WINSTEAM - THERMODYNAMIC PROPERTIES OF STEAM

WinSteam is a member of Techware's family of software packages bringing accurate thermodynamic properties of fluids to many popular **Windows®** programs. **WinSteam** provides thermodynamic and transport properties of steam and water. The **WinSteam** package includes: DeskTop Steam, an advanced steam property calculator; a dynamic link library (DLL) containing the steam property functions; and various add-ins which link the functions to **Windows®** applications. The add-ins allow you to use the functions as if they were built-in to **Microsoft Excel®, Lotus 1-2-3 for Windows®** and **MathSoft Mathcad®**. Programmers can call the functions in the dynamic link library directly from many **Windows®** programming languages such as **Microsoft Visual BASIC®**, **Microsoft Visual C++ ®** and **Microsoft Access.**

WinSteam will greatly simplify all types of calculations involving steam and water. The functions are extremely useful in performing mass and energy balances and in calculating the performance of steam turbines, steam generators and heat exchangers. You can conveniently design equipment right on your favorite spreadsheet and your results will be more accurate because you won't have to interpolate data from steam tables or read data from mollier charts. **WinSteam** uses the *IAPWS-IF97* formulations but the user can select the *1967 IFC* formulations if needed to be compatible with older projects.

Summary of WinSteam Features

- Seamlessly extends your spreadsheet program's set of built-in functions

- Properties calculated using actual IAPWS formulations - no interpolation

- All routines are robust, flexible and fast

- Supports most useful combinations of input parameters

- Uses English, English Gauge, SI Customary SI Formal, SI kPa, Metric and Metric Formal unit sets.

- Provides thermodynamic and transport properties

- Includes easy to follow examples

- Allows pressures up to 14,503 psia (100MPa)

- Temperatures from 32 °F to 3632 °F (0 °C to 2000 °C)

- Calculates specific volume, enthalpy, entropy, specific heat, sonic velocity and isentropic expansion coefficient

- Calculates viscosity and thermal conductivity

- Attractive quantity discounts available

- Free phone support

WinSteam gives you fast, accurate functions that return specific volume, enthalpy, entropy, specific heat, quality, sonic velocity, isentropic expansion coefficient, viscosity and thermal conductivity for steam and compressed water. **WinSteam** also includes reverse functions that calculate the thermodynamic properties when pressure and either enthalpy or entropy are known. The functions normally use the IAPWS-IF97 formulations, but at the user's option, can use the 1967 IFC formulations. The functions are valid across the full range defined by the formulations. The functions have been tested against data published by the ASME and IAPWS and show excellent agreement.

No programming is required to use the **WinSteam** functions with Excel, 1-2-3 or Mathcad. Just follow a few simple steps to load the ready-made add-ins. The **WinSteam** functions can be used in formulas just like any of the other built-in functions

The **WinSteam** package also includes DeskTop Steam, an advanced steam property calculator, which runs in its own window. DeskTop Steam features very flexible unit selection, intuitive, standard Windows user interface and a steam turbine expansion tool.

Programmers should note that all of the steam property functions are contained in a Windows Dynamic Link Library (DLL). Any Windows application, which allows users to call functions in a DLL, should be able to access the **WinSteam** functions. The 32-bit DLL works with Windows NT, 2000, XP and Vista. The 64-bit DLL works with Windows 7. Function protocols and .LIB files are included to support programming activities.

TECHWARE
ENGINEERING APPLICATIONS, INC.

WinSteam
Version 4.0

THERMODYNAMIC AND
TRANSPORT PROPERTIES OF
STEAM AND WATER FOR
WINDOWS APPLICATIONS

Technical Specifications	
Applications Supported	Microsoft Excel Versions XP, 2003, 2007 and 2010 (32-bit and 64-bit)
	Lotus 1-2-3 97 and Millennium
	Mathcad Plus 6. 7 and 8
	Visual Basic (32 bit and 64 bit)
	Visual C++ (32 bit and 64-bit)
Measurement Units	English, English Gauge, SI Customary, SI Formal, SI kPa, Metric and Metric Formal Unit Sets
Valid Range	Pressure up to 14,503 psia (100 MPa) Temperature from 32 °F to 1472 °F (0 °C to 800 °C) Pressure up to 7259.1 psia (50 MPa) Temperature up to 3632 °F (0 °C to 2000 °C)
Typical calling syntax	Excel: =STMPTH(P, T, units) 1-2-3: @STMPTH(P, T, units)

Function	Inputs	Output
StmPT()	Pressure	Sat, Temperature
StmTP()	Temperature	Sat. Pressure
StmPQV()	Pressure, Quality	Specific Volume
StmPQH()	Pressure, Quality	Specific Enthalpy
StmPQS()	Pressure, Quality	Specific Entropy
StmPQC()	Pressure, Quality	Specific Heat
StmPQW()	Pressure, Quality	Sonic Velocity
StmPQG()	Pressure, Quality	Isentropic Expansion
StmPQM()	Pressure, Quality	Viscosity
StmPQK()	Pressure, Quality	Thermal Conductivity
StmTQV()	Temperature, Quality	Specific Volume
StmTQH()	Temperature, Quality	Specific Enthalpy
StmTQS()	Temperature, Quality	Specific Entropy
StmTQW()	Temperature, Quality	Sonic Velocity
StmTQG()	Temperature, Quality	Isentropic Expansion
StmTQC()	Temperature, Quality	Specific Heat
StmTQM()	Temperature, Quality	Viscosity
StmTQK()	Temperature, Quality	Thermal Conductivity
StmPTV()	Pressure, Temperature	Specific Volume
StmPVT()	Pressure, Specific Volume	Temperature
StmPVQ()	Pressure, Specific Volume	Quality
StmTVP()	Temperature, Specific Vol.	Pressure
StmTVQ()	Temperature, Specific Vol.	Quality
StmPTH()	Pressure, Temperature	Specific Enthalpy
StmPTS()	Pressure, Temperature	Specific Entropy
StmPTC()	Pressure, Temperature	Specific Heat
StmPTM()	Pressure, Temperature	Viscosity
StmPTK()	Pressure, Temperature	Thermal Conductivity
StmPTW()	Pressure, Temperature	Sonic Velocity
StmPTG()	Pressure, Temperature	Isentropic Expansion
StmPHT()	Pressure, Enthalpy	Temperature
StmPHV()	Pressure, Enthalpy	Specific Volume
StmPHS()	Pressure, Enthalpy	Specific Entropy
StmPHQ()	Pressure, Enthalpy	Quality
StmPHC()	Pressure, Enthalpy	Specific Heat
StmPHW()	Pressure, Enthalpy	Sonic Velocity
StmPHG()	Pressure, Enthalpy	Isentropic Expansion
StmPST()	Pressure, Entropy	Temperature
StmPSV()	Pressure, Entropy	Specific Volume
StmPSH()	Pressure, Entropy	Specific Enthalpy
StmPSC()	Pressure, Entropy	Specific Heat
StmPSW()	Pressure, Entropy	Sonic Velocity
StmPSG()	Pressure, Entropy	Isentropic Expansion
StmPSQ()	Pressure, Entropy	Quality
StmTempTI	Temp on 1990 scale	Temp on 1968 scale
StmTempIT	Temp on 1968 scale	Temp on 1990 scale
StmVer()	None	Version/serial no.

Computer Requirements

Operating System: NT, 2000, XP, Vista and Windows 7
Disk Space Used: up to 2.5 MB