

jetQ™ – optimized AHSS material

for geometrically complex crash structures



JFE

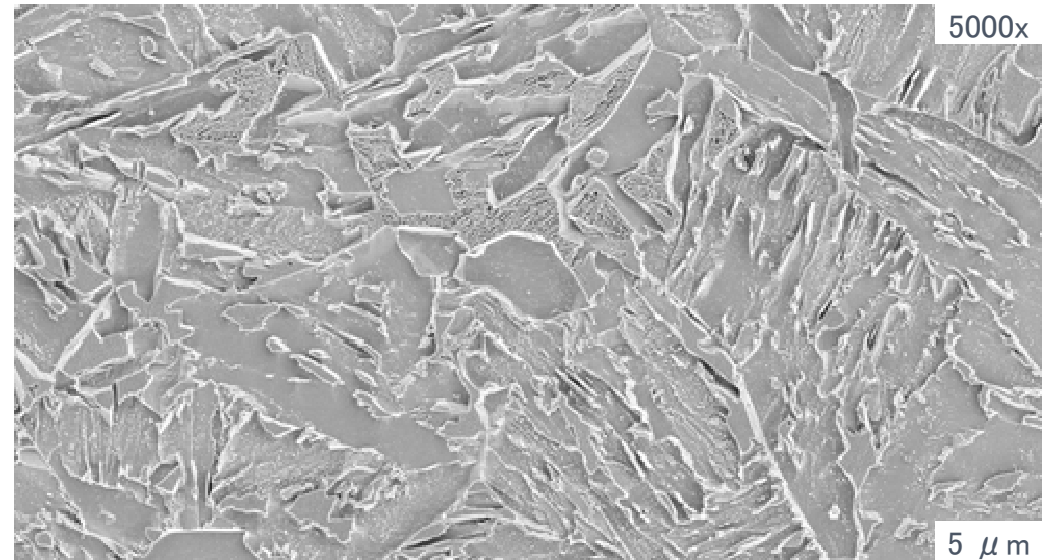
jetQ™ is a joint trademark of JFE Steel & thyssenkrupp Steel Europe

# jetQ™: optimized AHSS material for geometrically complex crash structures

More safety and efficiency in vehicle bodies



- ✓ Highly ductile AHSS with optimized local and global forming properties
- ✓ Robust processing in the press shop
- ✓ Optimized AHSS for new cost cutting and light-weighting potential
- ✓ Good hole expansion capability and high resistance to sheared edge failure
- ✓ Better crash performance compared with conventional DP steels thanks to increased yield strength
- ➔ AHSS with optimized property profile for greater safety and efficiency in vehicle bodies

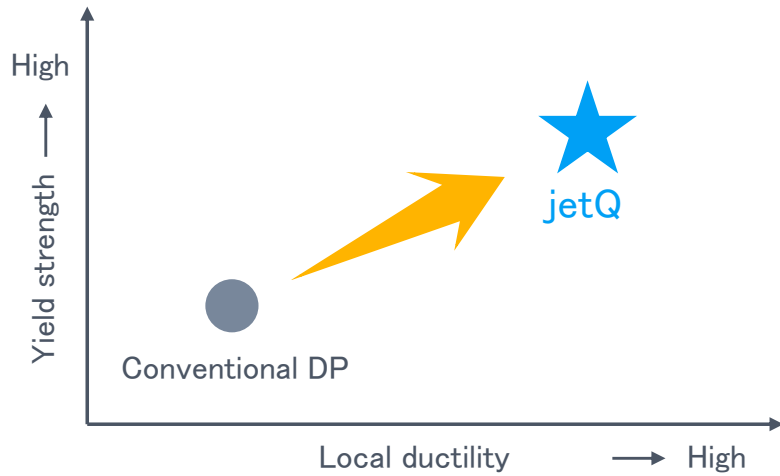


- Moderate alloying concepts
- Homogeneous distribution of tensile strength across the microstructural components
- ➔ Excellent processing properties in the tensile strength class > 980 MPa



# Characteristics of jetQ

High yield strength – excellent local ductility



JFE & tkSE have collaborated in jetQ development

## Potential applications



- Front side member
- Rear side member
- Rocker
- Seat cross member
- A pillar applications
- B pillar applications



## Mechanical properties

- High yield strength
- High local ductility

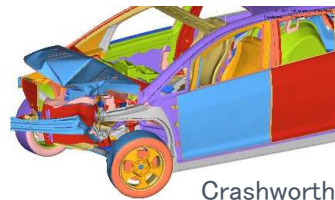


## Parts performance

- High energy absorption
- High stretch flangeability

## Customer Benefits

### Weight & LCA saving



Crashworthiness

### Production safety



Stretch flange



## Global supply and availability

jetQ: serving needs of globally acting OEM



Grade	CR <sup>1)</sup>	GI <sup>2)</sup>	GA <sup>1)</sup>	Reference Grade, Standard <sup>1)</sup>
jetQ 980	●	●	●	JSC980YH, CR700Y980T-DH
jetQ 1180	●	●	●	JSC1180YH, CR850Y1180T-DH <sup>2)</sup>

