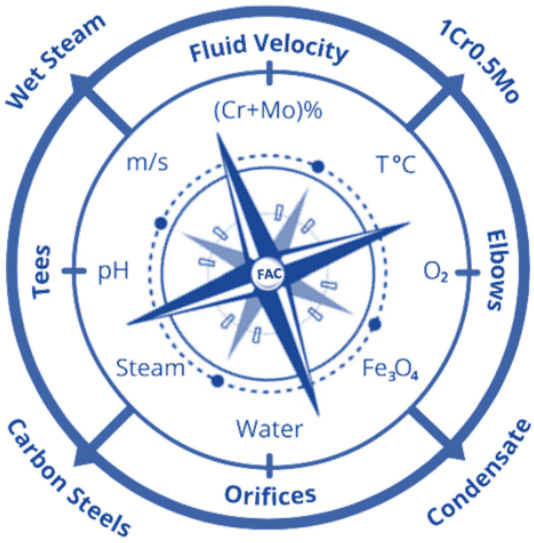

FAC-Compass®: Flow-Accelerated Corrosion Modeling, Life Prediction and Materials Selection in Water-Steam Systems

Version 9.23

★ **Performance** ★ **Functionality** ★ **Usability**

Anytime Anywhere Any Device Any OS

No USB dongles No installation No Browser Plug-ins

Contact Us for Licensing Details

Why WebCorr | Performance Guarantee | Unparalleled Functionality | Unmatched Usability | Any Device Any OS | Free Training & Support | CorrCompass

Features and Functions of FAC-Compass

FAC-Compass is the only device-and-OS independent software tool on the market for Erosion Corrosion and Flow-Accelerated Corrosion (FAC) modeling, life prediction, and materials selection in water-steam systems. Designers, engineers, consultants, maintenance and inspection personnel can quickly assess and quantify the impact of erosion corrosion and FAC on the remaining life of their components in the water-steam systems anytime, anywhere, on any device running any OS without the need to install or download anything.

FAC-Compass models the effects of the following parameters on the rate of metal wastage and wall thinning due to erosion corrosion (EC) and flow-accelerated corrosion (FAC):

- Fluid chemistry including pH, temperature, oxygen content, corrosion inhibitor availability and efficiency
- Fluid velocity, Flow pattern and geometry of the component in the water-steam system.
- Metallurgy of the components used in the water-steam system

The outputs from FAC-Compass include:

- Quantitative evaluation of the metallurgy's resistance to FAC: the FAC resistance index, R, and the Chromium equivalent. The metallurgy's resistance to FAC is classified into 3 categories as (1) not resistant to FAC; (2) generally resistant to FAC, and (3) highly resistant to FAC.
- The predicted FAC rate (wall thinning) in mm/y
- The predicted remaining life of the component
- The predicted FAC rate as a function of temperature
- The predicted FAC rate as a function of oxygen content
- The predicted FAC rate as a function of (Cr+Mo)% content in the steel or alloy
- The predicted FAC rate as a function of velocity
- The predicted FAC rate as a function of pH

Overview and Application Examples of FAC-Compass

Figures below show the screen shots of FAC-Compass.

FAC | Geometry

FAC-Compass®: Flow-Accelerated Corrosion Modeling, Life Prediction & Materials Selection

Component ID	Elbow in steam line to Cell #6				
Component Age	year	3.000	Steel Grade	SA105	
Wall Thickness	mm	6.000	Steel Density	kg/cm^3	7.870

Fluid Chemistry and Flow Pattern			Component Metallurgy and FAC Resistance			
Phase of Flow	Wet Steam		C %	0.170	Cr Equivalent	0.030
Mass Flux	kg/m^2.s	2000.000	Cu %	0.020	FAC Index: R_K	0.767
Steam Quality	% dry	95.00	Cr %	0.050	This metallurgy is not resistant to FAC.	
Temperature	°C	170.00	Mo %	0.010		
pH	at 25°C	9.00	Predicted FAC Rate and Remaining Life			
Oxygen Content	µg/kg	15	Predicted FAC Rate		mm/y	0.499
Corrosion Inhibitor Efficiency	%	90.00%	Predicted Remaining Life		years	9.024
Corrosion Inhibitor Availability	%	0.00%				
Flow Pattern (from the Geometry Tab)		G	Plot Option	FAC Rate (mm/y) vs ToC		

