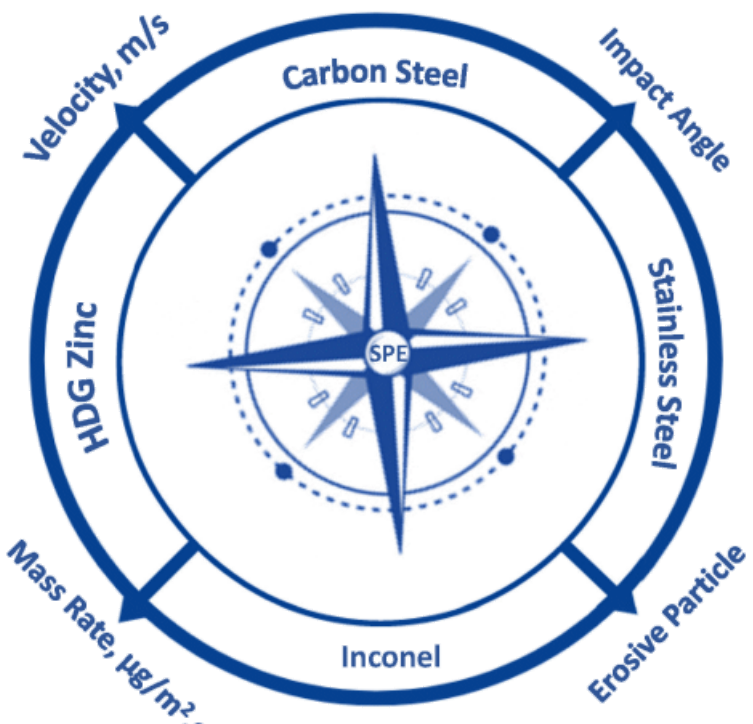


SPE-Compass®: Solid Particle Erosion Modeling and Prediction

Version 11.3.10

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

Anytime Anywhere Any Device Any OS
No USB dongles No installation No Browser Plug-ins

Contact Us for Licensing Details

Features and Functions of SPE-Compass

SPE-Compass is the only device-and-OS independent software tool on the market for the modeling and prediction of impact erosion by solid particles. Designers, engineers, consultants, maintenance and inspection personnel can quickly assess and quantify the extent of impact erosion on the remaining life of their components anytime, anywhere, on any device running any OS without the need to install or download anything.

SPE-Compass models the effects of the following parameters on the rate of metal wastage and wall thinning due to impact erosion by solid particles:

- Metallurgy of the Component
- Type of Erosive Particles:

  Barite/Calcite
  Clay/Silt
  Copper Slag
  Garnet Sand
  Proppants
  Quartz Sand
  Sodium Chloride (Salt)
  Steel Shot

- Particle Impact Velocity (m/s)
- Particle Impact Angle
- Particle Mass Rate ($\mu g/m^2.s$)

The outputs from SPE-Compass include:

- The erosion rate, nm/y

- Plot showing the erosion rate as a function of impact angle
- Plot showing the erosion rate as a function of impact velocity

Overview and Application Examples of SPE-Compass

Figures below show the screen shots of SPE-Compass. There are two modules in SPE-Compass, one is for the general industry and the other is specifically for the oil and gas industry.

