



Corrosion Modeling Software and Corrosion Prediction Software Series

MSC-Compass®: Modeling and Life Prediction of Corrosion in Molten Salts for TES and MSR Applications

The Effective Software Solutions to Molten Salt Corrosion
Version 12.4

★ 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

Overview and Application Examples of MSC-Compass Software for Predictive Modeling of Corrosion in Molten Salts for TES and MSR Applications

MSC-Compass is the only device and OS independent software tool on the market for the modeling and prediction of corrosion of stainless steels and alloys in various molten salts used in thermal energy storage (TES) and molten salt reactor (MSR) applications. Designers, OEM engineers, consultants, operation personnel, maintenance and inspection engineers can quickly and accurately determine:

- (1) the corrosion rate of the selected material in the specified molten salt under the prevailing operating condition,
- (2) the corrosion depth at the spent operating hours,
- (3) the remaining life or time-to-perforation,
- (4) the minimum wall thickness required to meet the design life,
- (5) the effect of galvanic coupling with graphite, and
- (6) the effect of cover gas in the vapor space of the molten salt system

MSC-Compass is a cloud-based software that works on any device running any OS without the need for users to install or download anything. Figure 1 below shows the user interface of MSC-Compass. Using MSC-Compass is as easy as 1-2-3.

- (1) Select the the material and the molten salt
- (2) Enter the design life, wall thickness, the operating temperature, and the spent operating life
- (3) Review the prediction results

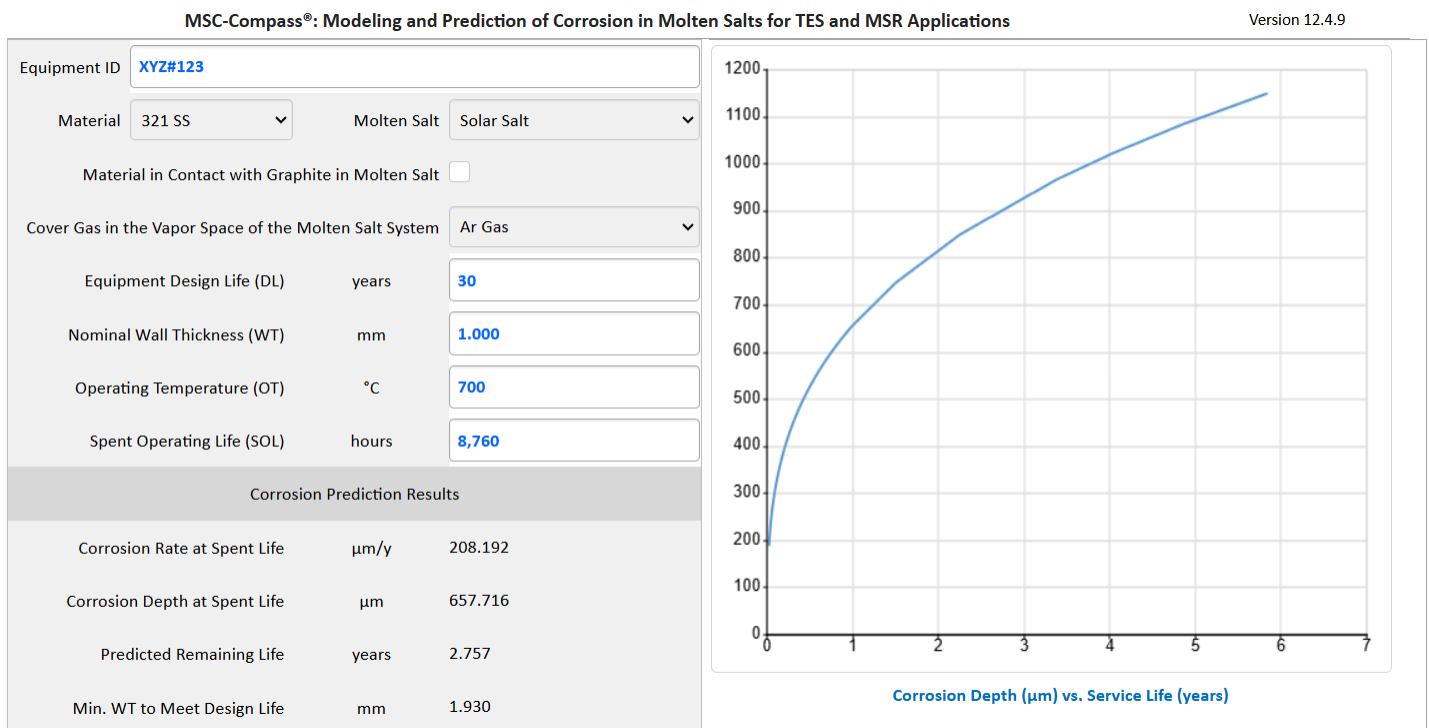


Figure 1 MSC-Compass models and predicts corrosion of stainless steels and alloys in molten salts for TES and MSR applications.