### Availability and supply

- Already commercially available
- Market launch in 2022
- Under development

1) CR (UC) and Galvannealed (GA) products supplied by JFE

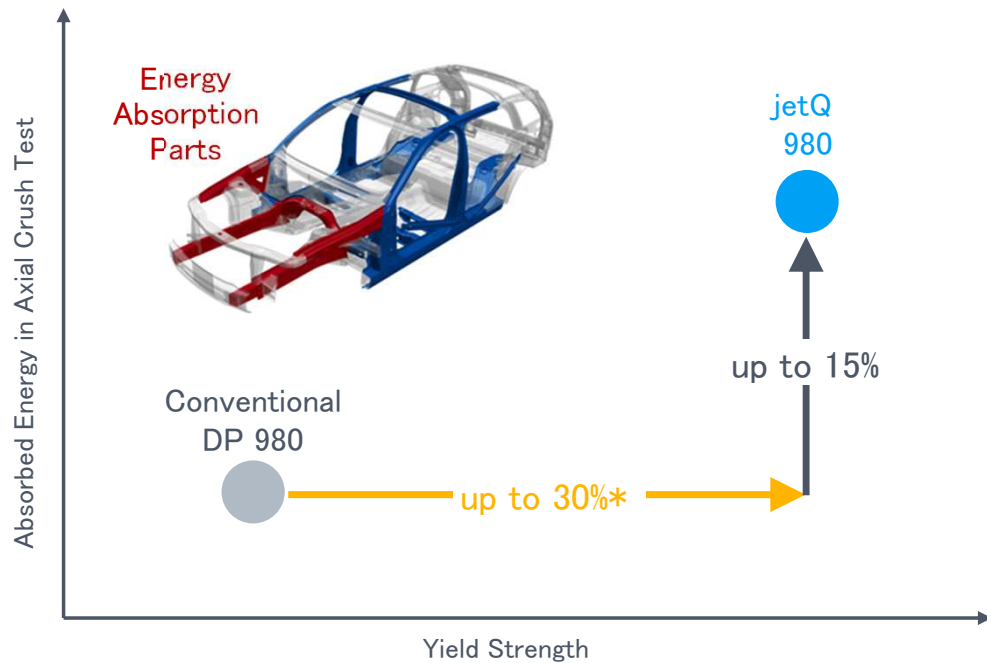
2) GI-coated products supplied by tkSE

- 1. VDA 239-100 or JFS A 2001 and A 3011; 2. Proposal for Revision VDA 239-100



# Crashworthiness – energy absorption

jetQ: stable in axial deformation and therefore excellent for energy absorption parts



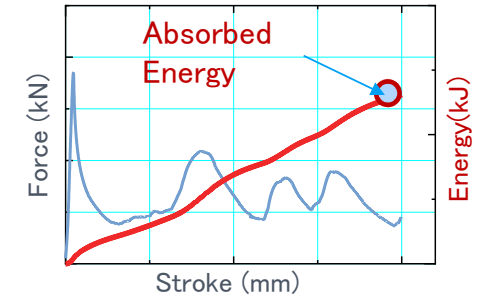
## Axial crash test



jetQ 980



Stable deformation



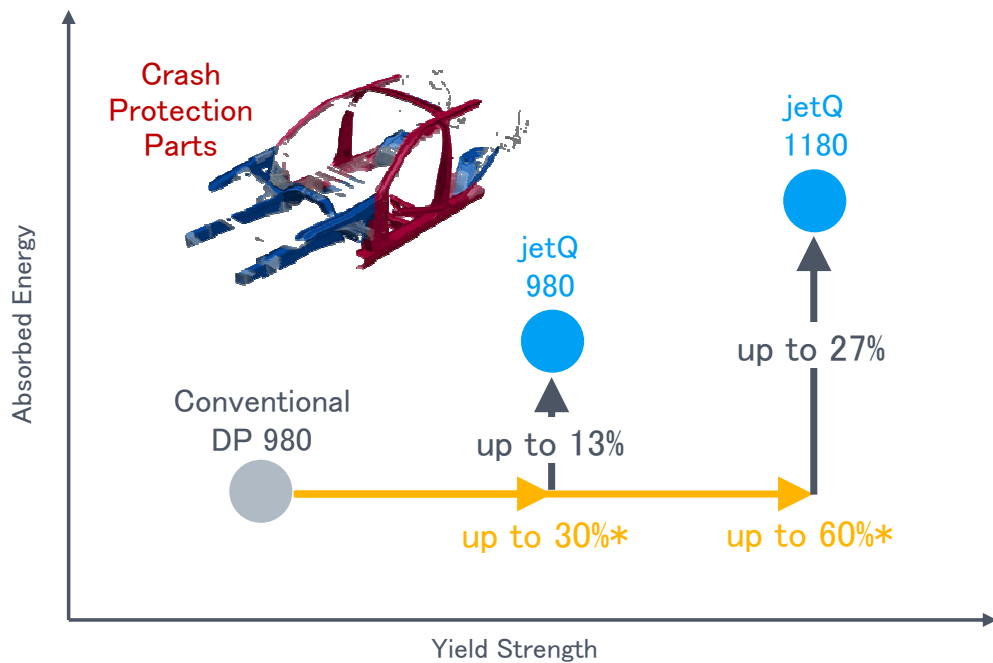
jetQ 980 has a higher absorbed energy due to its higher yield strength than conventional DP 980