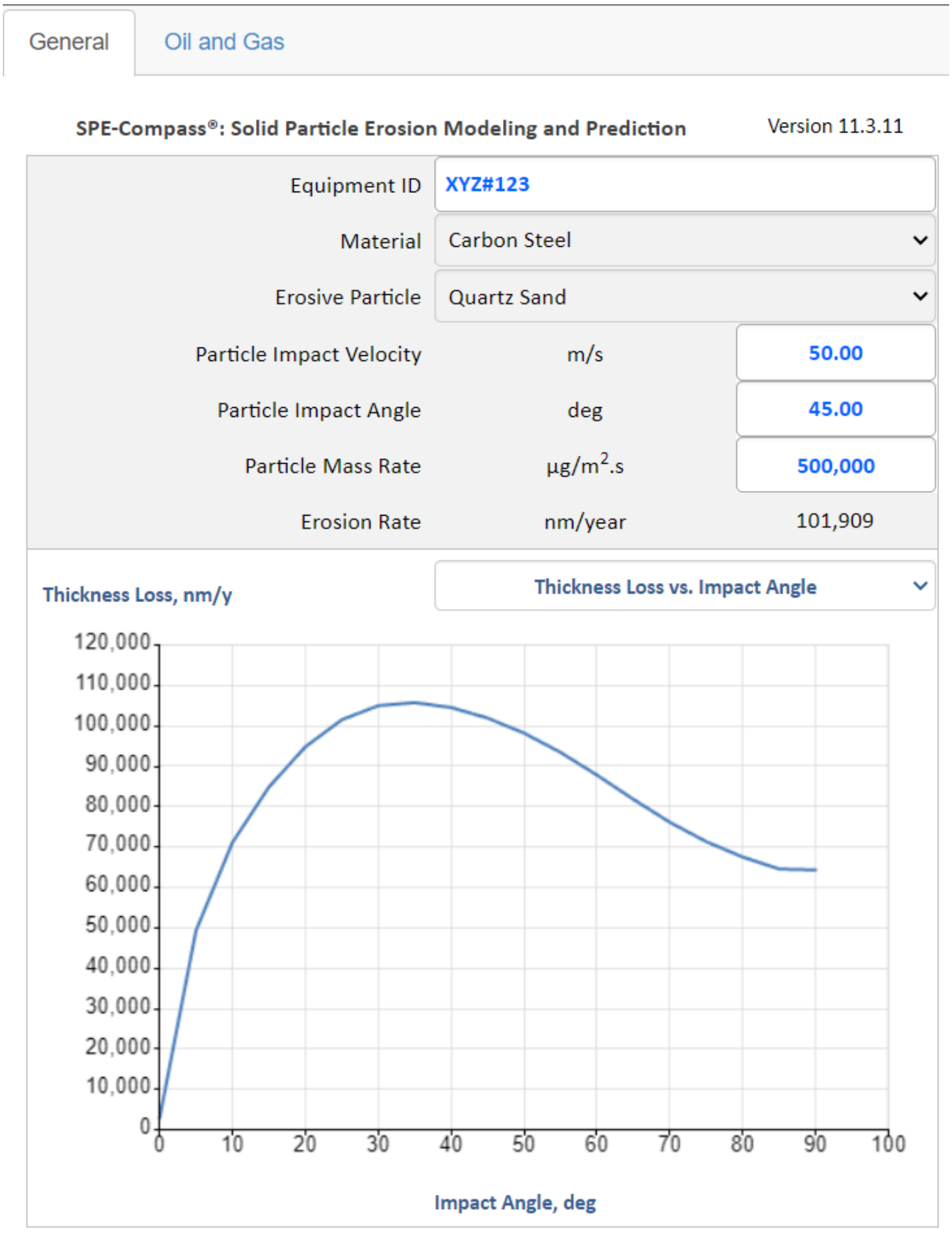


Figure 1 Overview of SPE-Compass

Users of SPE-Compass start by selecting the material (Figure 2) and erosive particle from the dropdown lists (Figure 3) for the general industry. The following materials are included in the software database. More materials are progressively added into the software database.