Under the prevailing operating conditions shown in Figure 1 above, the predicted corrosion rate at the spent operating hours for the type 321 stainless steel is 208.192 $\mu\text{m}/\text{y}$. The corrosion depth at the spent operating hours is 657.716 μm , the remaining life (time-to-perforation) is 2.757 years, the minimum wall thickness to meet the design life of 30 years is 1.930 mm (this can be considered as the corrosion allowance at the design stage). The predicted corrosion depth is also plotted against the exposure time. Figure 2 shows the alloys available for the evaluation and assessment of their resistance to corrosion in various molten salts in TES and MSR applications. The following steels and alloys are included in the software:

1018 CS

A213 T22

A213 T5

A213 T9

A36 CS

A516 CS

304 SS

310 SS

310S SS

316 SS

316L SS

316H SS

321 SS

347 SS

GH3535

Hastelloy C-276

Hastelloy N

Hastelloy X

Haynes 230

Haynes 556

Incoloy 800H

Inconel 600

Inconel 625

Nb-Zr

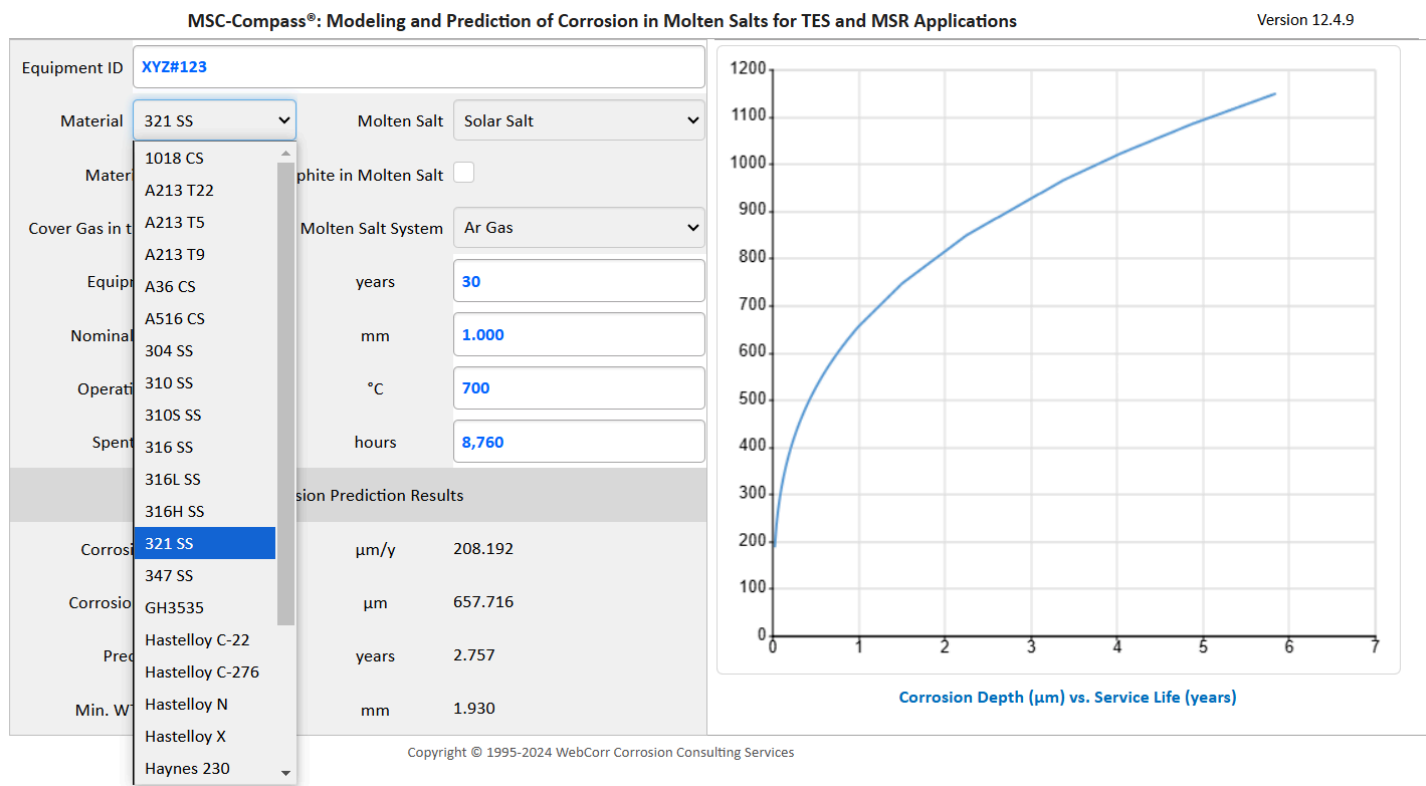
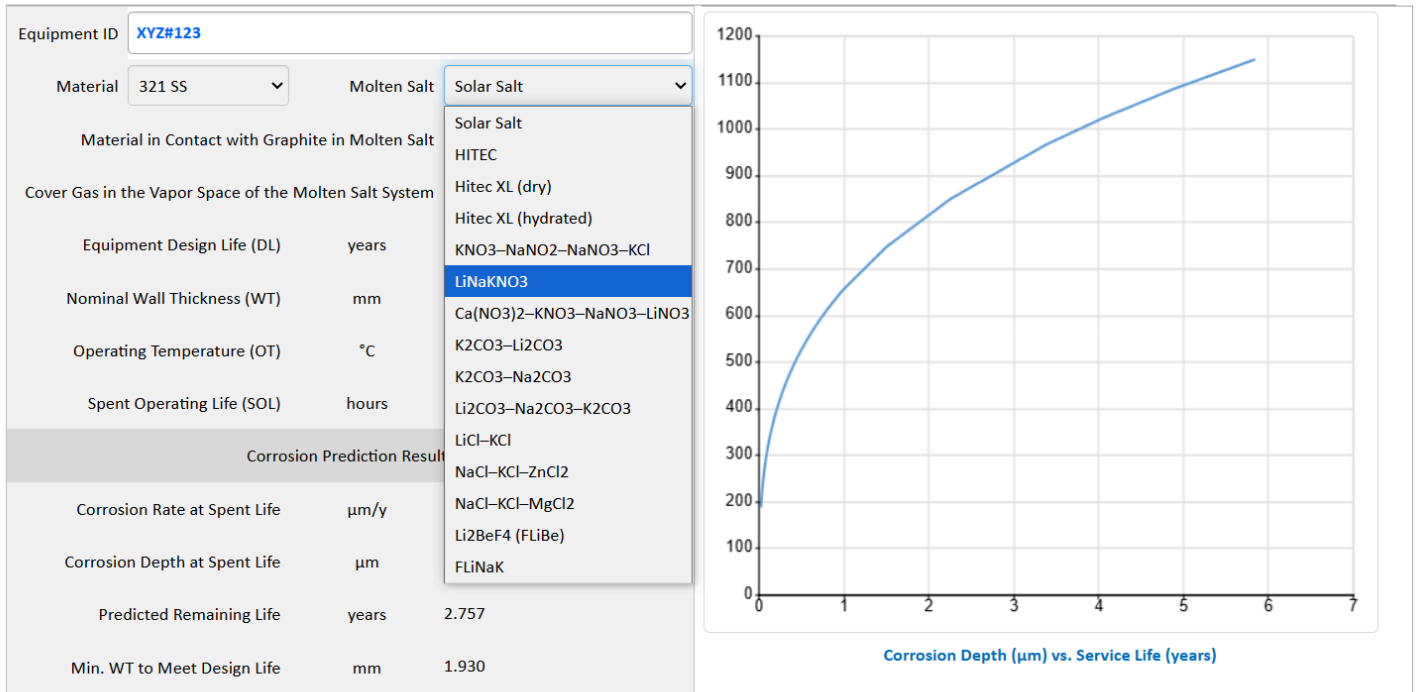


Figure 2 MSC-Compass can be used for materials selection for TES and MSR applications.



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Figure 3 MSC-Compass is an effective software tool for materials evaluation in various molten salts for TES and MSR applications.