- \*depending on reference values

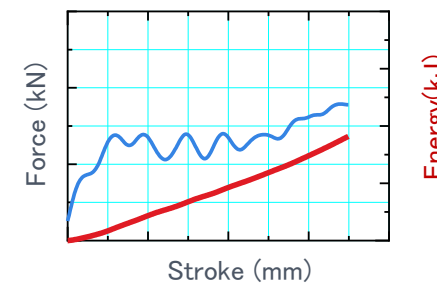
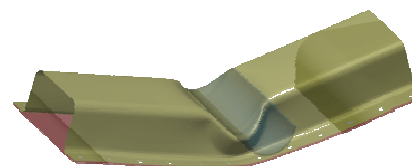


# Crashworthiness – crash protection

jetQ: stable in bending deformation and therefore excellent for crash protection



## Three-point bending test



jetQ 980



jetQ 1180



Stable deformation

jetQ 980/1180 has a higher absorbed energy due to its higher yield strength than conventional DP 980

- \*depending on reference values

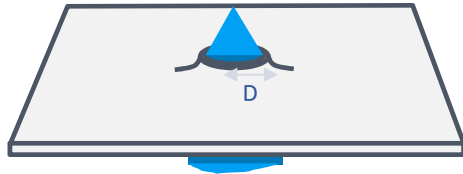


# Stretch flange formability

Excellent stretch flangeability of jetQ



Example:  
Hole expansion test\* of GI steels



$$\text{Hole Expansion Ratio (HER, \%)} = \frac{(D_{\text{after}} - D_{\text{before}})}{D_{\text{before}}} \times 100$$

Conventional DP 980



jetQ 980



jetQ 1180



Stretch flange forming  
in actual parts

— Stretch flange

Complex shape parts can be press formed with jetQ

- \* According to ISO 16630



# Potential of jetQ 980

Application & economic efficiency – microstory: front side member



## Customer Requirement

High energy absorption in a crash situation

High ductility requirements for crash

Medium to high forming complexity

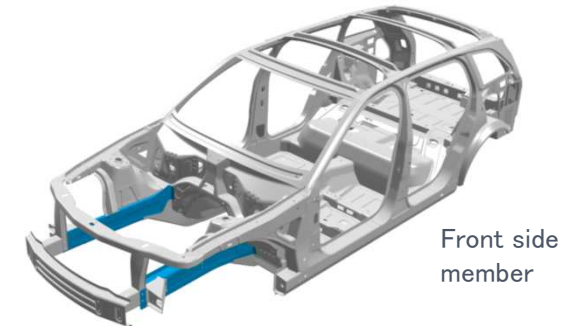
## Benefit by jetQ 980

Higher yield strength

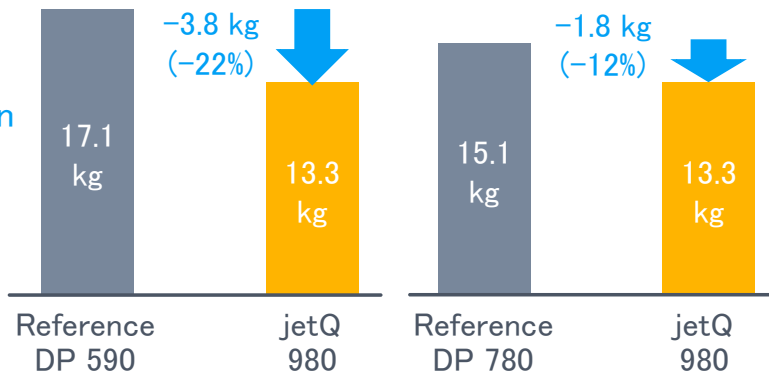
Less sensitive to cracking

Excellent local ductility

- ✓ Formability
- ✓ Crash safety
- ✓ Lightweight design



## Weight reduction per vehicle



A lightweight front side member is achieved by jetQ 980 keeping the crashworthiness of conventional DP 590/780.