Carbon Steel

Brass

Duplex SS

SS304

SS316

Inconel

Aluminium

AA6063

Cadmium Plating

Nickel

Electroless Nickel Coating

Electroplated Nickel Coating

Zinc

Hot-Dip Galvanized Zinc Coating

Hot-Dip Galvanized Zn-5Al Coating

Hot-Dip Galvanized Zn-55Al Coating

Hot-Dip Galvanized Zn-6Al-3Mg Coating

Hot-Dip Galvanized Zn-3.5Al-3Mg Coating

Hot-Dip Galvanized Zn-2.5Al-3Mg Coating

Electro-Galvanized Zinc Coating

Thermal Sprayed Zinc Coating

Sherardized Zinc Coatings

Mechanically Plated Zinc Coatings

DC-05: Tungsten Carbide

CS-10: Tungsten Carbide

CR-37: Tungsten Carbide

95% Al_2O_3: Aluminium Oxide

99.5% Al_2O_3: Aluminium Oxide

PSZ Ceramic: Zirconia

ZrO2-Y3 Ceramic: Zirconia

SiC: Silicon Carbide

Si3N4: Silicon Nitride

$TiB2B_2$: Titanium Diboride

B4C: Boron Carbide

SiSiC: Ceramic – Silicon Carbide

GRP/Epoxy

GRP/Vinyl Ester

HDPE

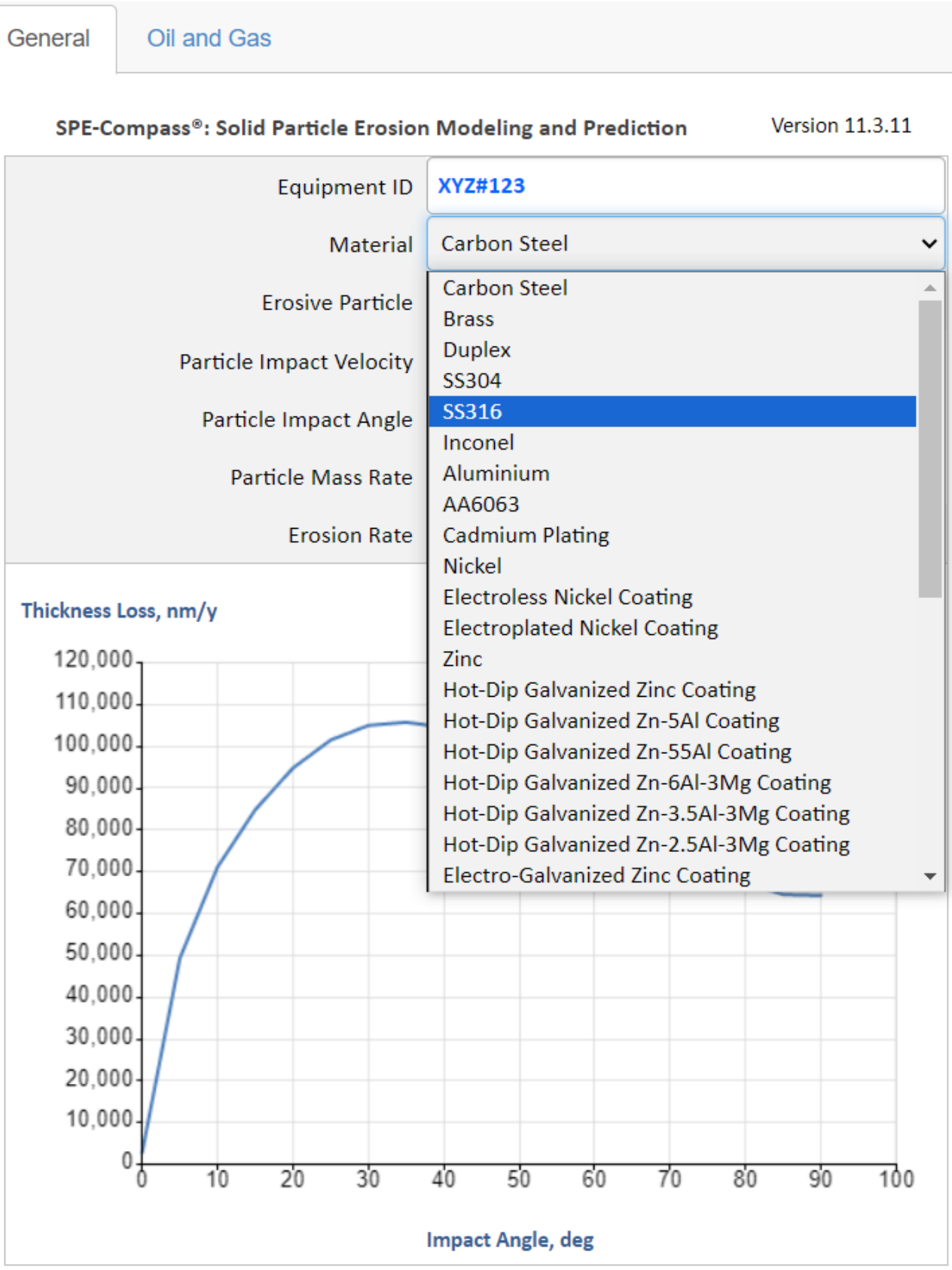


Figure 2 Selection of Materials for Sand Erosion Assessment

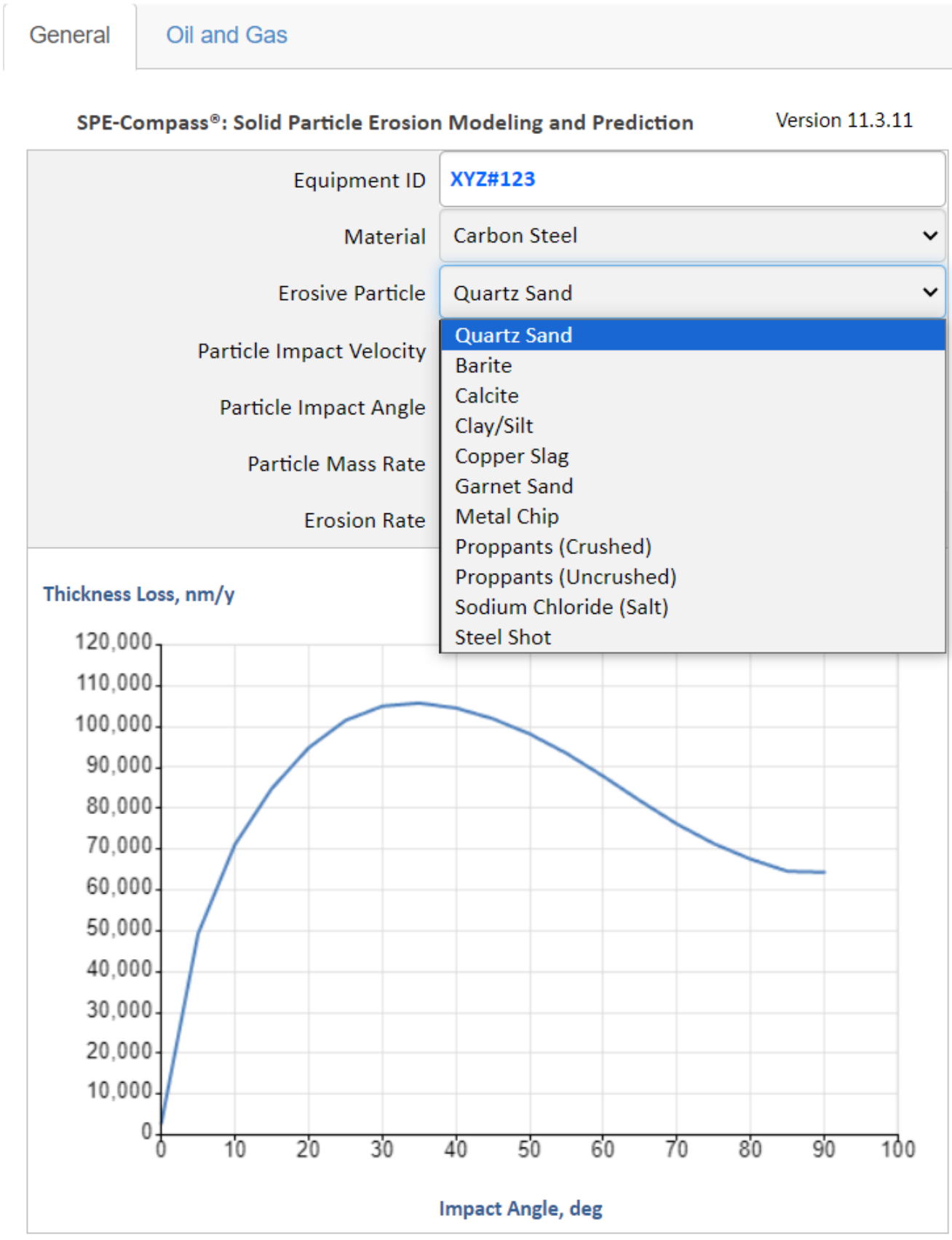


Figure 3 Selection of Erosive Particles for Erosion Modeling in SPE-Compass

Figure 4 below shows the plot options in SPE-Compass. Users of SPE-Compass software can choose to plot the erosion rate as a function of impact angle, the erosion rate as a function of impact velocity, or erosion rate as a function of particle mass rate.

