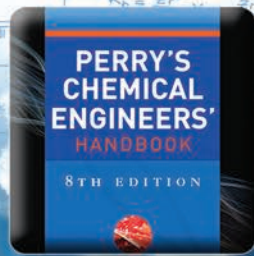
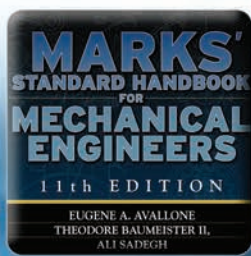
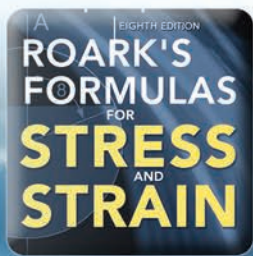


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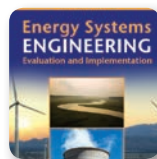
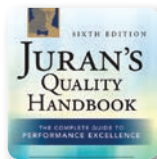
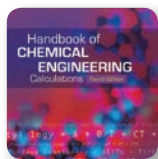
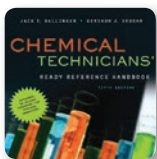
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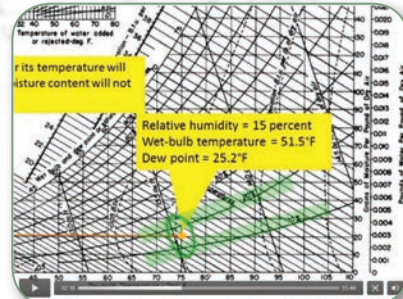
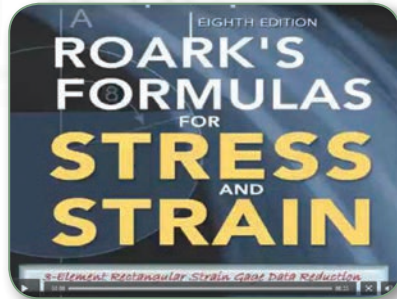
### ENGINEERING SUBJECT AREAS

- |                  |                             |                         |
|------------------|-----------------------------|-------------------------|
| ■ Biomedical     | ■ Energy/Petroleum          | ■ Operations Management |
| ■ Chemical       | ■ Environmental/Sustainable | ■ Software              |
| ■ Civil          | ■ Industrial                | ■ Mechanical            |
| ■ Communications | ■ Electrical/Electronics    |                         |

### ADVISED BY DISTINGUISHED ACADEMIC PROFESSIONALS

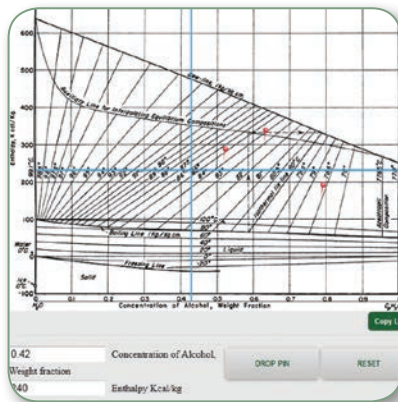
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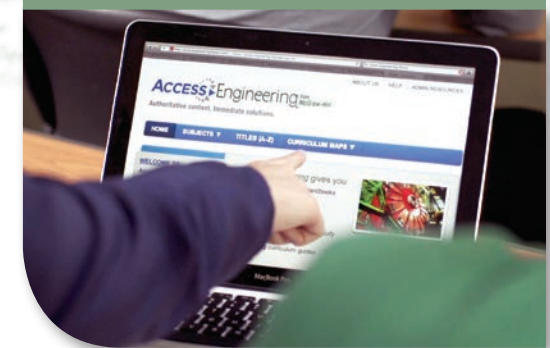


Pressure, bar	Temperature, K	$v_{1, \text{sat}}$ , m <sup>3</sup> /kg	$v_{2, \text{sat}}$ , m <sup>3</sup> /kg	$M_1$	$M_2$
1.0133	299.82	0.000 694	0.2096	91.837	79.137
2	309.57	0.000 711	0.1630	91.806	78.503
4	326.66	0.000 733	0.0876	91.766	77.538
6	337.43	0.000 749	0.0608	91.625	77.748
8	343.43	0.000 762	0.0469	91.489	78.480
10	351.88	0.000 774	0.0382	91.346	80.483
15	364.08	0.000 800	0.0262	90.979	87.742
20	373.17	0.000 822	0.0199	90.601	96.547
30	386.57	0.000 863	0.0133	89.823	144.997
40	396.52	0.000 903	0.0098	89.018	244.099
50	404.50	0.000 943	0.00763	88.191	383.532
60	411.20	0.000 993	0.00607	87.344	563.181
80	422.07	0.001 129	0.00494	85.602	922.959
100	430.76	0.001 577	0.00309	83.817	1383.346

Interactive graphs and downloadable tables make it easier to use and analyze key data.

