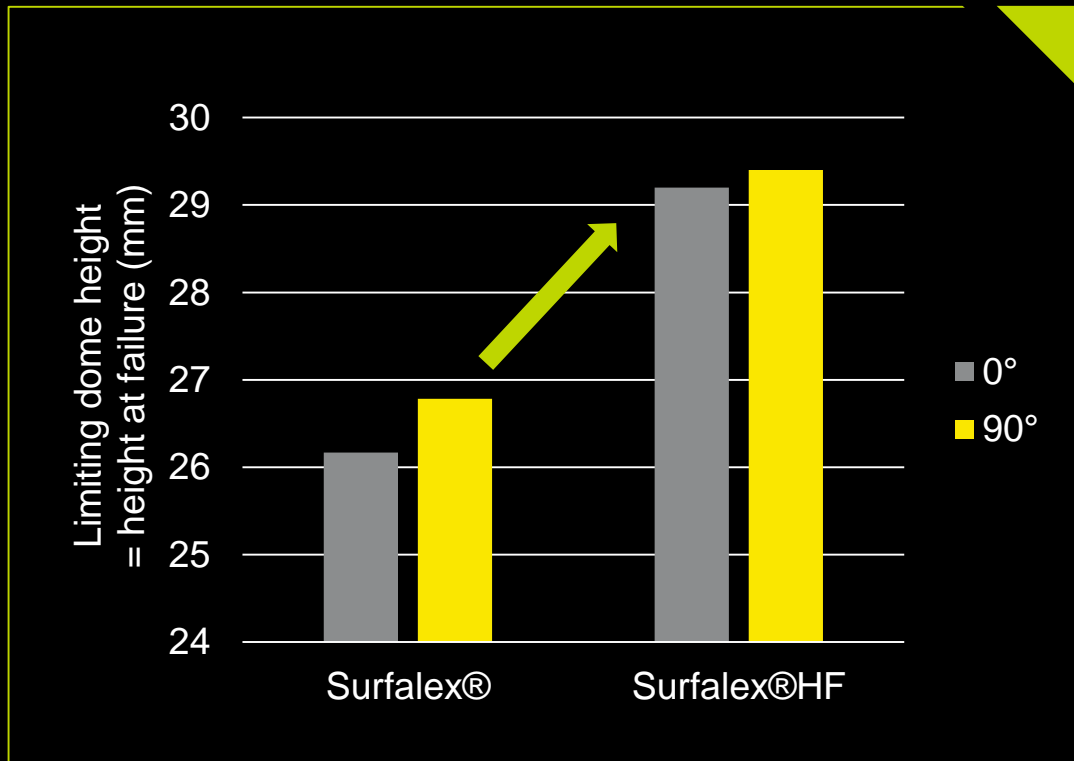


- Forming limit curve is improved, particularly in plane strain, enabling the forming of complex and deep parts

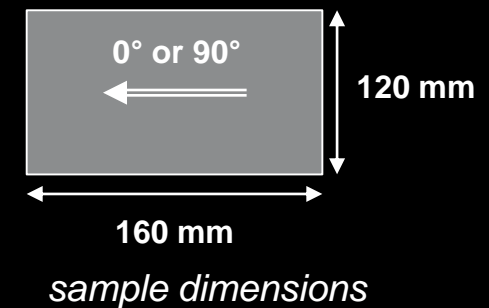


Improved formability validated experimentally ...

- The LDH (Limiting Dome Height) test aims to reproduce press conditions in a simple, fast laboratory procedure
- This test shows good correlation with plane-strain industrial failures



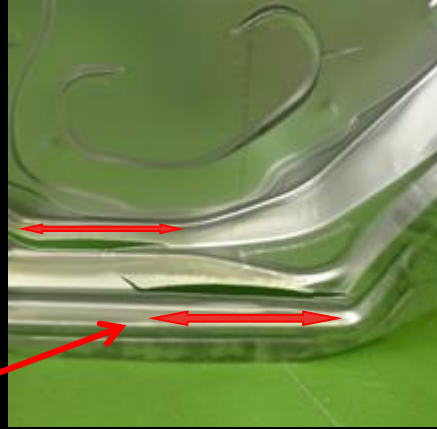
hemispherical punch + lock beads



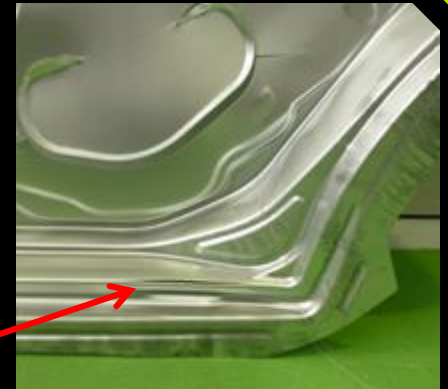
Improved formability validated experimentally...