General | Oil and Gas

SPE-Compass®: Solid Particle Erosion Modeling and Prediction Version 11.3.11

Equipment ID		XYZ#123
Material		Carbon Steel
Erosive Particle		Quartz Sand
Particle Impact Velocity	m/s	50.00
Particle Impact Angle	deg	45.00
Particle Mass Rate	µg/m^2.s	500,000
Erosion Rate	nm/year	101,909

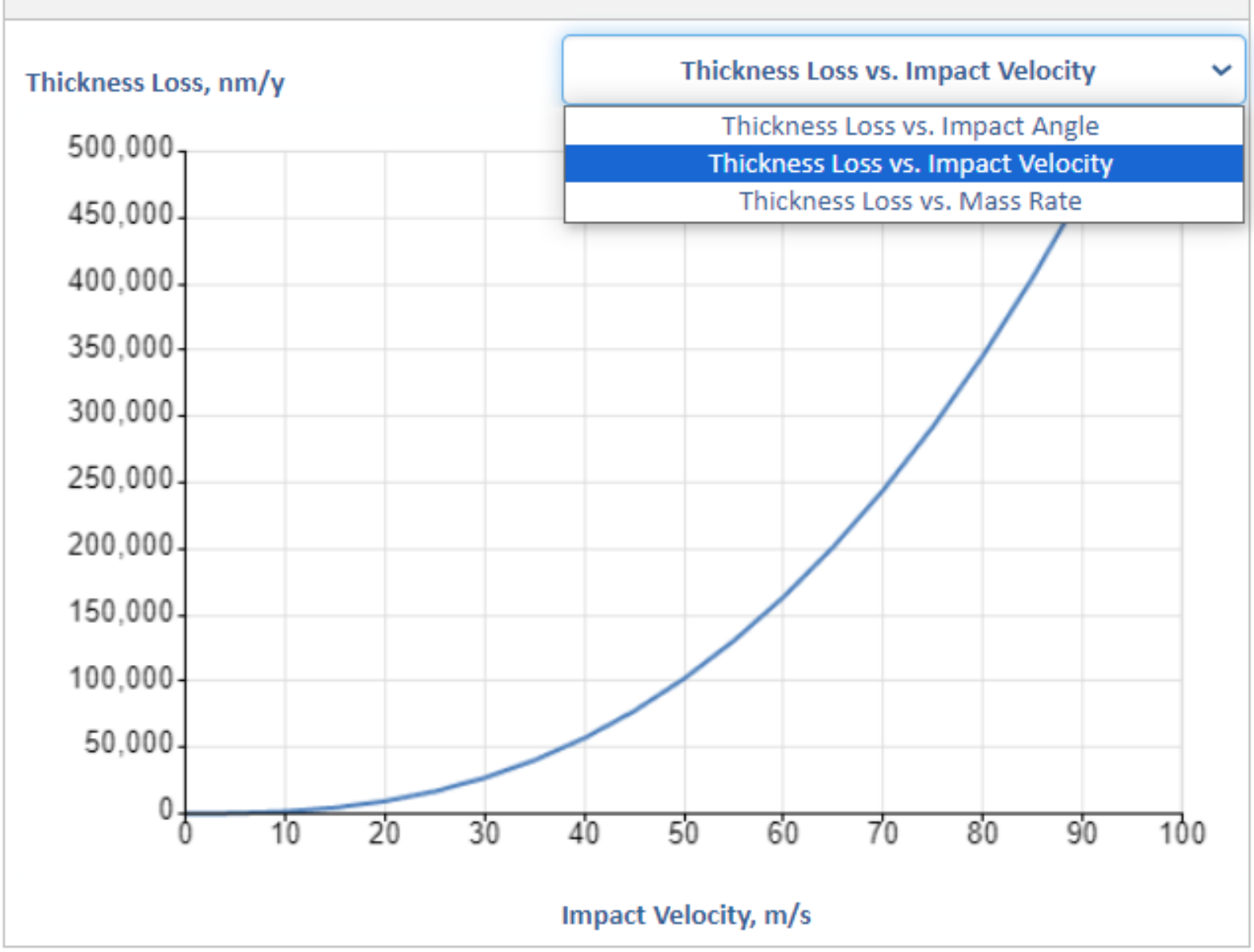
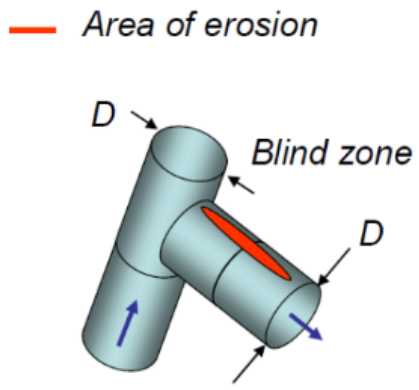


