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AABC Commissioning Group

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# **Safety & Commissioning: Practical, Regulatory & Ethical Issues**

Course Number: CXENERGY1629

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***Jacobs Engineering***

April 12, 2016

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# Course Description

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This presentation provides a review of an overall safety culture, how it impacts the commissioning practice, and how it relates to industry efforts in a climate that encounters greatly varied scopes, locations, and systems being commissioned with equally varied levels of care conducted during the process.

# Learning Objectives

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At the end of the this course, participants will be able to:

1. Promote a safety culture and understand its significance on the commissioning practice and beyond.
2. Understand best practices and safety considerations typical of all commissioning projects.
3. Discuss ramifications of safety in practice with observations, orchestration, or hands on commissioning and the ethical applications associated with commissioning safety.
4. Understand standards, rules, and regulations that impact safety, commissioning, and project approach.



# Safety & Commissioning

Practical, Regulatory & Ethical Issues



April 12, 2016

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# Speaker Bios



## **Ted Kuzel**, Regional HSE Manager

- Ted has 18 years of HSE experience across multiple market sectors includes: Federal/State Projects, K-12, Higher Education, Healthcare, Justice, Water/WW, Rail, Roadways, Industrial Capital and Maintenance. Training he has provided has allowed him to engage with clients as well as operational partners at a strategic level to assist in safe project delivery.



# Speaker Bios



**Doug Ekstrom, P.E., LEED AP BD+C, CxA,**  
Director – Commissioning Services

- Doug has 16 years' experience in MEP Design, Project Management, Construction Administration, and Commissioning. His projects have included Corporate Headquarters, Health Care, Retirement Facilities, Commercial Office Buildings, Municipal, Corporate and University Campuses, Retail, Restaurants, K-12 and Higher Education, Central Utility Plants, Combined Heat and Power Plants, Warehouses, and Tenant Finish. Scopes covered include design and commissioning services in all three disciplines; mechanical, electrical, and plumbing.

# Safety Moment

- Start of every meeting
- Examples:
  - Logistics such as emergency exits and or cluster points
  - Weather related safety
    - Watch your step
    - Travel & driving tips
    - Seeking shelter

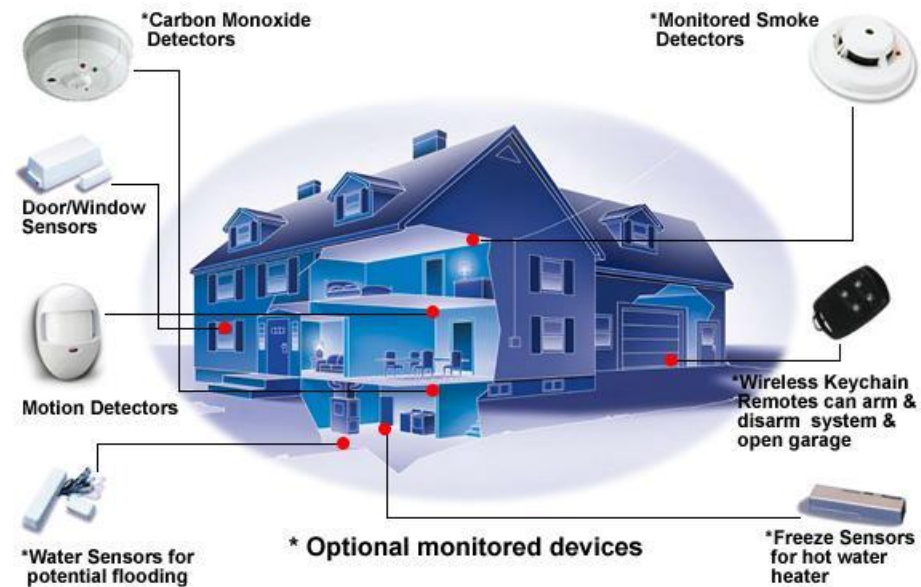


**S**AFETY **M**OMENT **C**ENTRAL



# Safety Moment

- Additional Examples
  - Auto
  - Defensive Driving
  - Travel
  - Family / home safety
    - Home security
    - Ladder safety