- Constellium in-house stamping trials using difficult door inner tooling

Surfalex®



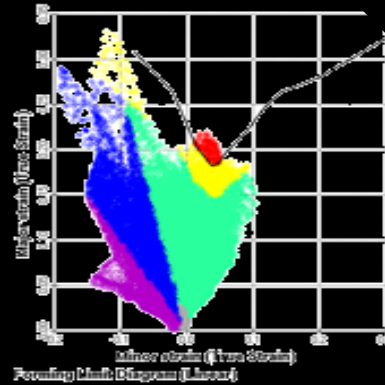
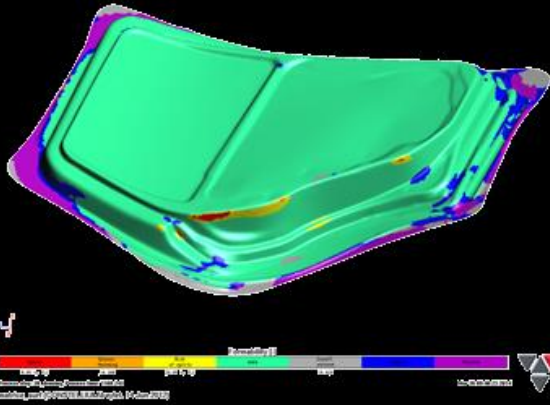
Surfalex® HF



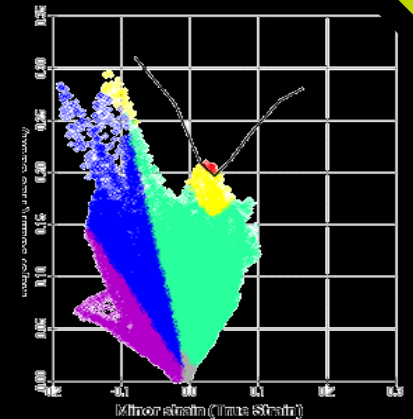
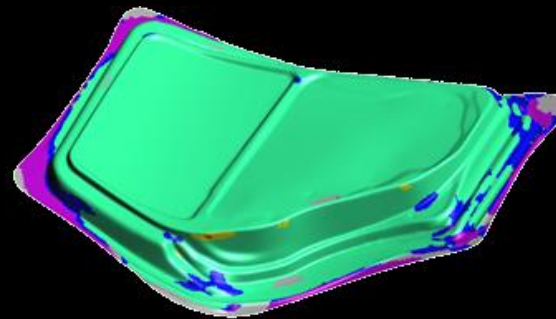
... and numerically

- Surfalex® HF gives clear formability improvement both in simulation and in prototype stamping trials of difficult parts

