2024 Critical Environments Summit

PLC v/s DDC

What is the right system choice?

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What is a “PLC”?

- P – Programmable
- L – Logic
- C - Controller

What are the typical applications for a PLC?

- Production Plants
- Packaging Machines
- Pharmaceutical Applications
- Traffic Lights
- Critical Environmental Controls

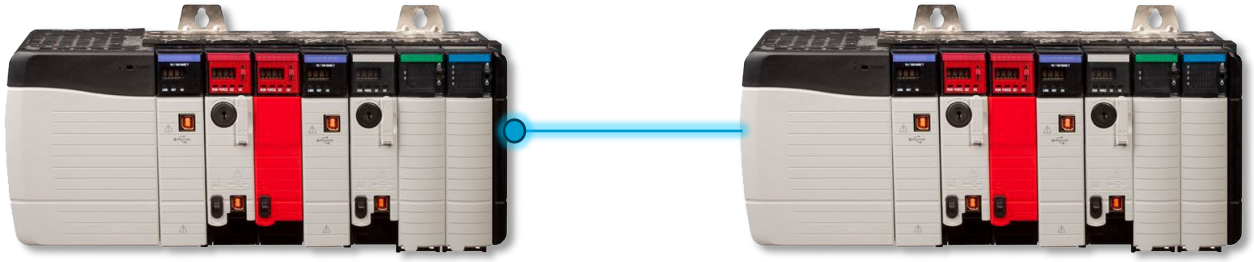
Uptime

- PLCs are generally considered the better choice for high-performance situations because of their extended mean-time-between-failure (MTBF) over DDC systems. This makes PLCs are a popular option for environments requiring continual 24×7 performance.

- The associative costs of unscheduled downtime can lower PLCs total cost of ownership (TCO), further supporting their suitability for mission-critical facilities, such as hospitals and data centers.

Redundancy

Some PLC models offer completely “bumpless” transfer of control with no programming.



Accuracy

- The inputs of a PLC are generally more accurate than that of their DDC counterparts, often with 16bit resolution.
- This means that the PLC can divide the analog input range into 65,536 (2^{16}) steps.

Speed

- PLCs are quicker at processing and monitoring than DDC. The speed of monitoring and reaction is program dependent, but many models refresh every 2ms.

- By comparison, many DDC models refresh at 100ms.

Capacity

- PLCs have a large point capacity, allowing one controller to monitor and control large or multiple systems.

What is “DDC”?

- D – Direct
- D – Digital
- C - Control

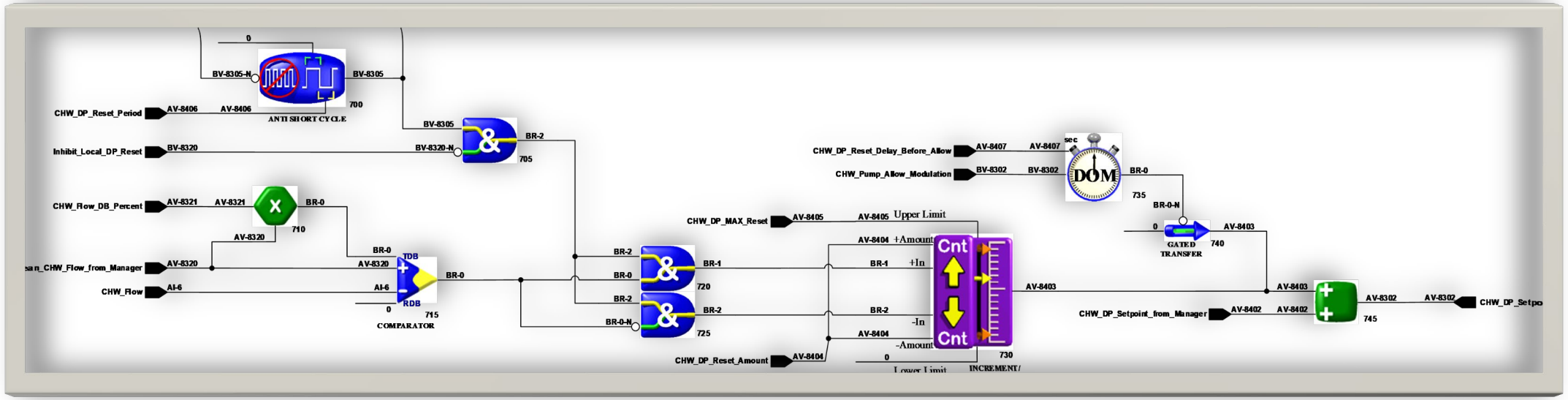
What are the typical applications for DDC?

- Building Temperature Control
- Lighting Controls
- Security / Access Systems

Communication - BACnet

- Most DDC utilizes the BACnet protocol, developed by ASHRAE.
- BACnet was developed as a standard protocol specifically for building automation.