Figure 3 shows the various molten salts commercially available for thermal energy storage and molten salt reactor applications. The following molten salts are included in the software:

Solar Salt

HITEC

Hitec XL (dry)

Hitec XL (hydrated)

KNO₃-NaNO₂-NaNO₃-KCl

LiNaKNO₃

Ca(NO₃)₂-KNO₃-NaNO₃-LiNO₃

K₂CO₃-Li₂CO₃

K₂CO₃-Na₂CO₃

Li₂CO₃-Na₂CO₃-K₂CO₃

LiCl-KCl

NaCl-KCl-ZnCl₂

NaCl–KCl–MgCl₂

Li₂BeF₄ (FLiBe)

FLiNaK

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

MSC-Compass also models the effect of galvanic coupling with graphite for the selected alloy. In the presence of galvanic coupling with graphite shown in Figure 4, the predicted corrosion rate at the spent operating hours for the type 321 stainless steel is increased from 208.192 $\mu\text{m}/\text{y}$ (Figure 1) to 380.499 $\mu\text{m}/\text{y}$. The corrosion depth at the spent operating hours is increased from 657.716 μm (Figure 1) to 1202.066 μm , the remaining life (time-to-perforation) is reduced from 2.757 years (Figure 1) to zero, the minimum wall thickness to meet the design life of 30 years is increased from 1.930 mm (Figure 1) to 3.528 mm.

