The role of microstructural development in the hydrothermal corrosion of cast and HIPed Stellite 6 (S-6) analogues in simulated PWR conditions

Table 1. Chemical composition (at. % and wt. %) of both cast and HIPed S-6 as measured by AMG Superalloys UK Limited, Rotherham, U.K.

Alloy	**Composition**								
		Co	**Cr**	**W**	**C**	**Fe**	**Ni**	**Si**	**Mn**
Cast S-6	at. %	51.7	31.2	1.5	6.6	3.0	2.6	2.9	0.5
	wt.%	55.9	29.7	5.1	1.5	3.0	2.8	1.5	0.5
HIPed S-6	at. %	59.8	29.5	1.7	4.5	0.7	0.8	2.9	0.1
	wt.%	63.0	27.4	5.4	1.0	0.7	0.9	1.5	0.1

Table 2. EDX analyses of the proportion of metallic elements in the three main phases in cast S-6 (at%) presented as average values from five individual measurements.

Element	Composition (at%)		
	Co-rich matrix	Cr-rich carbide	W-rich carbide
Si	4.4	0.1	8.9
Cr	26.3	83.4	34.6
Fe	3.2	1.5	1.4
Co	60.3	12.9	35.1
Ni	2.9	0.8	1.9
W	2.9	1.3	18.1
Total	100.0	100.0	100.0

Table 3. EDX analyses of the proportion of metallic elements in the two main phases in HIPed S-6 (at%).

Element	Composition (at. %)	
	Co-rich matrix	Cr-rich carbide
Si K	3.5	0.0
Cr K	25.2	85.4
Fe K	0.9	0.2
Co K	67.6	13.2
Ni K	1.0	0.1
W M	1.8	1.1
	100.0	100.0

Table 4 Equilibrium prediction of the composition of the Co fcc and M_7C_3 phases in HIPed S-6 at the HIPing temperature of 1200°C

Co fcc	
Component	At %
Co	68.5
Cr	24.0
W	1.6
Si	3.5
Ni	1.0
Fe	0.8
Mn	0.1
C	0.5
M_7C_3	
Component	At %
Cr	63.1
C	30.0
Co	5.3
W	1.4
Fe	0.1
Ni	0.0
Mn	0.0
Si	0.0