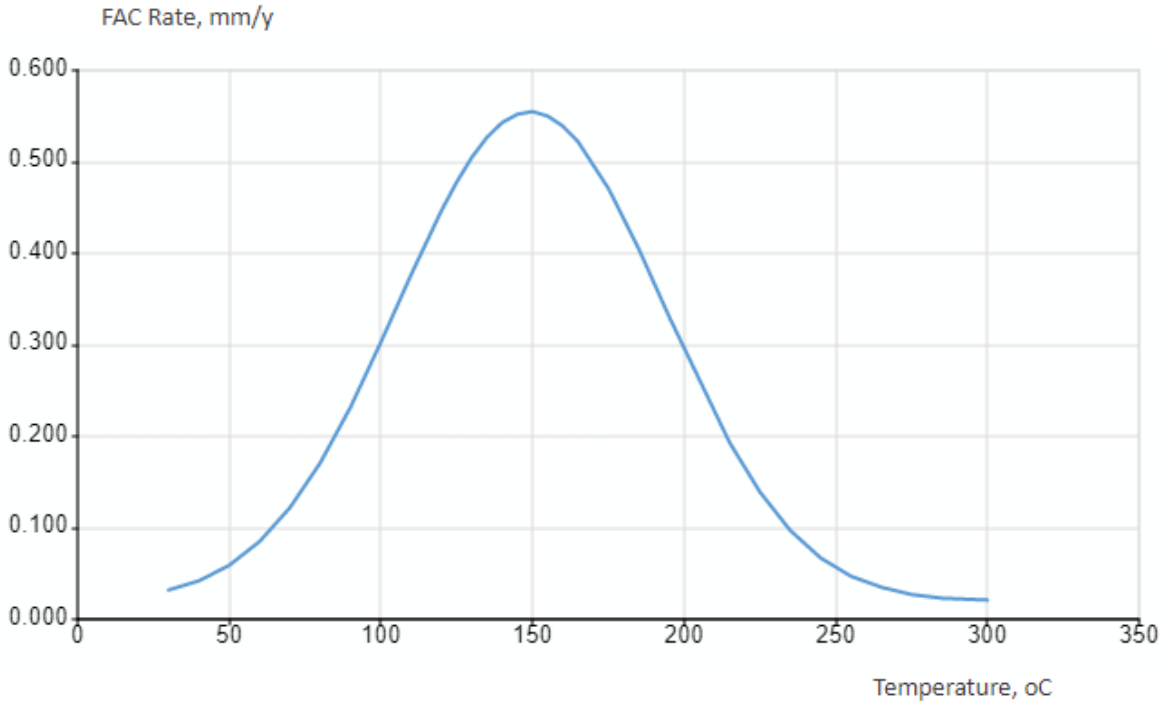

Figure 1 Overview of FAC-Compass

Users of FAC-Compass start by selecting the phase of flow (2-phase wet steam or single phase of water) from the dropdown list (Figure 2).

