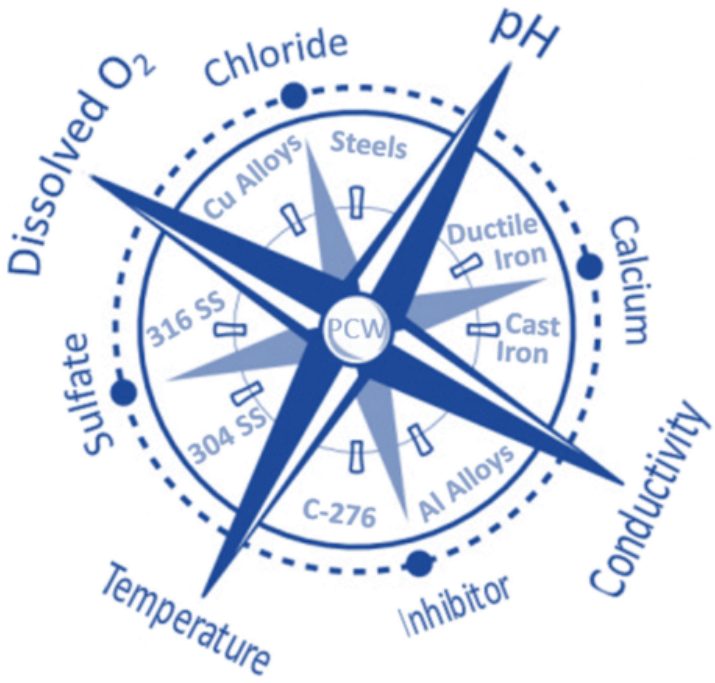


Corrosion Modeling Software and Corrosion Prediction Software

PCW-Compass®: Process Cooling Water Corrosion Modeling and Life Prediction

Highly Effective Software Solutions to Costly Corrosion in PCW Systems

Version 9.20

☆ **Performance** ☆ **Functionality** ☆ **Usability**

Anytime Anywhere Any Device Any OS

No USB dongles No installation No Browser Plug-ins

Overview of PCW-Compass: Predictive Modeling Software for Corrosion Prediction of Pipes/Tubes in Cooling Water Systems

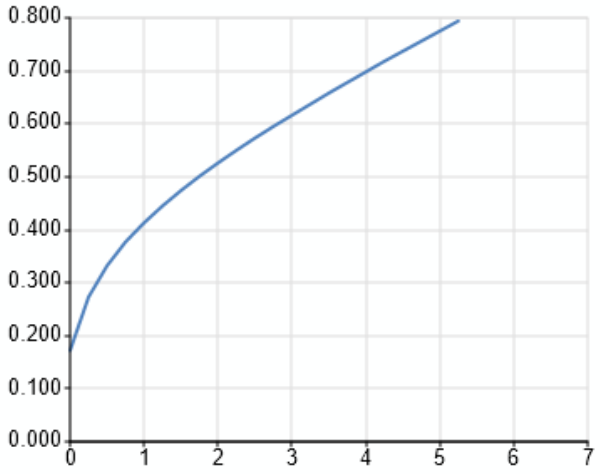
Cooling water systems are used in many industrial services, processes, and operations. Pipes and tubes are susceptible to severe corrosion if the cooling water chemistry is not properly controlled. Some of the critical factors influencing the corrosivity of the cooling water include: water pH, dissolved oxygen in water, water temperature, water velocity, water conductivity, concentrations of chloride and other ionic species. PCW-Compass is the only device and OS independent predictive software on the market for the modeling and life prediction of corrosion in process cooling water systems. Designers, engineers, architects, consultants, maintenance and inspection personnel can quickly assess and quantify the impact of the cooling water chemistry on the corrosion rate, corrosion depth, the remaining life, and the mode of failure for a range of materials including cast irons, ductile irons, mild steels, stainless steels, copper alloys, aluminum alloys, and nickel alloys.

Under the water chemistry shown in Figure 1 below, PCW-Compass predicts that the corrosion rate of ductile iron is 0.775 mm/y, the corrosion depth is 1.55 mm, the time-to-perforation is 14.125 years, and the mode of failure is leak due to perforation or cracking. This ductile iron pipe cannot meet the design life of 30 years under the prevailing water chemistry. PCW-Compass models the effect of corrosion inhibitors on the corrosion in cooling water system. In Figure 2 below, PCW-

Compass predicts that a corrosion inhibitor with a minimum of 50% inhibiting efficiency will reduce the corrosion rate of the ductile iron pipe to a level that will meet the design life of 30 years.