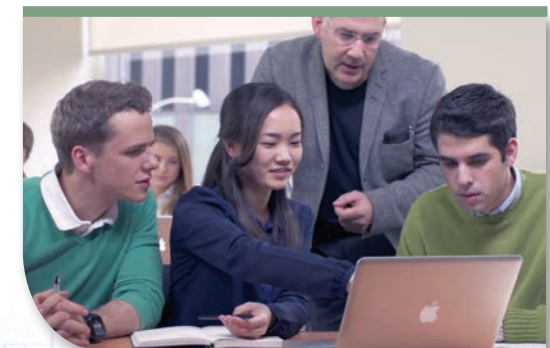
## CURRICULUM MAPS SAVE INSTRUCTORS TIME

Detailed curriculum maps in this growing collection tie the most relevant content from our classic references and guides to core engineering courses—saving faculty time in classroom preparation.



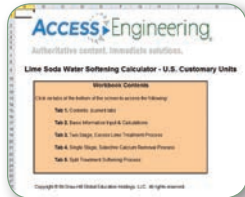
### SUBJECTS COVERED:

- Circuit Analysis (AC and DC)*
- Control Systems*
- Electronics*
- Engineering Economics*
- Fluid Flow/Momentum Transfer*
- Heat Transfer*
- Machine Design*
- Mass Transfer*
- Quality Control*
- Reaction Kinetics*
- Separations*
- Strength of Materials*
- Thermodynamics*
- Vibration and Control*



## CALCULATORS HELP YOU PERFORM CALCULATIONS MORE EFFICIENTLY AND ACCURATELY

Our calculator tools are created by engineering faculty and streamline common calculations that can be time-consuming to perform by hand. By embedding the relevant formulas directly into Excel spreadsheet workbooks—which work with both US and SI units—these calculators enable you to efficiently enter input data and quickly get the most accurate answer possible, within a software program already in daily use. Direct links to the source content and additional related material are provided in the spreadsheets:



### CALCULATORS INCLUDE:

- **Compressible (Fanno Flow) of Air in a Pipe (Chemical; Mechanical):**

*Fanno Flow calculations for adiabatic, compressible air flow in a pipe are extremely time-consuming. This calculator automates the iterative calculation of the friction factor and the overlaying iterative solution of the Fanno Flow equation.*

- **Incompressible Flow in Pipes and Channels (Chemical; Civil; Environmental; Mechanical; Petroleum)**

*This calculator automates the iterative calculation of the friction factor using the Colebrook equation.*

- **Lime Soda Water Softening (Civil; Environmental)**

*This workbook speeds up the numerous intermediate calculations required for dosages of water softening chemicals, daily chemical requirements, and daily solids production rates.*

- **Natural Convection Heat Transfer Coefficients (Chemical; Mechanical; Petroleum)**

*The most time consuming part of any convection heat transfer calculation is obtaining a good value for the convection heat transfer coefficient. This Excel workbook calculates the convection coefficient for three natural convection heat transfer configurations.*

- **Uniform Open Channel Flow (Manning Equation) (Civil; Environmental; Mechanical)**

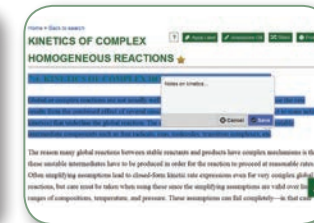
*Speeds up the uniform open channel flow calculations by automating the iterative solution for normal depth required by the Manning equation. It also calculates flow rate and velocity, or required channel slope for specified values of the other open channel flow parameters.*

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$$S = U \cdot I$$

$$P = U \cdot I \cdot \cos \varphi$$

$$Q = U \cdot I \cdot \sin \varphi$$

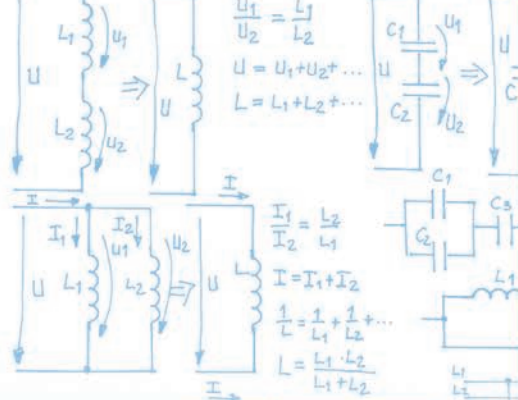
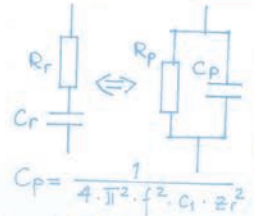
$$S = \sqrt{P^2 + Q^2}$$

$$\sin \varphi = \frac{Q}{S} \quad \cos \varphi = \frac{P}{S}$$

$$Z_p = \frac{R_p \cdot X_{cp}}{\sqrt{R_p^2 + X_{cp}^2}}$$

$$Z_r = \sqrt{R_r^2 + X_{cr}^2}$$

$$R_p = \frac{Z_r^2}{Z_r^2 + X_{cp}^2} \quad X_{cp} = \frac{Z_r^2}{X_{cr}}$$



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