

# ASHRAE TC 1.4 Control Theory and Application

## Sub-committee: Control Components and Applications

### Meeting Agenda: Sunday 28 JAN 2016

Meeting: 1500-1600, Sub Committee Chair Barry Bridges

**SCOPE Includes:** Components (Sensors, Actuators, Controllers, OWS), Networks, Control Applications Loops, Building management reporting

**Components and Control Application “brainstorming session”** lets TC 1.4 members and guests talk openly about issues and hot topics without being subjected to budgets or due dates.

**Introductions Around the Room:** Those in attendance verbally around the room and written on the attendance form provided with Name, Business affiliation. 26 Attended.

**Announcement:** TC1.4: Programs at WAM2016: Seminar 4, 7, 33; workshop 5, TC meeting Seminar

Discussion began with comments developed in the YEA Meeting with two questions first what is the committee assignment for YEA and second what training is available for new engineers to learn more about control systems? The discussion included connections in websites like ASHRAE YEA by Facebook or others. Possibilities of U Tube videos could be added to 700 or so that are now on the ASHRAE UTube Channel.

Committee activity including in committee presentations could be recorded and posted. Using apps like SCORM for flexible viewing syncing voice with closed caption or text transcripts and some editing to provide a product of interest could make this an effective way to be informative easy to navigate and better tailored to YEA members.

As a preliminary experiment, two presentations that will be included at the beginning of the Orlando meeting of the whole on Tuesday will be recorded by Ron Bernstein and YEA chair, Joe Kilcoyne then sent to Joe and Heather. Heather Schopplein’s Challenge with Joe’s encouragement will be to get fellow YEA members who have shown interest in the TC 1.4 committee to develop the proposed video for connection to the TC 1.4 and YEA Websites.

There are many sources for control training but they tend to be limited in focus so coordination to gain access is important. This connection between TC website and educational material is being addressed through the TC 1.4 education committee. Wikiversity was presented. It can be reached at [http://en.wikiversity.org/wiki/Building\\_Automation](http://en.wikiversity.org/wiki/Building_Automation) or by entering in an Internet Search tool the words “Building Automation wikiversity”

**How does the “theory” part of TC 1.4 incorporate “model predictive control” or similar alternatives to classic control into its scope?** Is there a building system design tool that can simulate different control strategies for a given system configuration? This program would allow a person to create a facility and put together control logic blocks. These would constitute the test bed that would be able to run a simulation based on the assumptions of design with a traceable path of what actually gets into the bldg control. The long term investigation would compare how well does the simulation relate to what is actually built. How close to reality is the control strategy implemented and perform.

A Second part is the SOO that comes out of this sim engine would be used to generate control code from the simulation.

This appears similar to 1455/ gpc 36 and those control strategies would be a good starting point. Accountability of changes would be tracked. This would be a big cost to create and compile.

It would be useful to have a simulation that would allow select and match that includes systems controls and ties all together adjusting for weather and special needs of a building to be able to compare various options. A concern if applied by anyone else than the original design team, then who becomes the designer of record? Who has the design responsibility if something goes wrong?

If a design shared on this tool allows the effort to become public does it benefit the author or just put them at more risk?

**Writing the perfect specification:** Guideline 13, and 36. Discussion considered that the designer's intent presented in the Sequence of Operation on the page may shift from manageable understandable words to difficult to comprehend program code as it is interpreted by the Control Contractor, CC. The interpretation is needed because the intent is not detailed enough. Difficulty in understanding the "hidden code" is especially true for operations personnel. Writing better control specifications and sequence of operations would limit the requirement for CC interpretation.

Would the broader audience of a forum, seminar or an ASHRAE web-poll improve the interest or requirement to use GL 13 and 36 when designing control systems?

**BAS Security:** Kris Kinney spoke about a guideline 13 concern to include program integration and security. This is an area that needs to get more visibility. Also desired are case studies for GL 13 application, how to use the specification as described in 13 to improve design. The committee is working with other TC's on two seminars in Saint Louis.

**Frank guideline 13 cyber security requirements.** DoD Information Assurance Certification and Accreditation Process (DIACAP) requirements are shifting to RMF, risk management framework. Control folks will need to know this or similar requirements to do government work. The TC should consider a presentation on cyber security with TC 1.5, BACnet, TG2 on HVAC security. This is a broad topic related to HVAC and building systems that may include what else is being done by ASHRAE, CIPSE and APAP. Security tends to not be included as prescriptive, specified, but instead is expected to be provided as best practice by the responsible party of installation.

**Metering:** Often metering is just electric power for the whole building or some specific broad distribution, not HVAC. Potentially pump suppliers and VFD controllers could provide flow that when combined with typical temperatures already in place for HVAC systems could provide HVAC BTU monitoring.

### **Past Topics for consideration**

**Campus BAS Data Analysis system performance in three different campus setting.**

**RP 1633 related to building interfaces and presentation of system data (aka the dashboard project). not a lot of support (18 of 83 responded to a survey**

*Can ASHRAE codify by reference to GPC 13 Design of BAS the requirement for advanced presentation options. Will owners become educated and pull for better use of data, or will vendors see a benefit in pushing a product that provides these types of features?*

**Seminar 17 about Guideline 13 Design of BAS. it was clear participants wanted to know more and were asking about training. the cellphone link makes a shift from hardware for BAS into a virtual machine.**

**How RP1455 became GPC 36 best of practice advanced sequence of control.**

*Irrigation Control is an example of a utility and component of the building environment that has complex sensors and sequence of operation, but not part of BAS. BAS should consider all building subsystem not just energy. The association for irrigation engineers need to know to integrate irrigation into BAS like HVAC as a source of gray water, but the controllers are not compatible with typical communication protocols like Modbus, BACnet, LonWorks.*

Connection of **metering to DDC** Are **advanced revenue meters needed or can a standard sub-meter that only sends out pulses sufficient with appropriate software** for integration and analysis.

If **contaminants are measured in the lab space** the Vent could react if those Unocc levels go high and allow lower flow when unoccupied and a later restart of equipment and provide records of actual levels

**Self-learning Self-healing software** to modify daily strategies especially setting the temperature of the floor slab over night for radiant cooling and to predict annual GSHP bore field strategy.

#### **Magic Sensors and practical considerations**

Air quality sensors exist to **detect infection in hospital rooms. Microbial sensors provide not only instant readings of microbes in the air but through DNA analysis identify what microbe.**

*OA is not just for IAQ it must be provided for **combustion, make up for exhaust, airside economizer, and avoid infiltration.** OA flow could never be 0 cfm. Economic benefits from advanced sensors must focus only on the OA portion that **can** be controlled for IAQ.*

#### **Preemptive control triggers**

Use an enterprise “schedule object” for a list of individuals who respond to a meeting invitation as the source for BAS occupancy load calculation. Example San Jose, SERPA “Thermavote”