# Beyond Zero – Safety Culture

- Our Corporate Commitment to Safety
  - More than a policy manual or a training video
  - It's how we do business and how we live
  - Our goal is to prevent even one accident from occurring
  - We put the personal health and safety of our employees, clients, and sub-consultants first



# Beyond Zero – Safety Culture

- How this affects our Clients
  - Safety briefing at the beginning of each meeting or day
  - Enhanced awareness of safety
  - Reduced incident rates
  - Safety incorporated into design



# Best Work Practices

- Training
  - 10 Hour OSHA Construction Training
  - Confined Space, Electrical, Fall Protection, Control of Hazardous Energy (LOTO), GHS
- HSE and Management review of Scope and Hazards Associated with steps of task
  - SPA (Safe Plan of Action)
  - HASAP (Health and Safe Action Plan)
  - EAP (Emergency Action Plan)



# Rules & Regulations



- OSHA
  - Safety Data Sheets (SDS) – formerly MSDS
  - Whistleblower
  - Refusing to work
  - If more than 35 employees on site – we require a HSE Safety Professional

# Typical Safety Items

- Falls
  - Sides/edges/holes – Slips/trips – Ladders/scaffolding
- Struck by
  - Vehicles – Flying/falling objects – Tip-overs
- Electrical
  - Overhead lines/live panels
- Caught in Between
  - Excavation



# Falls



# Struck by





# Electrical Safety

- Assume energized





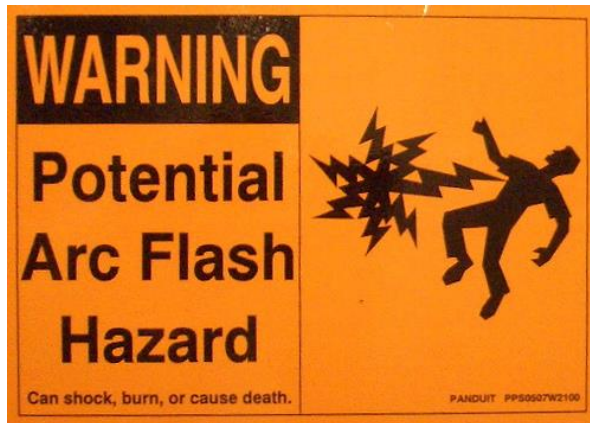








# NFPA 70 – Arc Flash





# Caught in Between



# Hazardous Energy – Other Forms

- Electrical
  - Stored/Static/Generated
- Mechanical
  - Rotation/Transverse/Reciprocating
- Thermal
- Chemical
- Potential
  - Pressure
  - Gravity
  - Spring



# Safety Considerations

- Personal protective equipment (PPE)
- Lock-out Tag-out (LOTO)
- Ladder safety
- Work at elevation
- Confined spaces
- Site management
- Equipment
- Guards

# Personal Protective Equipment

- PPE provided by employee
  - Employer to provide – employee to properly wear
  - Provide – attend training
  - Maintain/replace/disposal – Care for/clean/maintain PPE



# Lock-Out Tag-Out



# Ladder Safety



- Safe use
  - Base clear of materials
  - Face the ladder
  - Stay within the side rails (Belt Buckle)
  - Do not stand on the top nor the step below the top
  - Do not straddle
  - Side hinges fully locked
  - Don't carry items up nor down the ladder