Figure 4 SPE-Compass models the effect of impact velocity and impact angle on the thickness loss caused by sand erosion

SPE-Compass®: Solid Particle Erosion Modeling and Prediction Version 11.3.11

Equipment ID	Pipe XYZ		
Design Data		**Flow Data**	
Material	Carbon Steel	Operating Pressure	bar 120.00
Component	Tee	Operature Temperature	°C 42.00
		Oil Rate at Standard Condition	m3/d 500.000
		Water Rate at Standard Condition	m3/d 20.000
		Gas Rate at Standard Condition	m3/d 5.000e+005
		Oil Density (ρ_o)	kg/m3 800.000
		Water Density (ρ_w)	kg/m3 1000.000
		Gas Density (ρ_g)	kg/m3 0.700
		Gas Molecular Weight (MW)	kg/kmol 19.000
		Gas Compressibility Factor (Z)	0.900
		Gas Viscosity	Pa.s 1.00e-005
		Oil Viscosity	Pa.s 1.00e-004
		Water Viscosity	Pa.s 1.00e-003
		API Erosional Velocity Factor (C)	$(kg/m)^{0.5}/s$ 152
		Prediction Results	
		Mixture Velocity	m/s 4.384
		API Erosional Velocity Limit	m/s 13.942
		Mixture velocity is below the API erosional velocity limit.	
		Erosion Rate (relative)	mm/ton 2.023e-4
		Erosion Rate (annual)	mm/year 3.008



Pipe Diameter (D)	m	0.1245
Components in one plane with straight upstream pipe section <10xD		
Erosive Agent	Quartz Sand	
Particle Concentration	%wt	5.000
Particle Diameter	µm	150

Figure 5 SPE-Compass models the effect of sand concentration and diameter on the thickness loss caused by sand erosion

SPE-Compass®: Solid Particle Erosion Modeling and Prediction Version 11.3.11

Equipment ID	Pipe XYZ		
Design Data		**Flow Data**	
Material	Carbon Steel	Operating Pressure	bar 120.00
Component	Tee	Operature Temperature	°C 42.00
		Oil Rate at Standard Condition	m3/d 500.000
		Water Rate at Standard Condition	m3/d 20.000
		Gas Rate at Standard Condition	m3/d 5.000e+005
		Oil Density (ρ_o)	kg/m3 800.000
		Water Density (ρ_w)	kg/m3 1000.000
		Gas Density (ρ_g)	kg/m3 0.700
		Gas Molecular Weight (MW)	kg/kmol 19.000
		Gas Compressibility Factor (Z)	0.900
		Gas Viscosity	Pa.s 1.00e-005
		Oil Viscosity	Pa.s 1.00e-004
		Water Viscosity	Pa.s 1.00e-003
		API Erosional Velocity Factor (C)	$(kg/m)^{0.5}/s$ 152
		Prediction Results	
		Mixture Velocity	m/s 4.384
		API Erosional Velocity Limit	m/s 13.942
		Mixture velocity is below the API erosional velocity limit.	
		Erosion Rate (relative)	mm/ton 2.023e-4
		Erosion Rate (annual)	mm/year 3.008

Area of erosion
D
Blind zone
D

Pipe Diameter (D)	m	0.1245
Components in one plane with straight upstream pipe section <10xD		
Erosive Agent	Quartz Sand	
Particle Concentration	%wt	5.000
Particle Diameter	µm	150

Figure 6 SPE-Compass models the effect of sand concentration and diameter on the thickness loss caused by sand erosion

