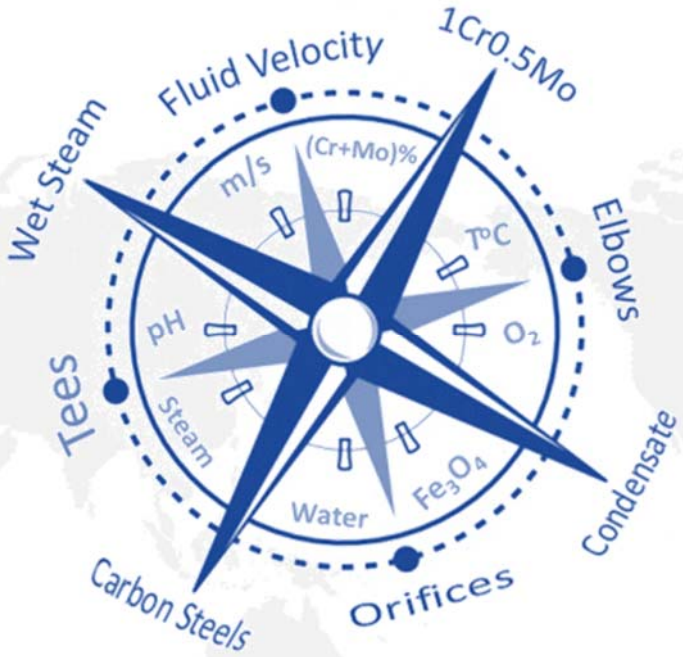
# FAC-Compass® 9.20

## Flow-Accelerated Corrosion Modeling, Life Prediction and Materials Selection in Water-Steam Systems




☆ Performance ☆ Functionality ☆ Usability

*The Ultimate Software Solution to Costly Flow-Accelerated Corrosion*

Anytime Anywhere Any Device Any OS

1 Scotts Road #24-10, Shaw Centre, Singapore 228208 webcorr@corrosionclinic.com

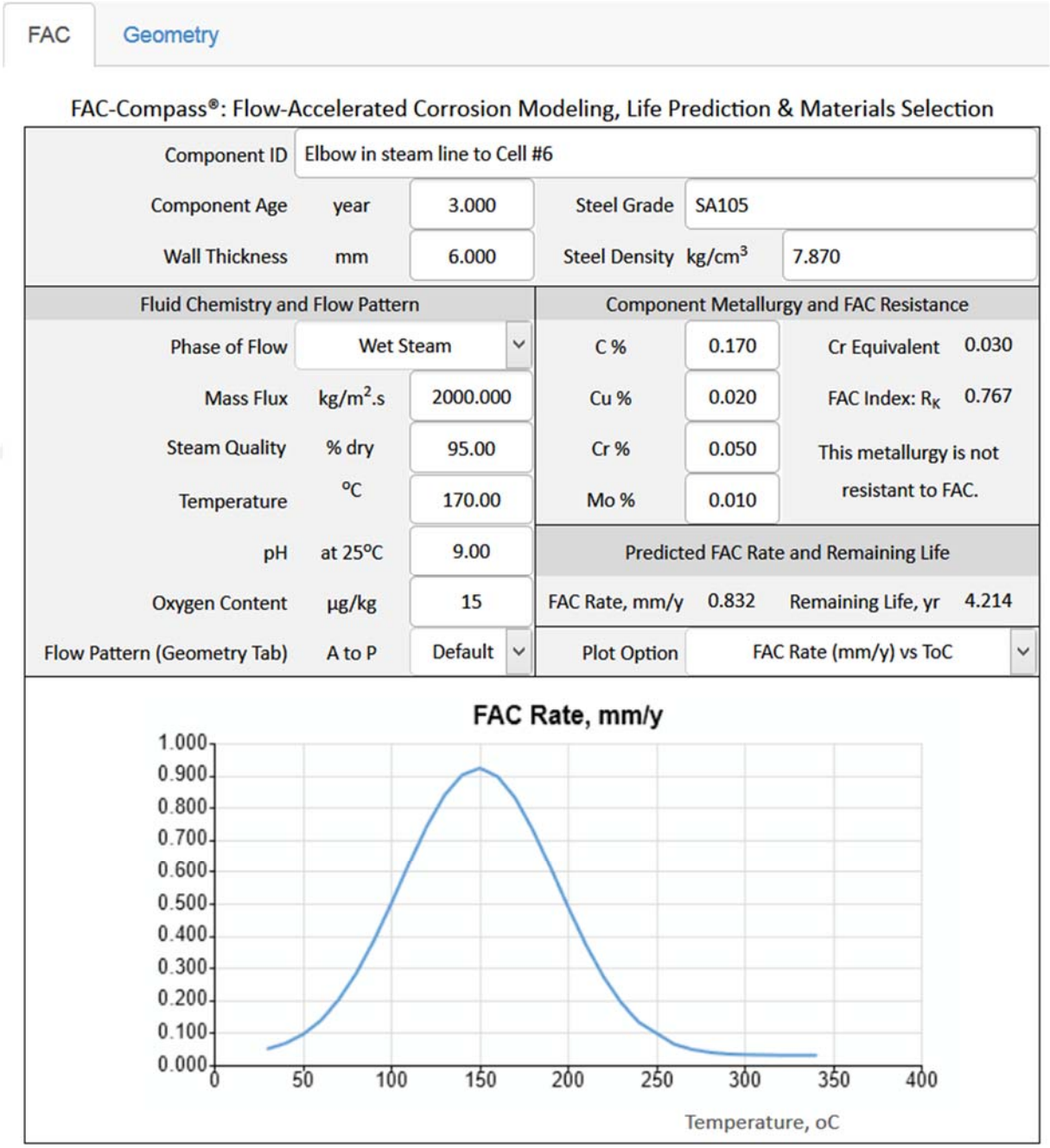



Figure 1 The User Interface

## Overview 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, and oxygen content.
- 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

