Supplementary material 2:

Effect of the EBSD step size on the pole figures of martensitic variants.

A Fe-9Cr-1W-0.1C steel austenitized at 1100°C/1h, water quenched and heat-treated at 750°C/1h has been studied by Electron Back-Scatter Diffraction (EBSD) on a Field Emission Gun Scanning Electron Microscope (FEG-SEM) LEO1530 at 20 kV equipped with a Oxford HKL Channel5 system, with a condenser aperture of 60 µm, at a working distance of 25 mm. This steel is fully martensitic, as shown in part of a EBSD map (Fig. S2_1a). The prior-austenitic grains have been reconstructed by using the software ARPGE (Cayron, 2007a), one of them is delimited by the white frontier in Fig. S2_1a.

Two EBSD maps have been acquired with the same conditions on the same area, the only difference being the step size: 3µm or 0.3µm. The $<110>_\alpha$ pole figures (PF) of the raw data (without noise reduction) of the martensitic grains contained in the white-contoured prior austenitic grain of Fig. S2_1a are shown in Fig. S2_1b and Fig. S2_1c, respectively. The PF with the 3µm step size exhibits discrete features characteristic of the 24 KS variants. These features become spread and continuous with the 0.3µm step size. The spreading of Fig. S2_1c is composed of an isotropic broadening of the discrete spots already present in Fig. S2_1b and of orientations continuously distributed between those of the 24 KS variants.

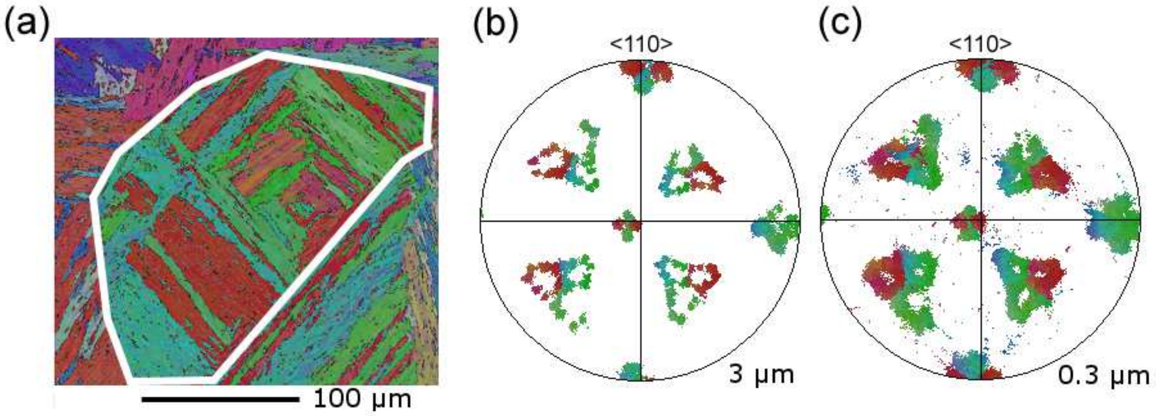

Fig. S2_1. Effect of the step size on the pole figure of martensite variants inside a prior austenitic grain. (a) EBSD map of a Fe9CrW martensitic steel, with Euler color coding, and $<110>_\alpha$ pole figures of the subset delineated in white, with (b) 3 µm and (c) 0.3 µm for the step size chosen for the EBSD map acquisition.

These results can be understood as following: increasing the step size reduces the number of pixels in the map and only the most frequent orientations are scanned in the map and represented in the PF. This effect is analogous to the convolution algorithms used to obtain the average PF from experimental spread PF (Nolze, 2004).