# Potential of jetQ 1180

Application & economic efficiency – microstory: rocker

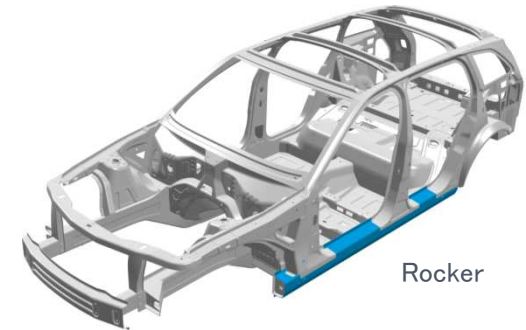


## Customer Requirement

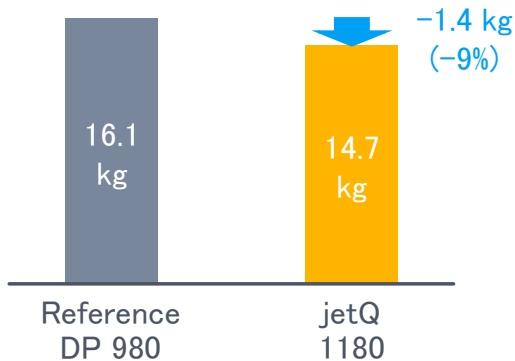
## Benefit by jetQ 1180

High crash deformation resistance	Higher yield strength
Medium ductility requirements for crash	Less sensitive to cracking
Medium to high forming complexity	Excellent local ductility

- ✓ Formability
- ✓ Crash safety
- ✓ Lightweight design



## Weight reduction per vehicle



A weight reduction with similar crashworthiness is achieved by jetQ 1180 due to its increased yield strength compared to conventional DP 980. In addition, jetQ 1180 has better formability than conventional DP 1180.



## Mechanical properties – according to European standard

High yield strength & excellent hole expansion ratio



Grade	Coating	YS (MPa)	TS (MPa)	T-EL (%)	HER <sup>1</sup> (%)	Remarks
jetQ 980	GI	830	1030	14	40	–
Ref. 980DP		720	1030	12–17	20	DP 700/1000 WAS <sup>2</sup>
jetQ 1180	GI	1020	1200	15	25	–
Ref. 1180DP		880	1235	10–14	N/A	DP 800/1180 WAS <sup>2</sup>
jetQ 980	CR (UC)	810	1040	16	60	–
Ref. 980DP		720	1030	12–17	20	DP 700/1000 WAS <sup>2</sup>
jetQ 1180	CR (UC)	950	1220	13	40	–
Ref. 1180DP		880	1235	10–14	N/A	DP 800/1180 WAS <sup>2</sup>

1. Hole Expansion Ratio, 2. from WAS (FSV Overview Report)



## Mechanical properties – according to Japanese standard

High yield strength & excellent hole expansion ratio



Grade	Coating	YS (MPa)	TS (MPa)	T-EL (%)	HER <sup>1</sup> (%)	Remarks
jetQ 980	GA	850	1030	15	60	–
Ref. 980DP		720	1030	12–17	20	DP 700/1000 WAS <sup>2</sup>
jetQ 1180	GA	Under development				
Ref. 1180DP		880	1235	10–14	N/A	DP 800/1180 WAS <sup>2</sup>
jetQ 980	CR (UC)	810	1040	18	60	–
Ref. 980DP		720	1030	12–17	20	DP 700/1000 WAS <sup>2</sup>
jetQ 1180	CR (UC)	950	1220	15	40	–
Ref. 1180DP		880	1235	10–14	N/A	DP 800/1180 WAS <sup>2</sup>

1. Hole Expansion Ratio, 2. from WAS (FSV Overview Report)



## Mechanical properties – according to US standard

High yield strength & excellent hole expansion ratio



Grade	Coating	YS (MPa)	TS (MPa)	T-EL (%)	HER <sup>1</sup> (%)	Remarks
jetQ 980	GI	830	1030	15	40	–
Ref. 980DP		720	1030	12–17	20	DP 700/1000 WAS <sup>2</sup>
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# jetQ: optimized AHSS material for geometrically complex crash structures

More safety and efficiency in vehicle bodies



- ✓ The ideal balance between strength, formability and processing
- ✓ Increased yield strength and local ductility for improved crash behavior
- ✓ Local and global forming properties combined
- ✓ Expanding application of cold forming in light-weight body structure

The ideal balance between strength, formability and processing