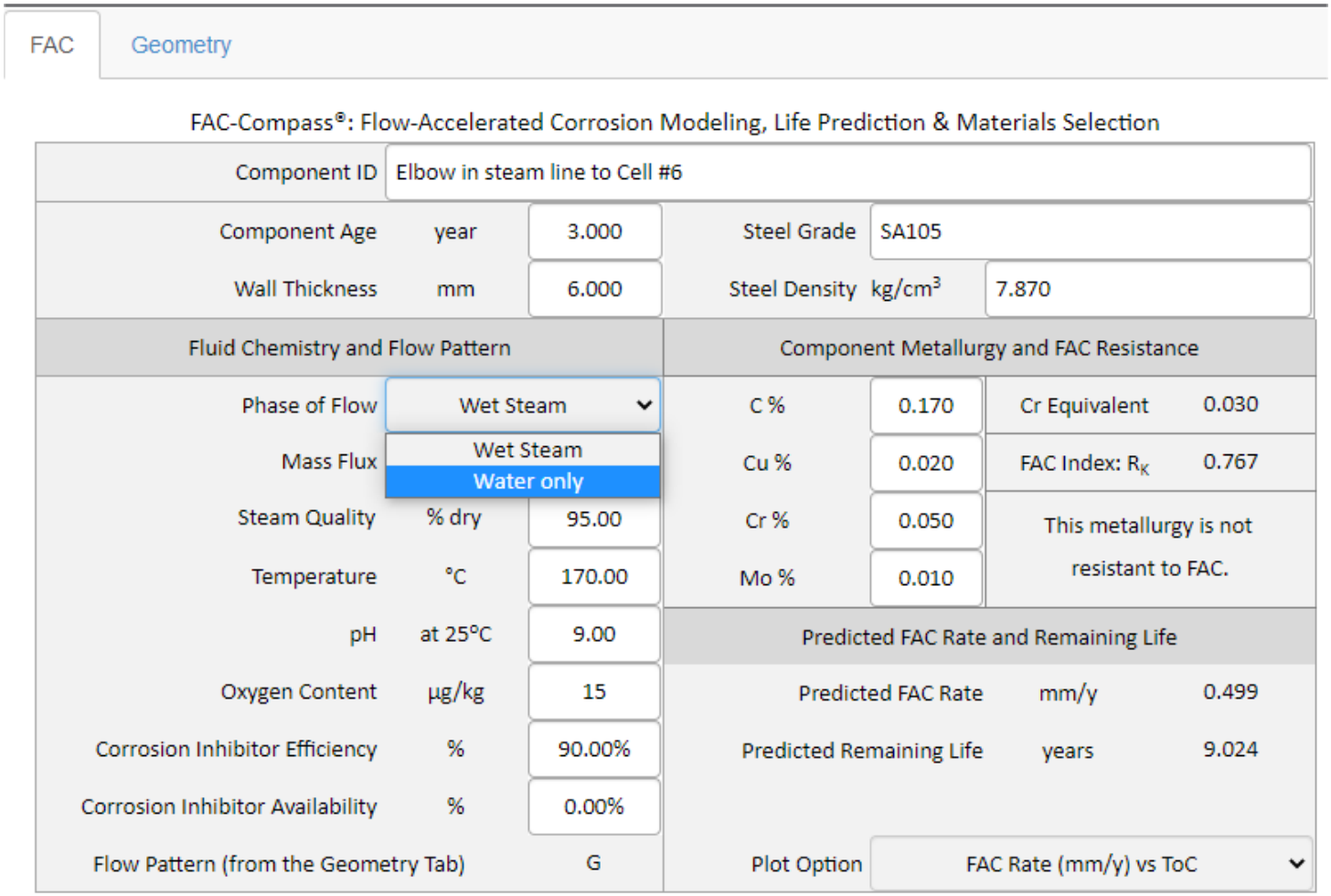

Figure 2 Phase of Flow: Single Phase (Water) and 2-Phase (Wet Steam)

After entering the metallurgy of the component, FAC-Compass computes the chromium equivalent and the FAC resistance index with comment on the FAC resistance of the selected metallurgy. The FAC rate in mm/y can be plotted as a function of (Cr+Mo)% under the prevailing operating conditions of the water-steam system (Figure 3). This function is particularly useful for FAC-resistant materials evaluation, assessment and selection. Users of FAC-Compass can also plot the FAC rate in mm/y as a function of temperature, velocity, pH, oxygen, as shown in Figure 3 below.