PCW-Compass ® 9.20 Process Cooling Water Corrosion Modeling and Prediction

Pipe/Tube ID	Ductile Iron Pipe		Unit of Measure	SI Metric	
Design Data			**Corrosion Prediction**		
Pipe/Tube Material	Ductile Iron		Corrosion Depth	mm	1.550
Design Life	years	30.000	Corrosion Rate	mm/y	0.775
Age of Pipe/Tube	years	2.000	Time to Perforation	years	14.125
Nominal Wall Thickness	mm	12.500	Failure Mode: Leak due to perforation/cracking		
Water Chemistry					
Water pH	pH	7.000			
Water Temperature	°C	25.000			
Water Velocity	m/s	5.000			
Dissolved O_2 (ppm)	measured	6.500			
Conductivity	µS/cm	3,500			
Calcium [Ca^{2+}]	mg/L	73.000			
Chloride [Cl^-]	mg/L	1,418.000			
Copper [Cu^{2+}]	mg/L	0.000			
Sulphate [SO_4^{2-}]	mg/L	2,592.000			
Total Alkalinity as CaCO3	mg/L	90.000			
Total Hardness as CaCO3	mg/L	380.000	Langelier Saturation Index (LSI)		-0.490
Total Dissolved Solids (TDS)	mg/L	2,275.000	Ryznar Stability Index (RSI)		7.980
Inhibitor Efficiency	%	0.000	Slightly corrosive but non-scale forming		



Corrosion Rate (mm/y) vs. Velocity (m/s)

Figure 1 Overview of PCW-Compass.

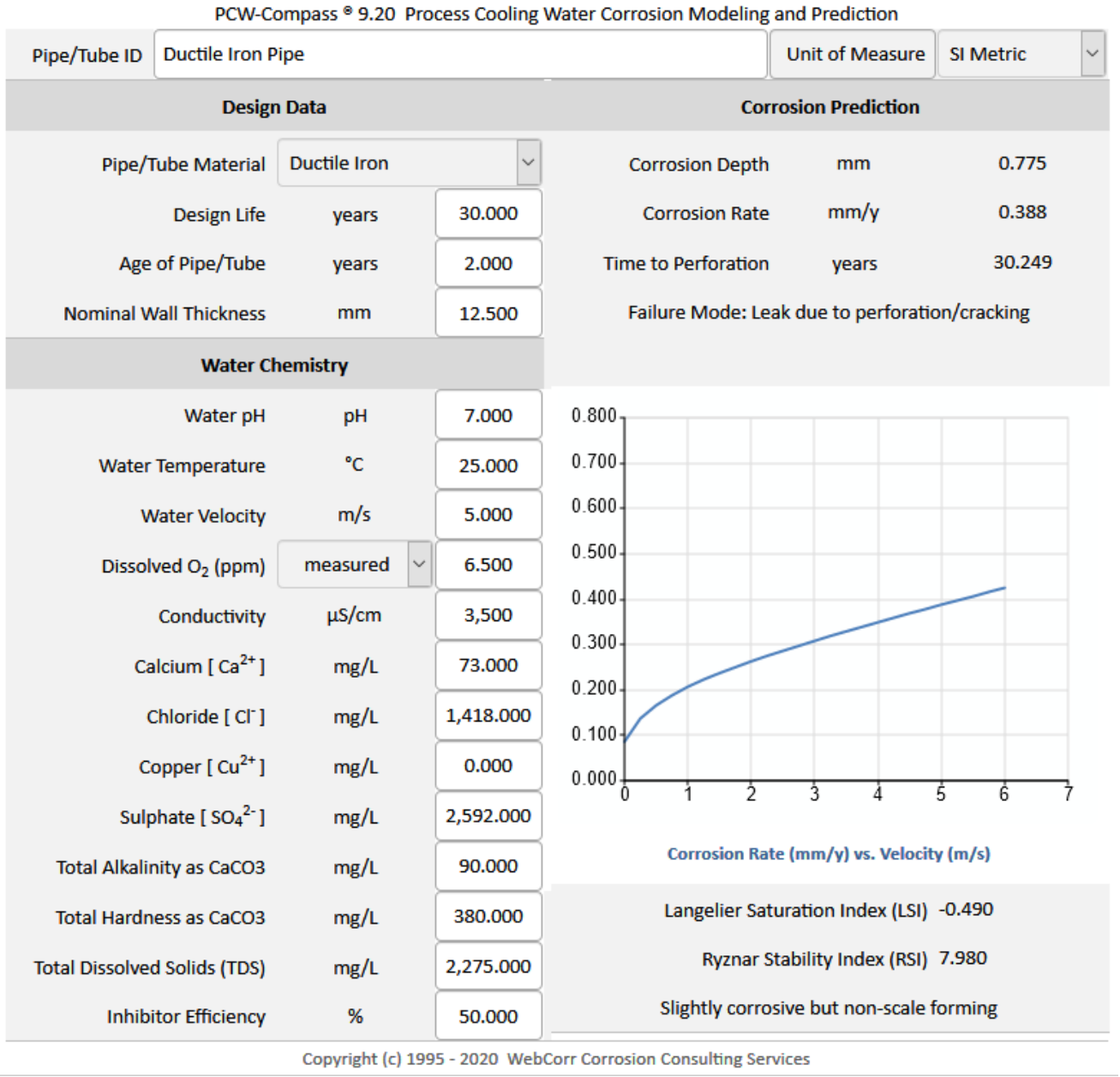


Figure 2 PCW-Compass models the effect of corrosion inhibitor on the remaining life of ductile iron pipe

Using PCW-Compass is as easy as 1-2-3:

(1) Select the pipe/tube material from the dropdown list;

(2) Enter the water chemistry;

(3) Review the prediction results.