# Ladder Safety



# Ladder Safety





# Work at Elevation

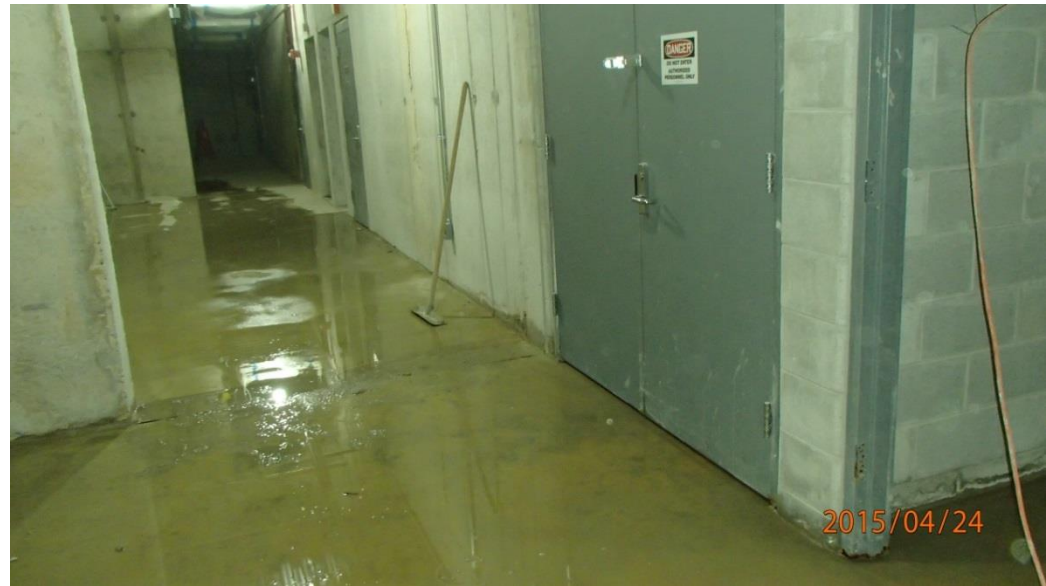
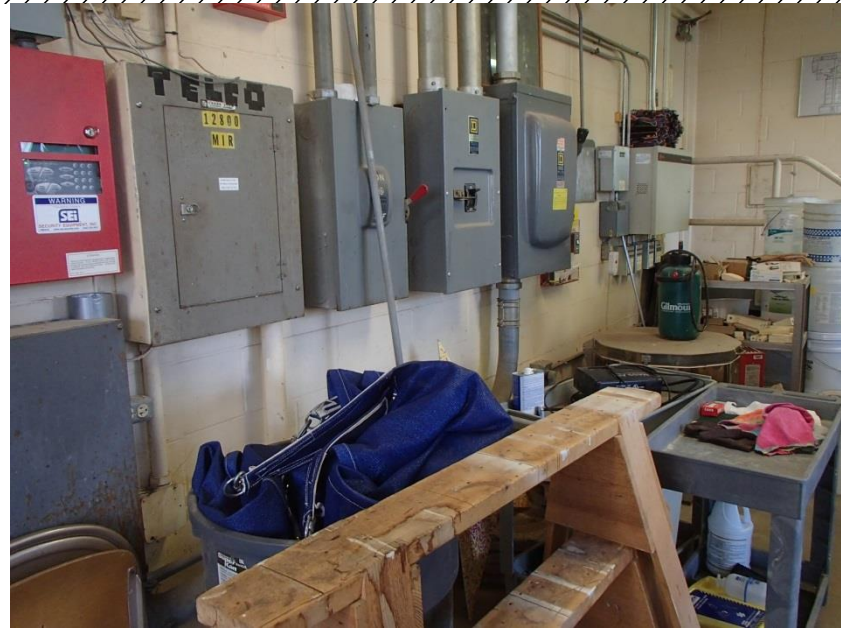
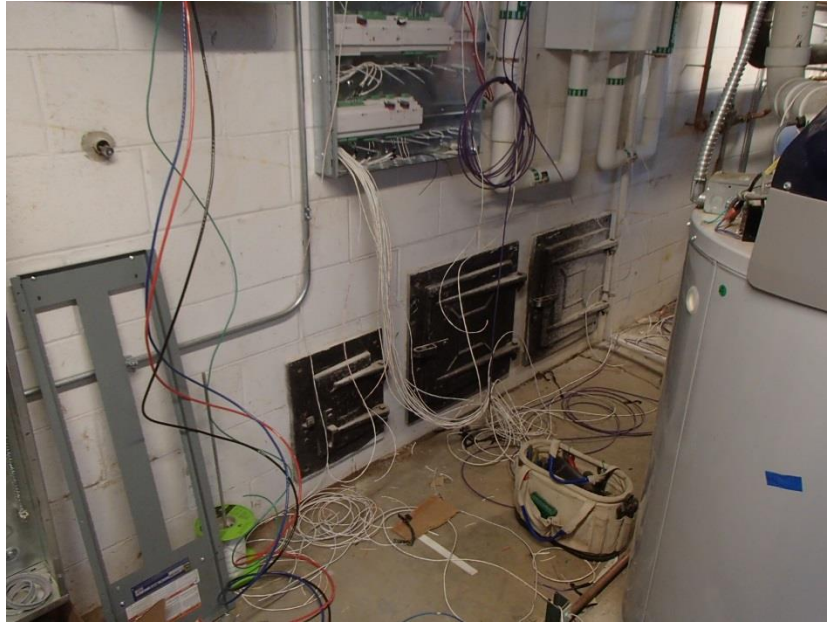