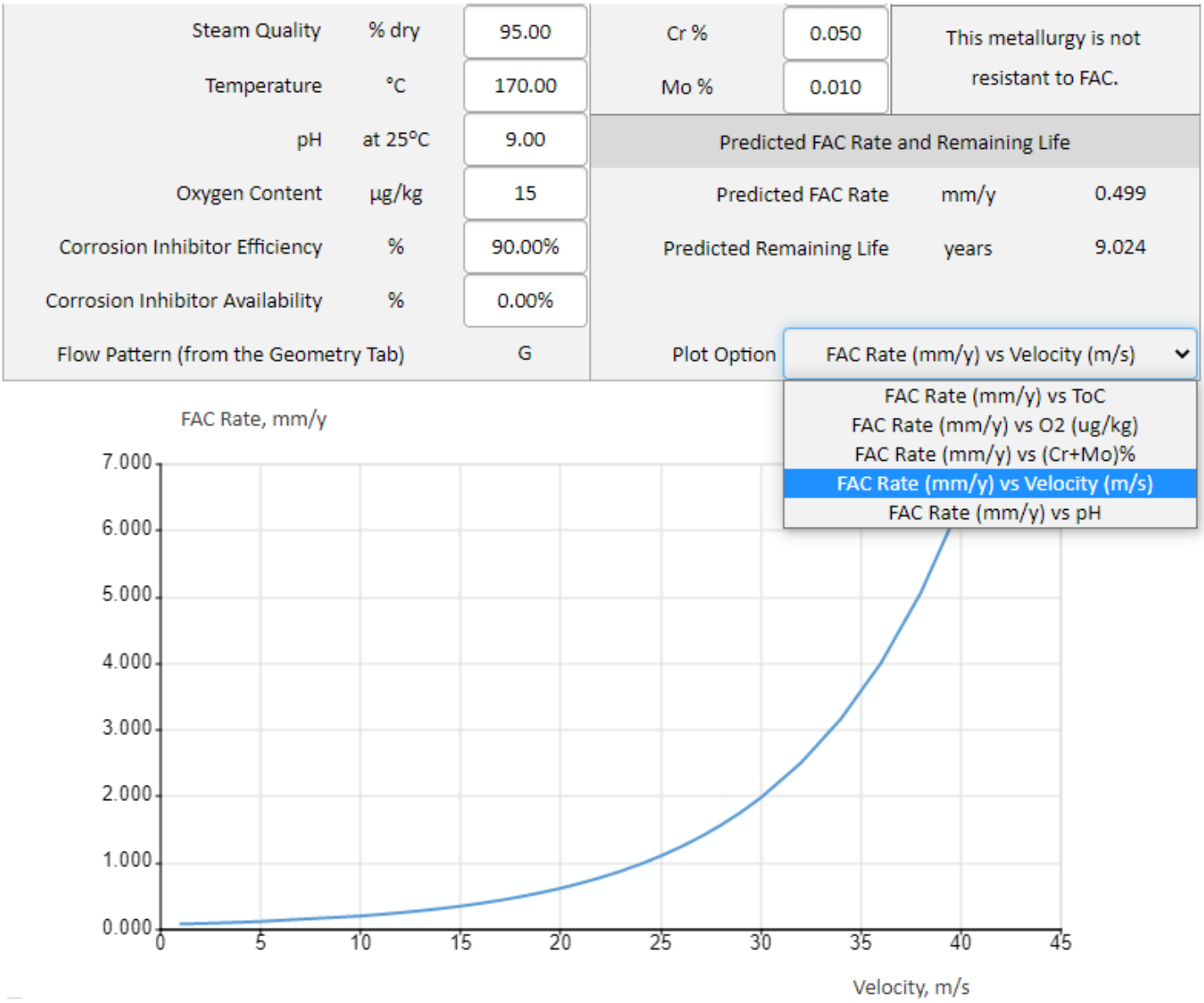

Figure 3 Plot Options in FAC-Compass

The effect of corrosion inhibitors on the corrosion rate can be assessed by entering the corrosion inhibitor efficiency (provided by the inhibitor supplier) and the inhibitor availability (determined by the operator). Figure 4 below shows that the corrosion rate is reduced from 0.499 mm/y to 0.274 mm/y when a corrosion inhibitor with 90% efficiency and 50% availability is used in the system.

FAC | Geometry

FAC-Compass®: Flow-Accelerated Corrosion Modeling, Life Prediction & Materials Selection

Component ID	Elbow in steam line to Cell #6				
Component Age	year	3.000	Steel Grade	SA105	
Wall Thickness	mm	6.000	Steel Density	kg/cm^3	7.870
Fluid Chemistry and Flow Pattern			**Component Metallurgy and FAC Resistance**		
Phase of Flow	Wet Steam		C %	0.170	Cr Equivalent 0.030
Mass Flux	kg/m^2.s	2000.000	Cu %	0.020	FAC Index: R_K 0.767
Steam Quality	% dry	95.00	Cr %	0.050	This metallurgy is not resistant to FAC.
Temperature	°C	170.00	Mo %	0.010	
pH	at 25°C	9.00	**Predicted FAC Rate and Remaining Life**		
Oxygen Content	µg/kg	15	Predicted FAC Rate	mm/y	0.274
Corrosion Inhibitor Efficiency	%	90.00%	Predicted Remaining Life	years	34.293
Corrosion Inhibitor Availability	%	50.00%			
Flow Pattern (from the Geometry Tab)		G	Plot Option	FAC Rate (mm/y) vs ToC	