The materials database in the PCW-Compass software is updated regularly with more alloys added to the list. If you cannot find the alloy of your interest in the list, do let us know through the Contact Us link and we will conduct the necessary work to add the alloy in the database, free of charge for licensed users of PCW-Compass.

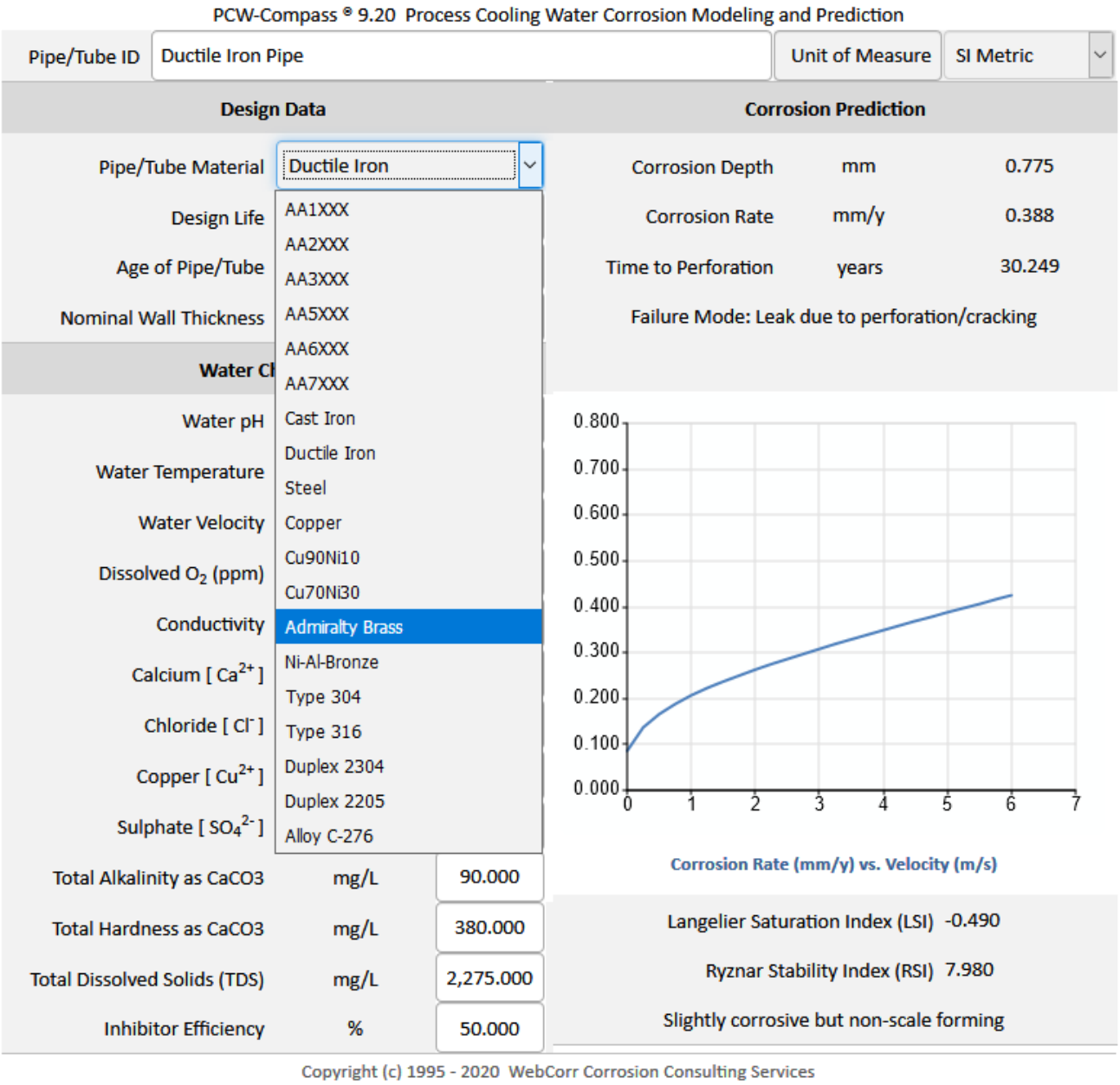


Figure 3 PCW-Compass A Software Tool for Materials Selection in Process Cooling Water Systems

