

PTS, (Prescient Technical Services) Customized Course Offering's:

PTS offers customized courses to fit client needs. The overall theme is fuels, piping, boilers, and steam systems safety. The following are already developed core offerings that can be tailored to the equipment and circumstances that exist at your facility. These modules are about an hour.

It's typical for 6 modules to 7 modules to be presented in a day. Some clients also choose to do hands on plant tours of their own equipment where systems can be discussed and actual safety interlock training and valve seat leakage testing can be demonstrated with special tools and instruments. Many of the modules have video clips inserted, some from YouTube. In many cases slides are supplemented by real life stories from the presenter's book, "Fuels and Combustion Systems Safety, "What you don't know can KILL you!", published 2014 by Wiley & Sons.



1. **Combustion Basics:** fire triangle, how explosions happen, fuel properties, LEL/UFL, range of flammability, how to observe a flame and what is telling you, review of hazards that you might encounter in the field.
2. **Fuel Train Basics:** description of the 5 things fuel trains accomplish, double block and bleed, fuel train trips, identification and description of all fuel train components, description of 3 kinds of pilot systems, description of flame detectors.
3. **Fuel Train Component Inspection, Testing & Maintenance:** Real life experience passed on including best practices for installation of components from someone who oversaw the testing and inspections of more fuel trains than anyone else in the world. Includes flame detector testing, pressure switches, air flow switches, water level switches, valve seat leakage (bubble tests), and more.
4. **Piping and Valve Basics:** Piping grades and classifications, pipe joining methods, description of key codes and standards related to piping system components, important valve types and how they work, valve maintenance, piping and valve installation mistakes.
5. **Steam distribution Systems:** Steam balance diagrams, condensate flows and flash tanks, avoiding water hammer (causes and fixes), condensate pumps and return systems, steam users and consumers (i.e. turbines and let down stations), desuperheaters.
6. **Boiler Basics:** different boiler types (water tube, fire tube, steam generators), sensible heat and latent heat, steam tables, superheated steam, blowdown, water treatment systems.
7. **Boiler auxiliaries and Plant Water Systems:** deaerators, boiler feedwater pumps, ion exchange systems, RO systems, sand filters, corrosion and issues surrounding water treatment mistakes regarding boiler reliability.
8. **Instrumentation & Controls Basics:** Basic control loops, input and output elements, control valves, turndown, characterization, calibration, thermocouples and RTD's, flow metering and measurement, pressure measurement, PLC's and single loop controllers.
9. **25 Hazards Overview:** Overview of 25 fuels and combustion systems hazards, provides key elements of many of the modules presented here. Great overview for large group. Usually presented to groups of 30 or more who are not doing other modules. Great as a keynote or limited engagement.
10. **Gas Piping Safety:** Standards that apply (NFPA 54, 56, and ASME B31.3), 4 main gas hazards, meters and protections, plume modelling, flammability risks, PPE, FRC clothing, OSHA Isolations, venting, purging, purging plants, codes and standards that apply.

- 11. Standards & Codes:** Consensus codes and standards, the role of ANSI, listing and labeling, the difference between standards, codes and recommended practices, code cycles, retroactivity, when codes and standards apply and when they don't, how to read NFPA codes, main body versus annex notes, TIA's and interpretations.
- 12. Why Piping Systems Fail:** Corrosion types, where to look and how to look, NDT basics like magnetic particle, X-ray, and ultrasonic thickness testing, weld defects, piping geometrical defects, chemical compositions, pipe manufacturing and installation problems.
- 13. Pressure Bolted Boundary Systems Safety:** Fastener types and markings, strength and mechanical properties, failure mechanisms and identifying them, gasket types, flange faces and problems, torque patterns, flange alignments and sources of piping leaks.

Specific Codes & Standards

- 14.** Overview of NFPA 86, Standard for Ovens and Furnaces
- 15.** Overview of NFPA 85, Boiler Combustion Hazards Code
- 16.** Overview of NFPA 54, The National Fuel Gas Code
- 17.** Overview of NFPA 56, Flammable Gas Piping safety
- 18.** Overview of NFPA 820, Prevention of Fires and Explosions in Waste Water Treatment Facilities

Knowledge Validation

Knowledge validation, (testing), can be provided. Our firm has a database of tests. Questions are developed from Blooms Taxonomy concepts. Some questions require knowledge recall, some require the application of knowledge. If content is customized knowledge validation can also be customized.

Skills Coaching & Demonstration

Many issues associated with combustion equipment safety requires hands on skills. Things like bubble testing valves, testing pressure switches, and using meters requires skills that need to be demonstrated and practiced. Our firm can offer hands on skills and develop skill witnessing programs for validation.

Who Should Come

The course offerings can provide value to all levels of hourly and management staff. The modules can also be tailored to the audiences to stress operational issues for operators or maintenance issues for maintenance staffs.