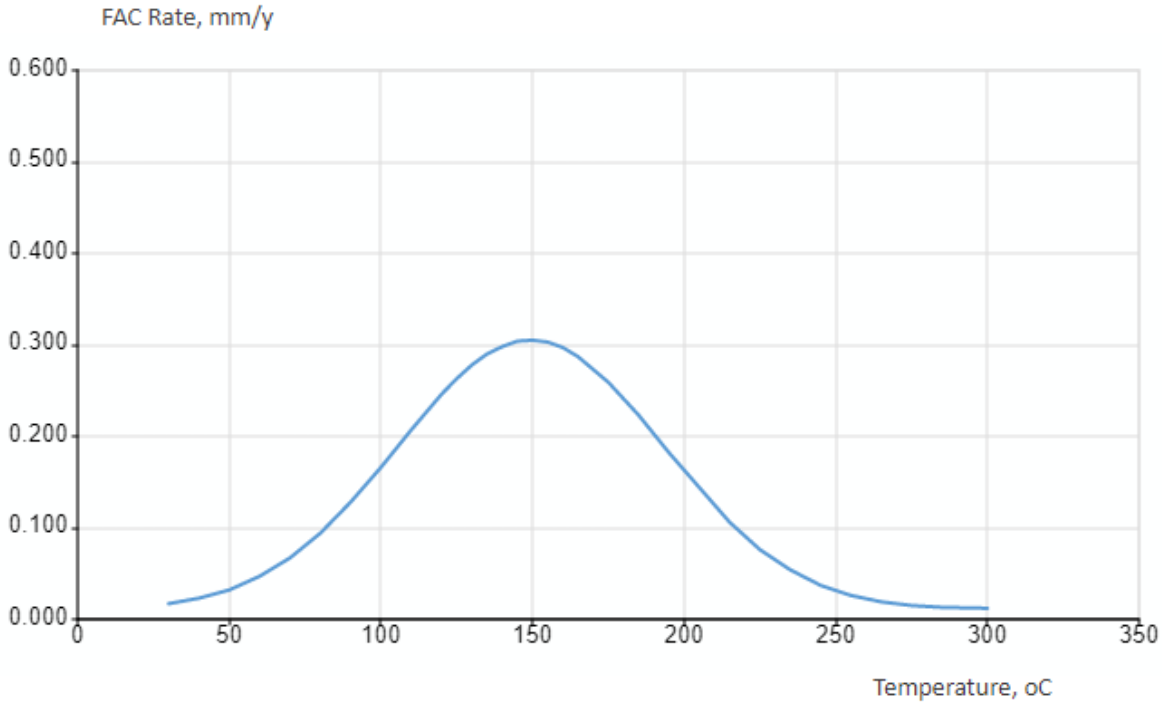

Figure 4 FAC-Compass models the effect of corrosion inhibitor on the corrosion rate

Service Life Prediction for a 1 1/4" Steam Pipe Elbow

A pipe elbow (SA105) in a wet steam line perforated after 6 years in service. The metallurgy of the elbow is: C% (0.030), Cu%(0.020), Cr%(0.050), Mo%(0.010). FAC-Compass determines that this metallurgy is not resistant to FAC based on the evaluation of the chemical composition of the elbow. The chemistry of the fluid is as shown in Figure 5. The FAC rate predicted by FAC-Compass under the prevailing operating condition is 1.018 mm/y. The nominal wall thickness is 6 mm, the elbow is predicted by FAC-Compass to perforate in 6 years.