Surfalex®



Surfalex® HF



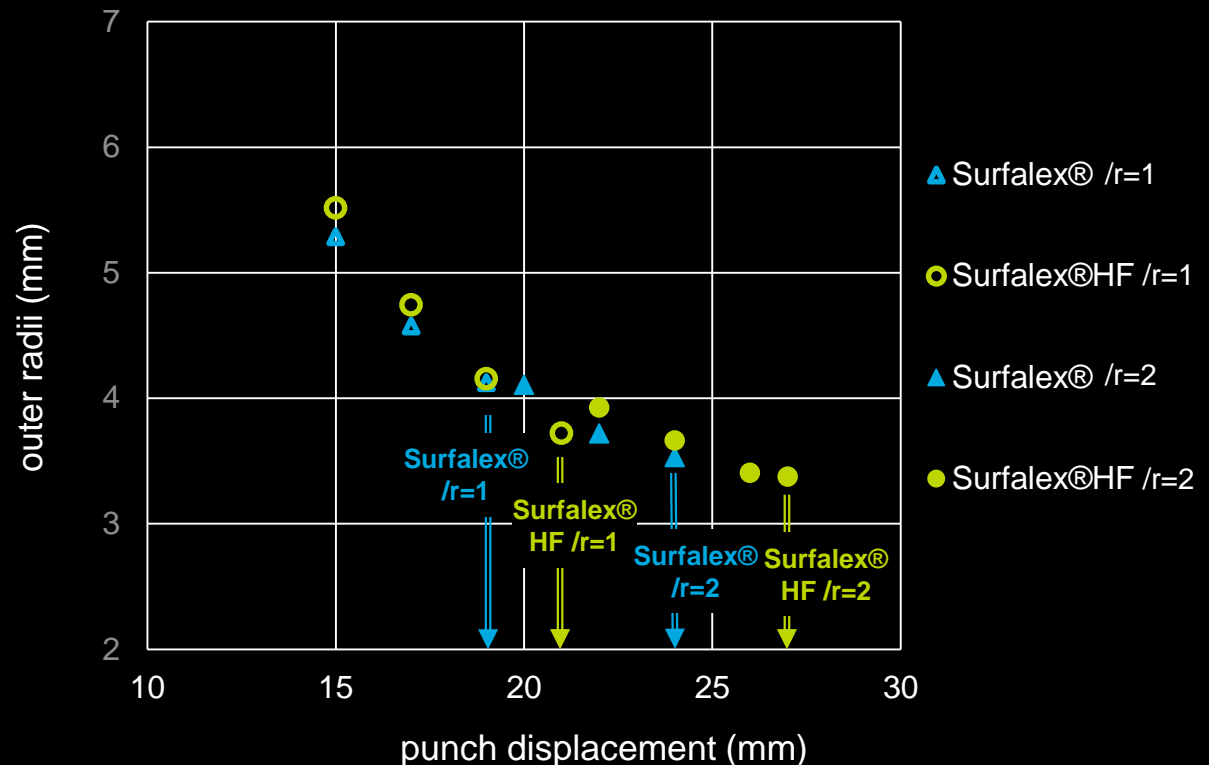
“Sharper” lines can be achieved

- In this stretch-bending test, a high punch displacement is the key indicator of the ability to form sharp lines. The given outer radii values depend on the tool geometry & setup.
- Lower outer radii can be obtained with **Surfalex® HF**

Interrupted stretch-bending tests at different punch displacements (up to failure) & optical measurement



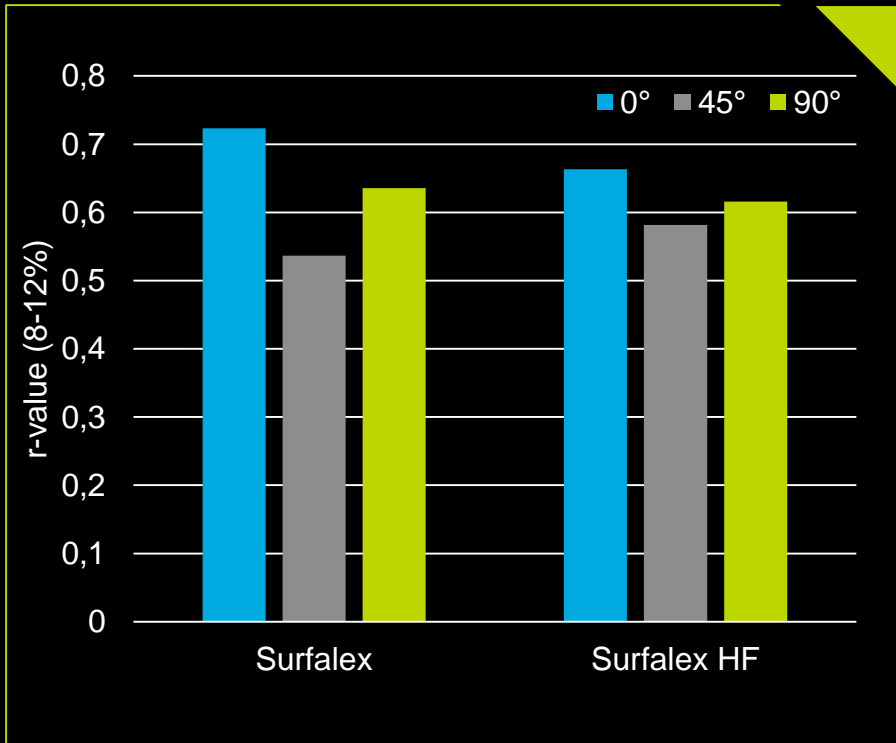
Max. punch displacement before failure is indicated by an arrow