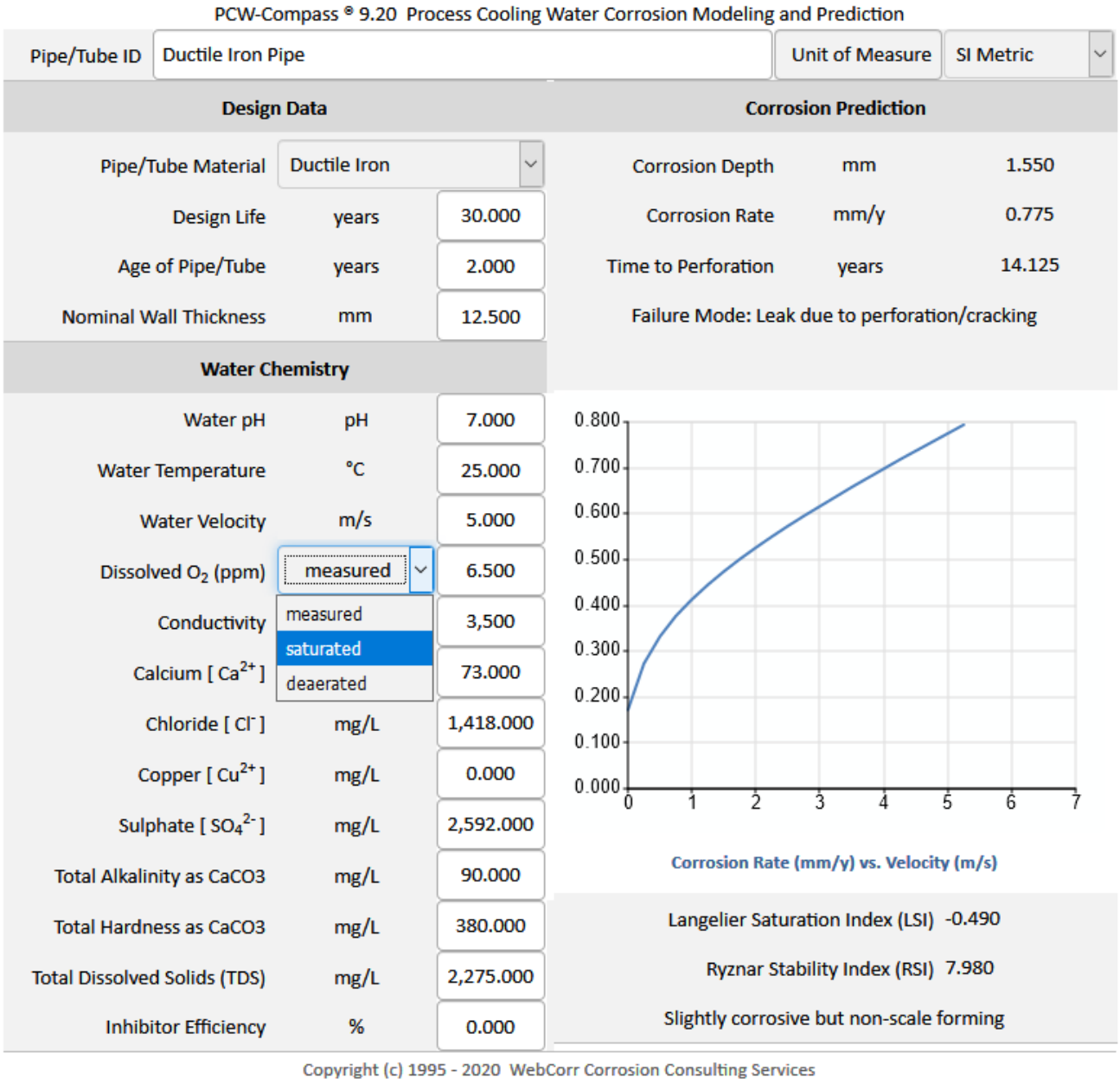


Figure 4 PCW-Compass models and predicts saturated oxygen in PCW if not measured.

PCW-Compass also predicts the scaling tendency of the specified water chemistry. The commonly used Langelier Saturation Index (LSI) and Ryznar Stability Index (RSI) are computed for the prevailing operating conditions. The corrosivity of water is predicted and classified in accordance with the LSI results.

The powerful applications of PCW-Compass are truly unlimited in engineering design, materials selection, process operation, inspection and maintenance, modeling and prediction of corrosion in process cooling water systems.

WebCorr can customize PCW-Compass for your specific process fluids and alloys used in your company's operations.

PCW-Compass, giving you the right directions in managing corrosion in cooling water systems.