# Confined Spaces



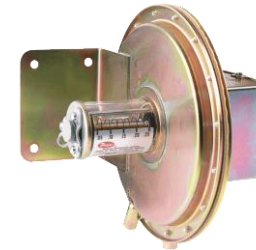


# Site Management



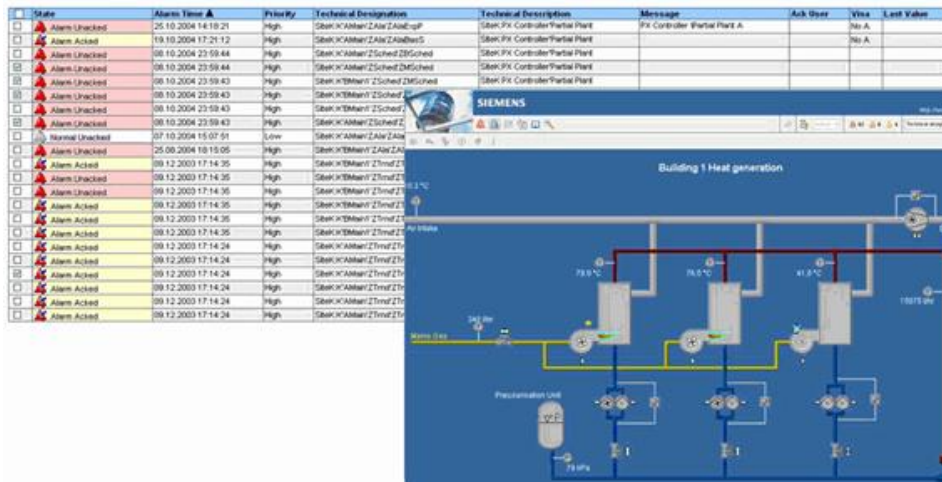
# Safety in Design & Construction

- Accessibility
  - Clearance for maintenance
  - NEC requirements
- Safety guards in place
- Door safety & pressure switches



# Safety in Design & Construction

- Interlocks
- Alarms & Safeties
- Building Automation System (BAS)
- Emergency Power Off (EPO)





# Safety in Design & Construction - Continued

- Refrigerant monitoring
- Ventilation / make-up / exhaust
- Temperature & pressure relief
- Maintenance bypasses
- Handrails, access ladders,



# Level of Care

- CxA and Installing Contractor
  - Orchestration and execution
  - Pushing buttons, turning knobs, & pulling levers
  - Safety coordination
  - Warranty impacts



# Level of Care

- Self-performing Cx
  - Test and Balance Contractor
  - Controls Contractor
- Witness of Start-up
- Pre-functional Checklists
- Functional Performance Tests

Equipment Installation	2.3	CP	Y / N	Bird screen, back specifications.
	2.4	AP	Y / N	EF is in proper loc
	2.5	CP	Y / N	Verify the unit is s
	2.6	AP	Y / N	Ductwork is install
	2.7	AP	Y / N	Required length of
	2.8	AP	Y / N	Fan has free rotati
	2.9	CP	Y / N	Verify bearings are
	2.10	AP	Y / N	Verify that all sets
	2.11	AP	Y / N	ID label permanen
	2.12	CP	Y / N	Protective guards
	2.13	AP	Y / N	Grilles and diffuse
	2.14	AP	Y / N	All electrical conne
	2.15	CP	Y / N	Emergency electri
Equipment Start-up	3.1	CG	Y / N	All dust and const
	3.2	CG	Y / N	connected ductwo
	3.3	AP	Y / N	All quality assuran
	3.4	AP	Y / N	Fan rotation is cor
	3.5	CG	Y / N	Power supply ener
	3.6	CG	Y / N	Permanent labels
BAS Control & Integration	4.1	CG	Y / N	Manufacturers Re
	4.2	CG	Y / N	BAS monitoring po
	4.3	CG	Y / N	BAS front end.
Completion	5.1	CG	Y / N	Point-to-point veri
	5.2	CG	Y / N	Graphics are comp
	5.3	N/A	Y / N	Test and balance
	5.4	AP	Y / N	O&M and warranty