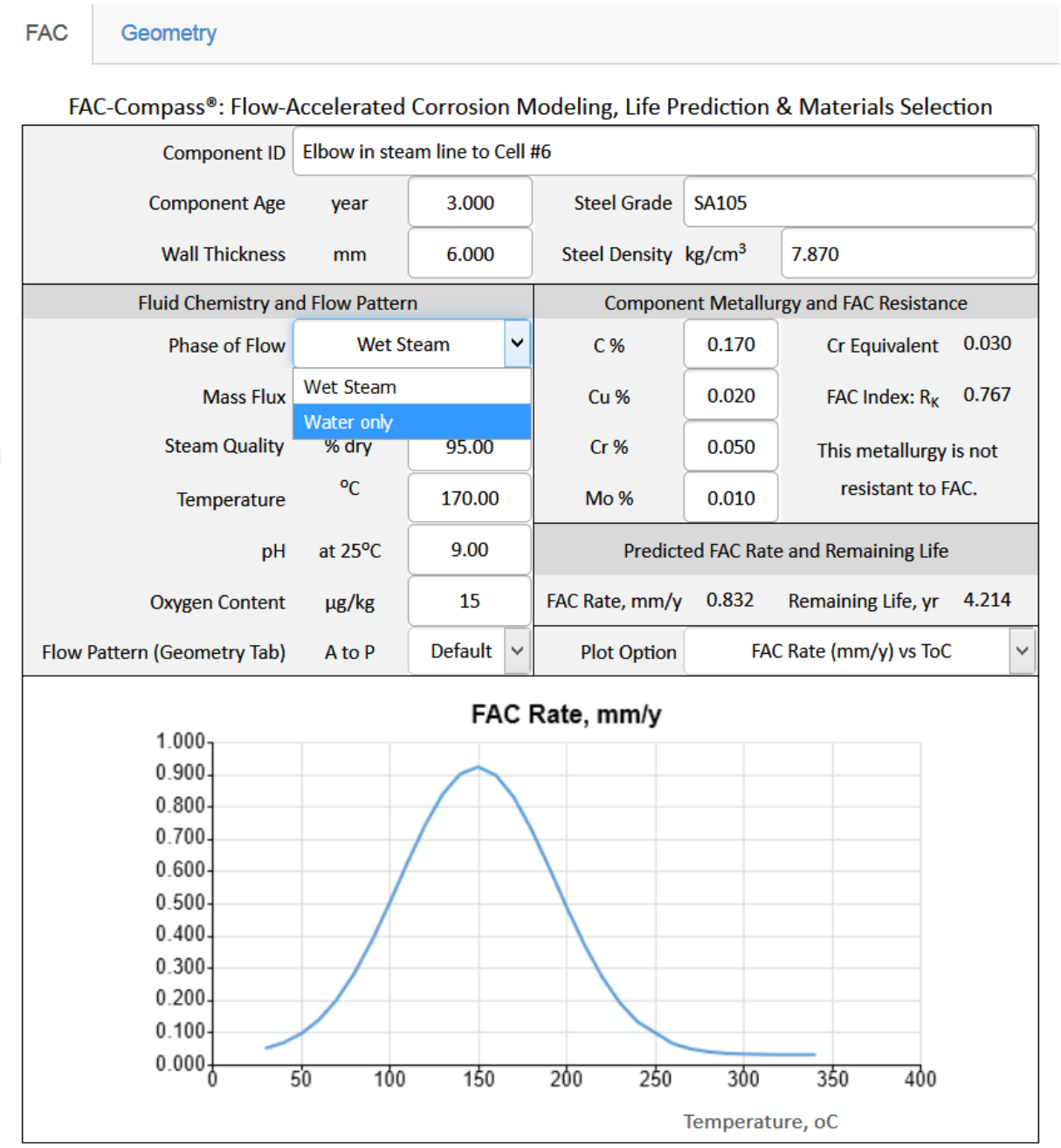



Figure 2 Phase of Flow in FAC-Compass: Single Phase (Water) and 2-Phase (Wet Steam)

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.