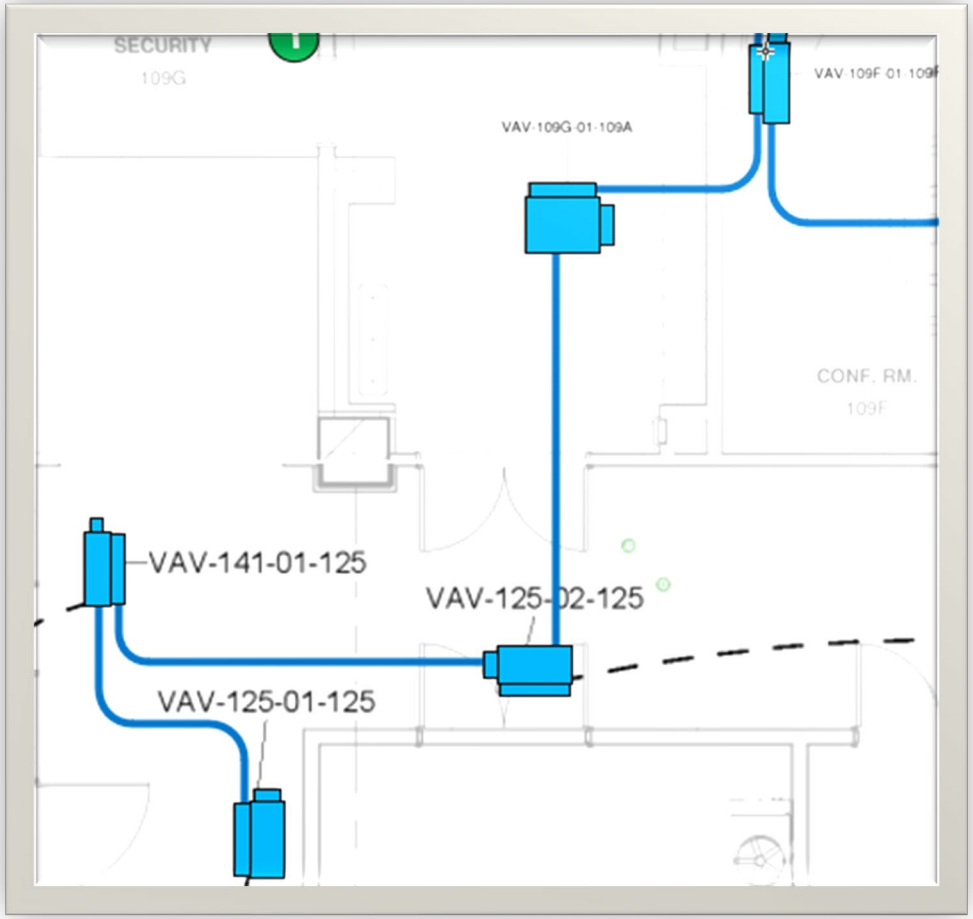
Programing



- DDC programming is often straightforward and simple to follow. Alarming, trending, scheduling and standard functions are built in features.

Distributed Control

- DDC uses a distributed control model.
- Controllers are located at each system served.



Standard Programs

- Many DDC systems have controller models available with “standard” programs.
- These allow for quick, cost-effective installs for systems such as Terminal Units and Fan Coils.

Choosing a path…

What's better? Should we use PLC or DDC?

Cost

PLC

- Higher cost of material
- Higher cost of programming
- High Extended-Meantime-Between-Failure (MTBF)

DDC

- Lower Cost of Material
- Lower Cost of Programming
- While not unreliable, may have lower MTBF

Programming

PLC

- “Clean Slate” – Do everything precisely how you want
- Higher cost of programming

DDC

- Built in Alarming, Scheduling, PID, and basic tools – One can be limited to this construct
- Lower Cost of Programming

I/O Density

PLC

- Higher I/O density than DDC
- Allows large scale monitoring and control
- Multiple systems can be controlled from one PLC

DDC

- Designed to be distributed control
- For extremely large-scale monitoring and control, multiple controllers may be required
- Each system generally has a dedicated controller

Redundancy

PLC

- High end PLCs are capable of “bumpless” redundancy

DDC

- Controllers are not designed for “bumpless” redundancy
- Redundancy can be achieved through careful programming but will never be “truly bumpless”.

Communication

PLC

- Common languages include a host of proprietary languages as well as Modbus, CANopen or HART

DDC

- Most DDC controllers speak ASHRAE's BACnet, with Lon and Modbus also as commonly available languages

Accuracy

PLC

- Can be up to 16bit. This allows for 65,536 steps or levels within an input
- 16bits, resolution of 0.002 degrees per bit for 120° range

DDC

- Generally, is 10 bit. This allows for 1024 steps or levels within an input
- 10bits, resolution of 0.117 degrees per bit for a 120° range.

Speed

PLC

- Some refresh I/O up to every 2ms.

DDC

- Most respond roughly 100ms.

Existing Gear

PLC

- Are there existing PLCs?

DDC

- Is there an existing DDC system?

Maybe Use Both?

PLC

Use them for the critical equipment

DDC

Use them for non-critical areas

Bring everything together under one seamless unified “front end”


Questions, Thoughts, Comments?