# Level of Care

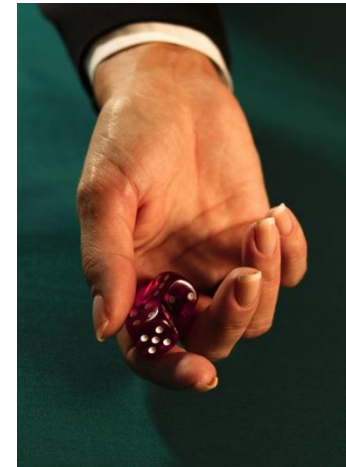
- Planning & coordination
- Hazard recognition
- Risk management
- Situational Awareness
- What if scenarios?
- Contractor protocols



The purpose of the *BeyondZero*® is to elevate our level of awareness of safety by making it **personal, relevant** and **important** such that it impacts our choices and actions.



- For each of us to take the time to examine our own **relationship** to safety
- To explore the **contradiction** regarding safety:
  - ***No one wants to get hurt***
  - Yet we take chances or allow co-workers to take chances



- To build **permission** with one another to “take care of” each other
- To **speak up** when necessary to support the safety of those around us
- To leave all of us in **action** — focus on the one or the few things we can do that will make a difference



# What is *BeyondZero*?

- It is about all workers going home safely every day – no kidding.
- It is about a mindset intolerant of any level of injury





# What is *BeyondZero*?

- It is about **taking responsibility** for your own safety and those that work with you and around you.
- It is about **being proactive** and asking questions such as:
  - What dangerous things can happen on this job/task?
  - What preventive actions will I take?

# What is *BeyondZero*?

- It is about an attitude of **choosing** to follow the safety rules and procedures (versus **having** to follow them)
- It is about **speaking up** and expressing your concern when you see something unsafe



# How Can You **Contribute**?

When you **contribute**, you help drive the safety culture!

- Actively contribute to safety discussions and meetings
- Participate in required safety processes (SPAs, HASAPs)
- Share knowledge
- Provide ideas for improvement
- Get involved in safety committees, training, etc.

# Why *BeyondZero* For Jacobs?

- Cannot continue to allow our people to get hurt
- Steady improvement will not address the problem soon enough
- We **can** create a BeyondZero environment
- A major step-change is needed in our performance
- It is the right thing to do for our people
- It is the smart thing to do for our people



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# Questions?



## A poem from the construction industry...



'I chose to look the other way'

by Don Merrell

*I could have saved a life that day,  
But I chose to look the other way.  
It wasn't that I didn't care,  
I had the time, and I was there.  
But I didn't want to seem a fool,  
Or argue over a safety rule.  
I knew he'd done the job before,  
If I called it wrong, he might get sore.  
The chances didn't seem that bad,  
I've done the same, he knew I had.  
So I shook my head and walked on by.  
He knew the risks as well as I.  
He took the chance, I closed an eye,  
And with that act, I let him die.  
I could have saved a life that day,  
But I chose to look the other way.  
Now every time I see his wife,  
I'll know I should have saved his life.  
That guilt is something I must bear,  
But it isn't something you need to share,  
If you see a risk that others take,  
That puts their health or life at stake.  
The question asked, or thing you say,  
Could help them live another day.  
If you see a risk and walk away,  
Then I hope you never have to say,  
I could have saved a life that day,  
But I chose to look the other way*

This concludes The American Institute of Architects  
Continuing Education Systems Course

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