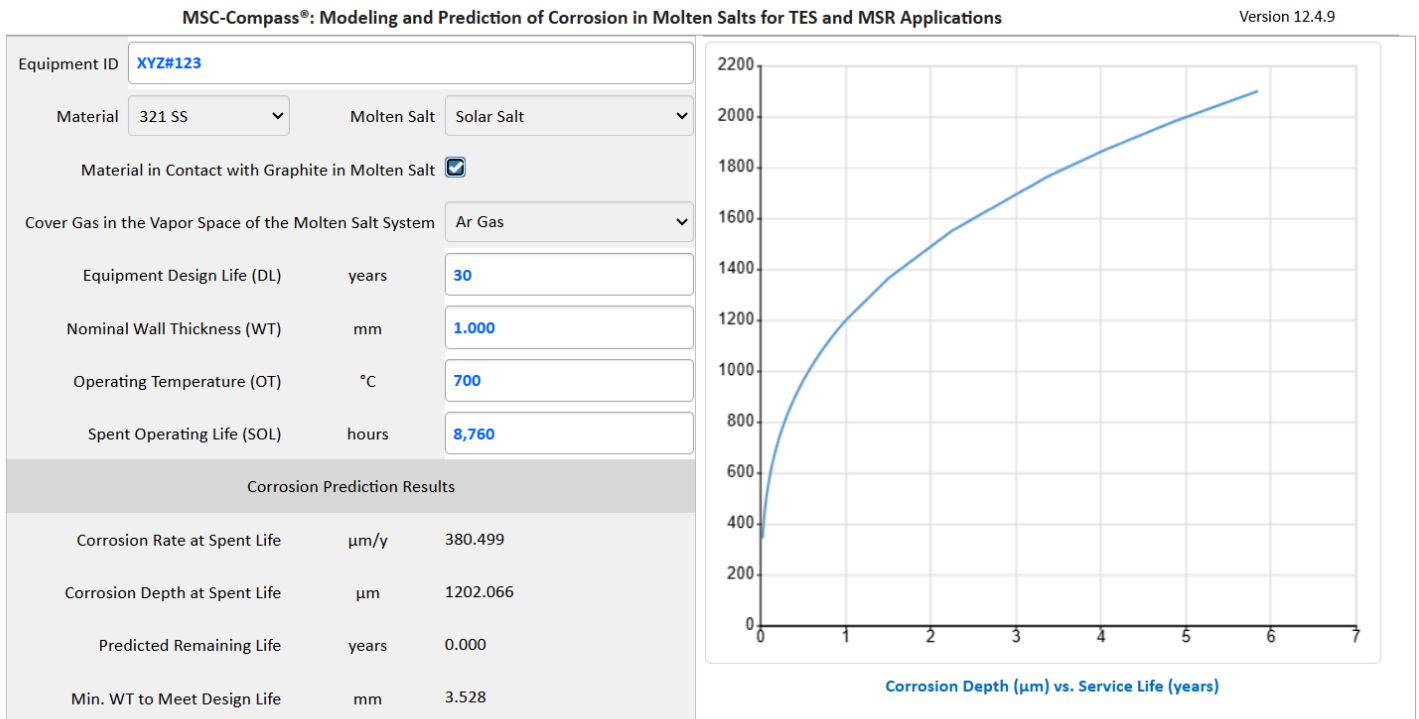
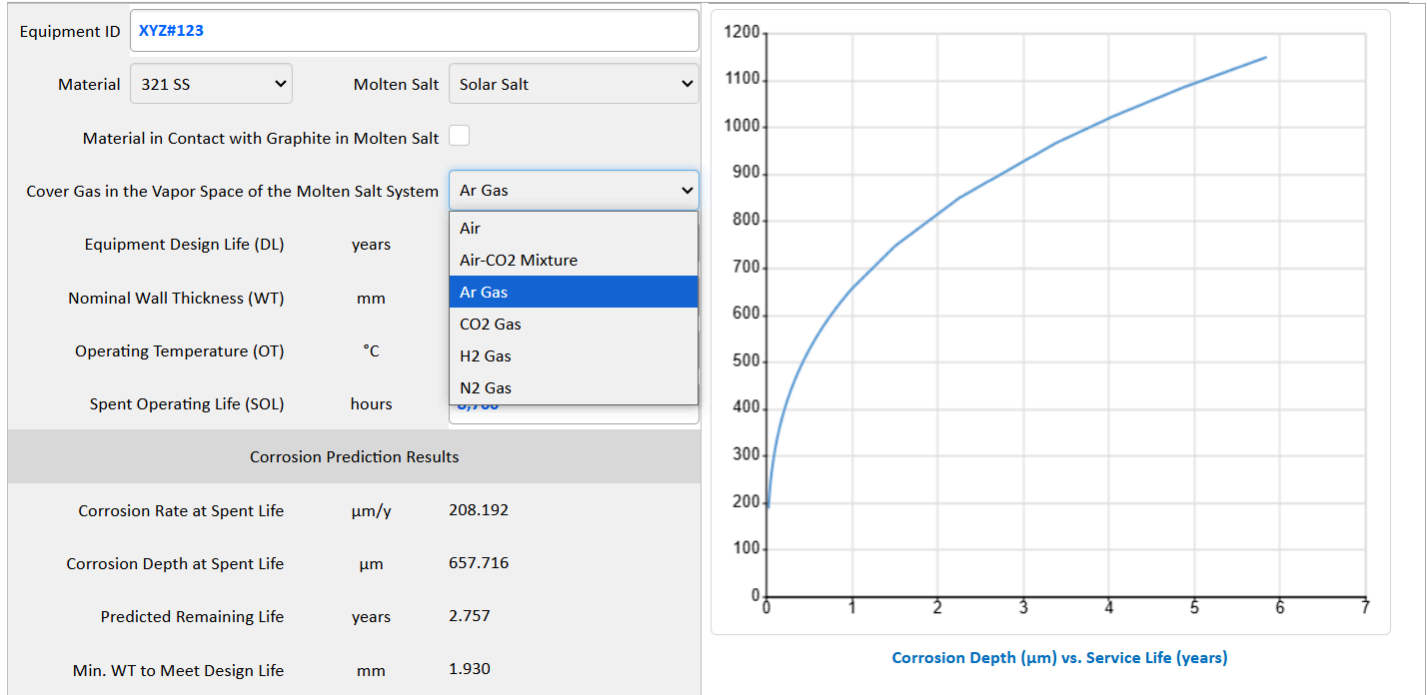


Figure 4 MSC-Compass models the effect of galvanic coupling with graphite in molten salt.



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Figure 5 MSC-Compass models the effect of cover gas in the vapor space of the molten salt system. MSC-Compass also models the effect of cover gas in the vapor space of the molten salt system. The following cover gases are included in the software:

- Air,
- Air-CO2 mixture
- Ar gas
- CO2 gas
- H2 Gas
- N2 Gas

The powerful applications of MSC-Compass are truly unlimited in engineering design, materials selection, process operation, inspection and maintenance, modeling and prediction of corrosion in various molten salts for thermal energy storage and molten salt reactor applications.

[Click here to contact us for licensing details and experience the power of MSC-Compass.](#)

MSC-Compass, giving you the right directions in the Modeling and Prediction of Molten Salt Corrosion.