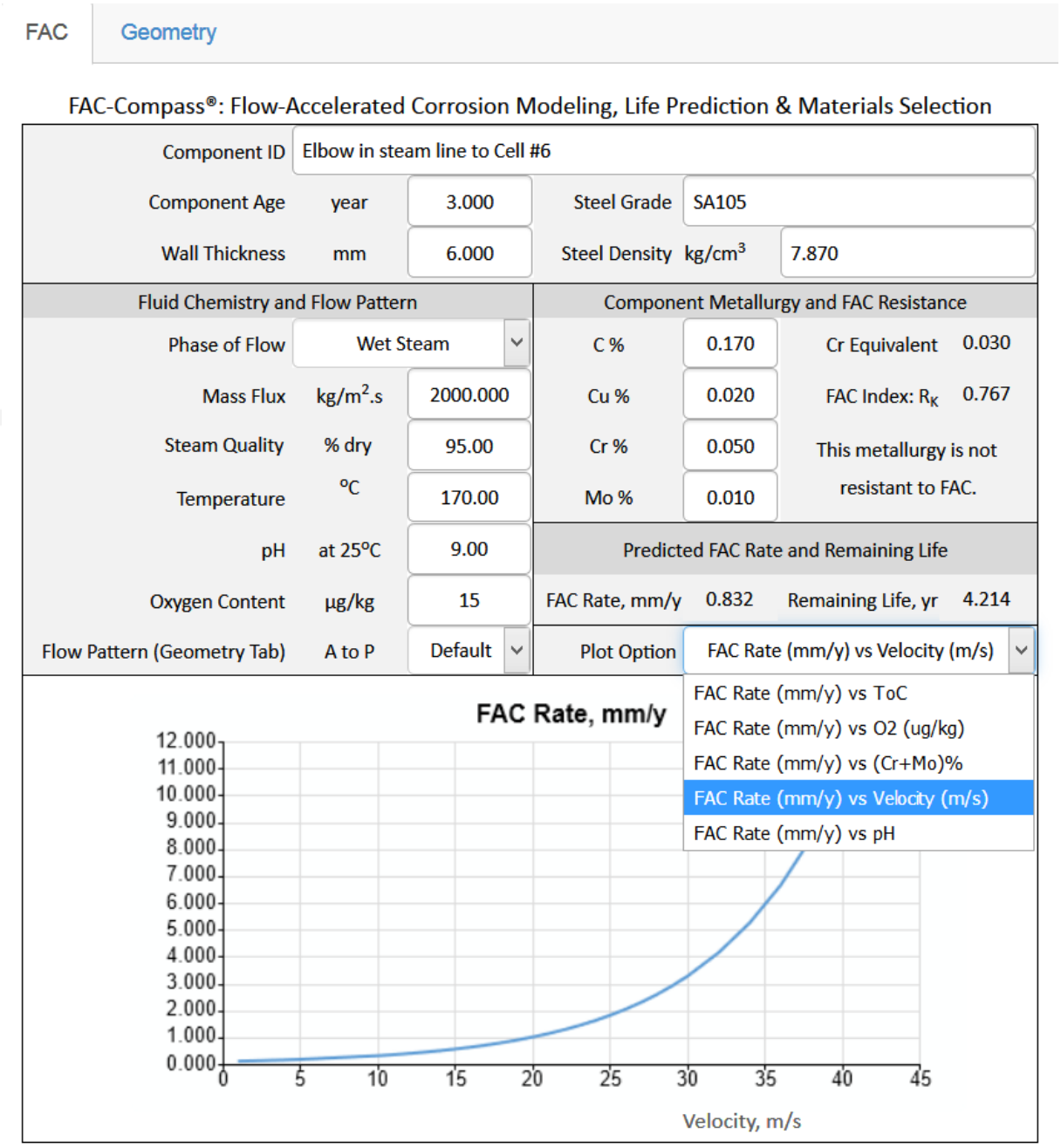
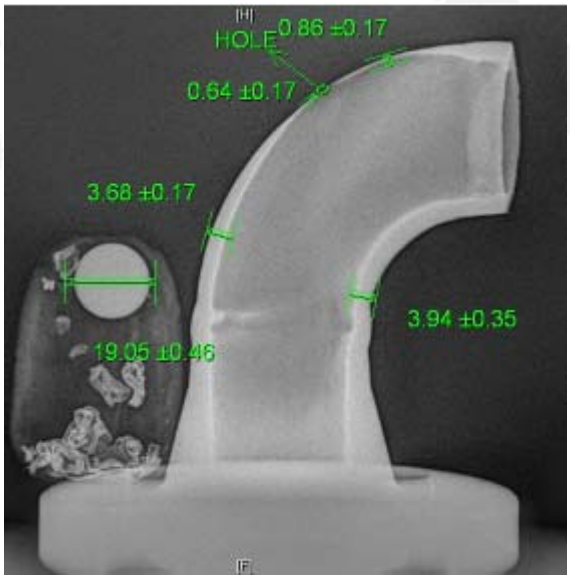


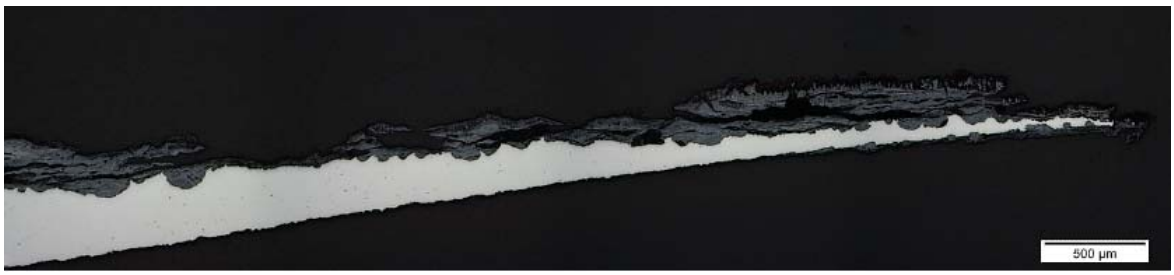

Figure 3 Plot Options in FAC-Compass

**Application Example:**
**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 4 on page 6. 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.