FAC | Geometry

FAC-Compass®: Flow-Accelerated Corrosion Modeling, Life Prediction & Materials Selection

Component ID	Elbow in steam line to Cell #6				
Component Age	year	6.000	Steel Grade	SA105	
Wall Thickness	mm	6.000	Steel Density	kg/cm^3	7.870
Fluid Chemistry and Flow Pattern			**Component Metallurgy and FAC Resistance**		
Phase of Flow	Wet Steam		C %	0.170	Cr Equivalent 0.030
Mass Flux	kg/m^2.s	1000.000	Cu %	0.020	FAC Index: R_K 0.767
Steam Quality	% dry	95.00	Cr %	0.050	This metallurgy is not resistant to FAC.
Temperature	°C	170.00	Mo %	0.010	
pH	at 25°C	8.50	**Predicted FAC Rate and Remaining Life**		
Oxygen Content	µg/kg	5	Predicted FAC Rate	mm/y	1.018
Corrosion Inhibitor Efficiency	%	90.00%	Predicted Remaining Life	years	0.000
Corrosion Inhibitor Availability	%	0.00%			
Flow Pattern (from the Geometry Tab)		G	Plot Option	FAC Rate (mm/y) vs ToC	

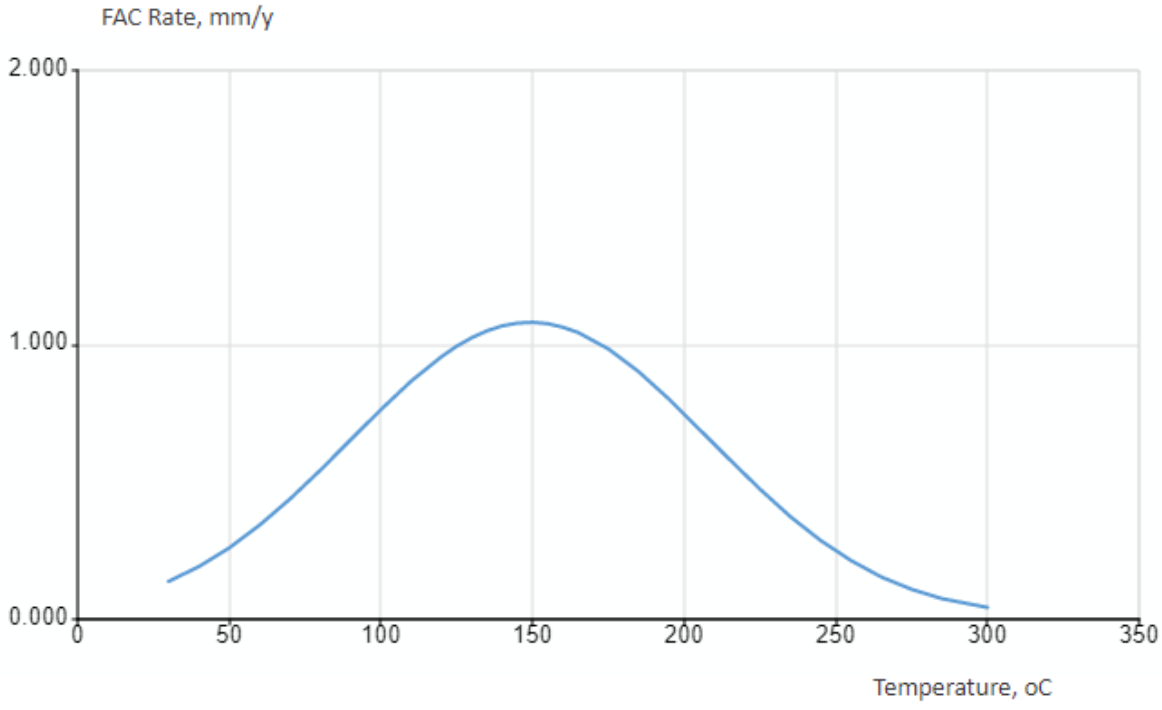

Figure 5 Service life prediction for a pipe elbow in wet steam service

The powerful applications of FAC-Compass in water-steam services are truly unlimited in engineering design, FAC resistant materials evaluation and selection, remaining life prediction, process optimization (such as temperature, pH, O2, velocity), trouble-shooting and failure analysis.

Click here to contact us for licensing details and experience the power of FAC-Compass.

FAC-Compass, giving you the right directions in FAC Prediction and Assessment