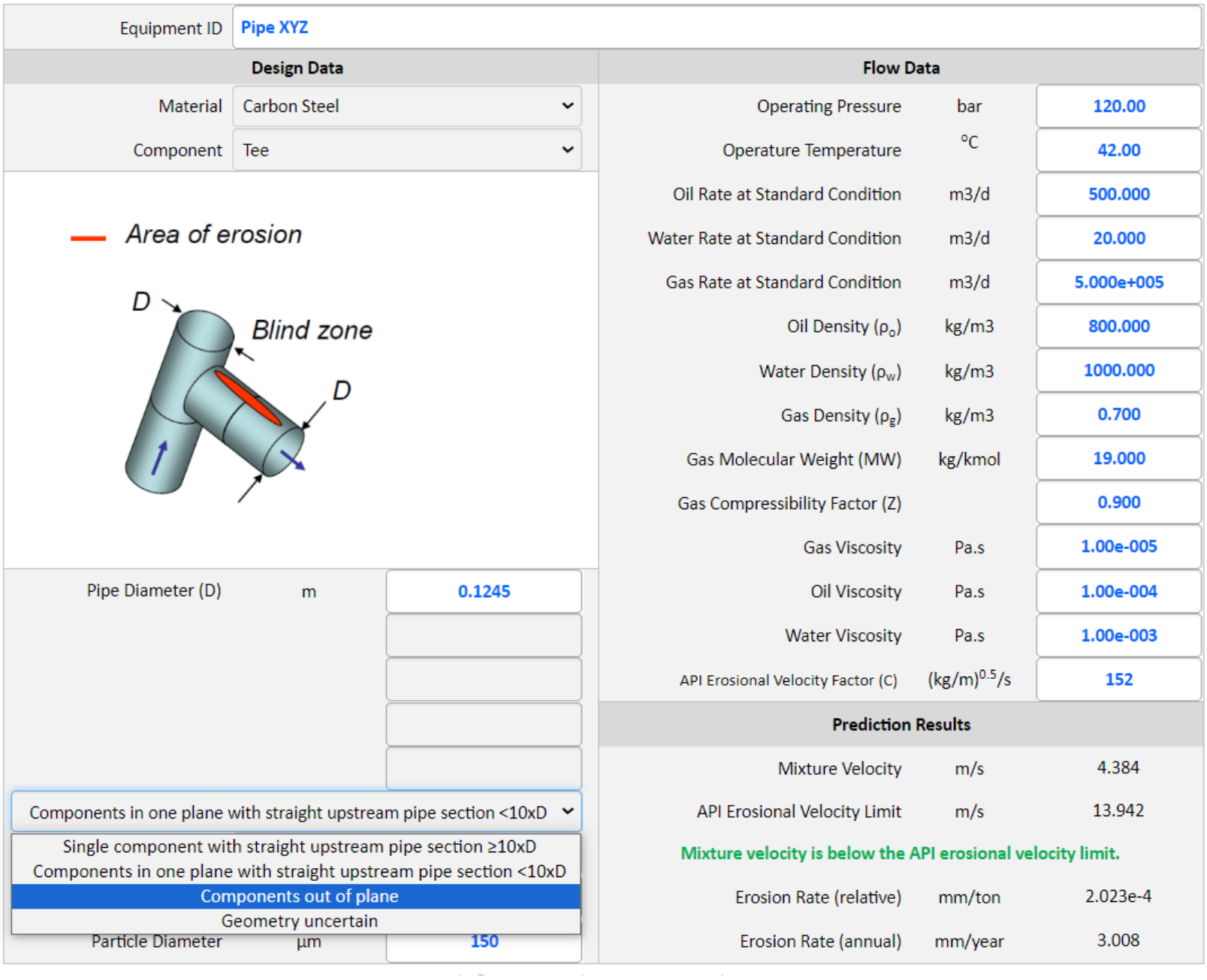


Figure 7 SPE-Compass models the effect of pipe geometry on the thickness loss caused by sand erosion

The powerful applications of SPE-Compass are truly unlimited in engineering design, erosion resistant materials evaluation and selection, remaining life prediction, process optimization, trouble-shooting and failure analysis.

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

SPE-Compass, giving you the right directions in Sand Erosion Prediction and Assessment

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