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. Contact us for licensing details.



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 | FAC Rate, mm/y | 1.018 | Remaining Life, yr | 0.000 |
| Flow Pattern (Geometry Tab) | A to P | G | Plot Option | FAC Rate (mm/y) vs ToC | | |

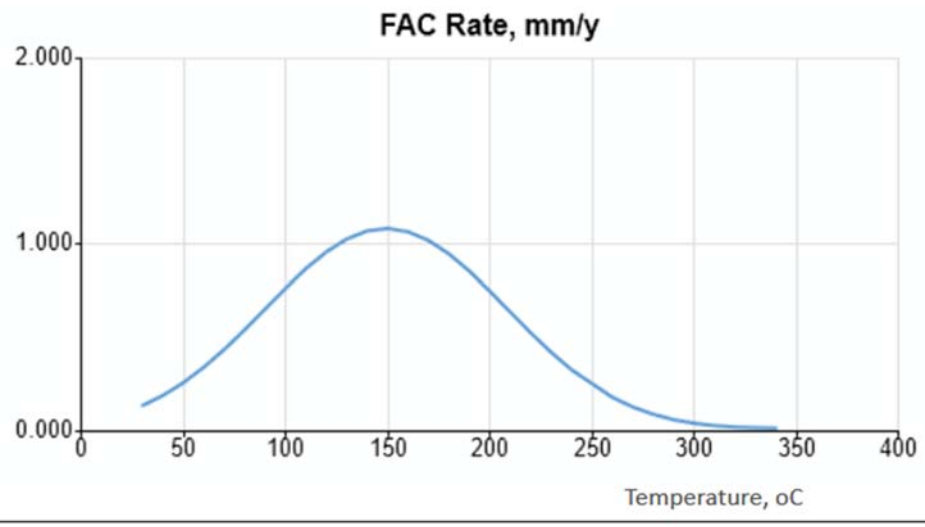



Figure 4 Service life prediction for a pipe elbow in wet steam service

## Why You Should Consider WebCorr for Corrosion Prediction Software

WebCorr Corrosion Consulting Services is in the corrosion consultancy business. Corrosion prediction and corrosion modeling are integral parts of our expertise and strength. WebCorr has developed 35 integrated predictive software programs for corrosion prediction and corrosion modeling, cementing a CorrCompass-based ecosystem covering all types of corrosion in every industry and service environment. Extensive field data from our corrosion consulting work help keep the predictive engines in our corrosion software always accurate, up-to-date, and directly applicable to the various systems, processes and industries. Unlike other corrosion prediction software and corrosion modeling software developed by computer programmers, mechanical engineers, metallurgists or chemists, WebCorr's corrosion prediction software and corrosion modeling software are developed by NACE certified Corrosion Specialists with both BEng and PhD degrees in corrosion and decades of practical corrosion experience. The WebCorr team knows corrosion from inside out. While other corrosion prediction software developers make bold claims about the accuracy and performance of their software on paper without committing to a performance guarantee, WebCorr backs up our software's accuracy with a performance guarantee, giving our clients confidence and peace of mind.

## Performance Guarantee

WebCorr is the only corrosion software developer that offers performance guarantee. If at any time during the licensing period, the corrosion rates predicted by WebCorr's corrosion prediction software and corrosion modeling software are not closer to the measured values than the values predicted by any other corrosion prediction and corrosion modeling software on the market, we will refund the pro-rated licensing fee to you. It is that simple. No other corrosion prediction software and corrosion modeling software offers you this performance guarantee.

*Contact us for licensing details: webcorr@corrosionclinic.com*