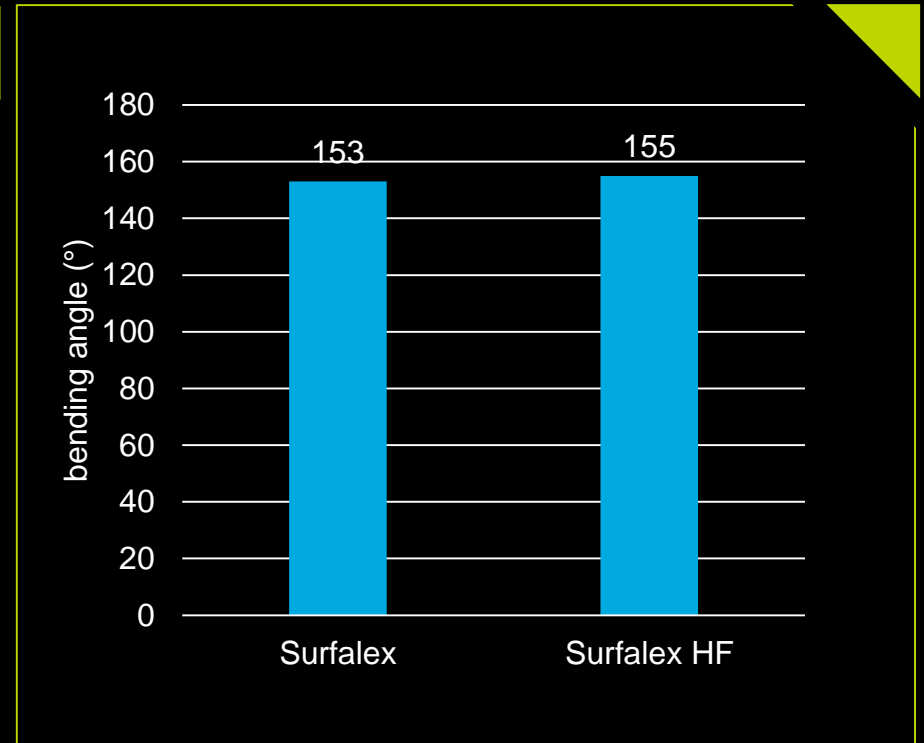
Additional relevant forming properties

- **Surfalex® HF** also shows a lower in-plane anisotropy, that means a more similar forming behavior in the 3 directions, and good hemming aptitude

► r-value



► bending angle:

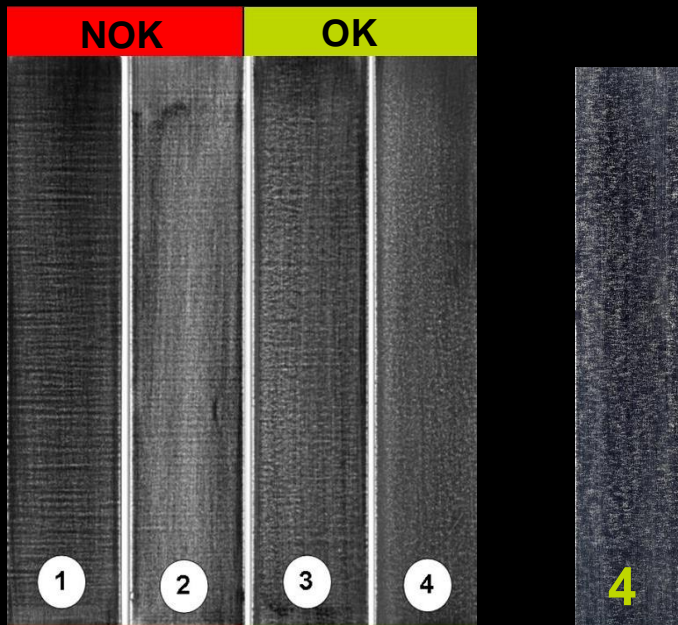


Perfect surface aspect and corrosion resistance complying with skin products

- Trend towards thinner paints mean less tolerance for surface disturbance and/or roping lines after forming: **excellent surface quality of Surfalex® HF**
- **Good corrosion resistance:** IGC results within specifications

➤ roping:

Surfalex® HF



➤ IGC:

