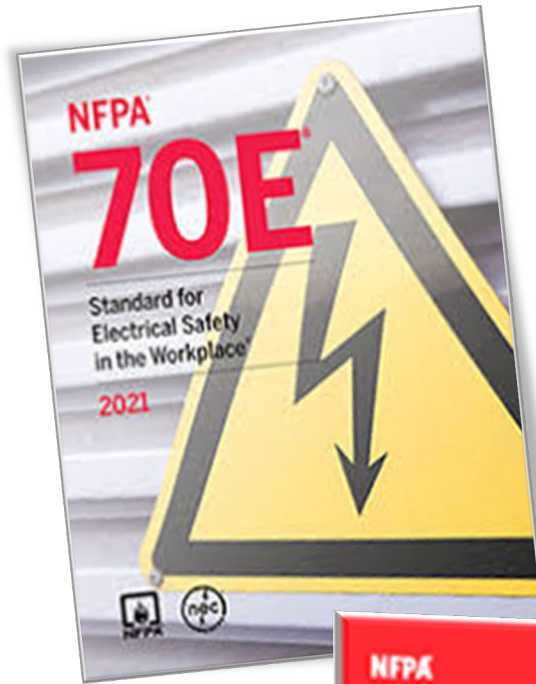


NFPA 70E 2021

Updates and Changes Worth Discussing
and How Training Keeps you Current

Presenter: David Weszely & Chris Rucci





- NFPA 70 (NEC)
- NFPA70B (Maintenance)
- NFPA70E (Electrical Safety)

- (Up-dated every three years)



NFPA 70E 2021 CHANGES WORTH DISCUSSING



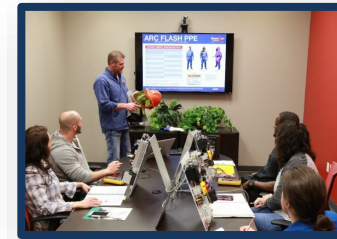
Number One Priority



PPE



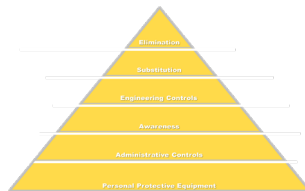
Circuit Breakers



Training



Attendant



Risk Reduction Methods



Battery Safety



Electrical Safety Program



Capacitor Safety



Non-Contact
proximity test
instruments

Restructuring of Article 110 General Requirements

2018 Edition

- 110.1 Electrical Safety Program
- 110.2 Training Requirements
- 110.3 Host and Contractor Responsibilities
- 110.4 Test Instruments and Equipment
- 110.5 Portable Plug-and-Cord-Connected Equipment
- 110.6 Ground Fault Circuit Interrupter Protection
- 110.7 Overcurrent Protection Modification

2021 Edition

- 110.1 Priority (moved from 105.4)
- 110.2 General (moved from 120.2(A))
- 110.3 Electrical Safe Work Condition
- 110.4 Energized Work (moved from 130.2(A))
- 110.5 Electrical Safety Program
- 110.6 Training Requirements
- 110.7 Host and Contractor Responsibilities
- 110.8 Test Instruments and Equipment
- 110.9 Portable Plug-and-Cord-Connected Equipment
- 110.10 Ground Fault Circuit Interrupter Protection
- 110.11 Overcurrent Protection Modification
- 110.12 Equipment Use (New Article)

Hazard Elimination

Article 110.1 Priority (Formerly Article 105.4):

Hazard elimination shall be the priority in the implementation of safety-related work practices.

Informational Note 1: *Elimination is the risk control method listed first in the hierarchy of risk control identified in 110.5(H)(3). See Annex F for examples of hazard elimination.*

Informational Note 2: *An electrically **safe work condition is a state** wherein all hazardous electrical conductors or circuit parts to which a worker might be exposed are placed and maintained in a deenergized state, for the purpose of temporarily eliminating electrical hazards. See Article 120 for requirements to establish an electrically safe work condition for the period of time for which the state is maintained. See Informative Annex F for information regarding the hierarchy of risk control and hazard elimination.*

Electrical Safety Program Changes

Electrically Safe Work Condition Policy Policy must comply with Article 110.3 (electrical Safe Work Condition)

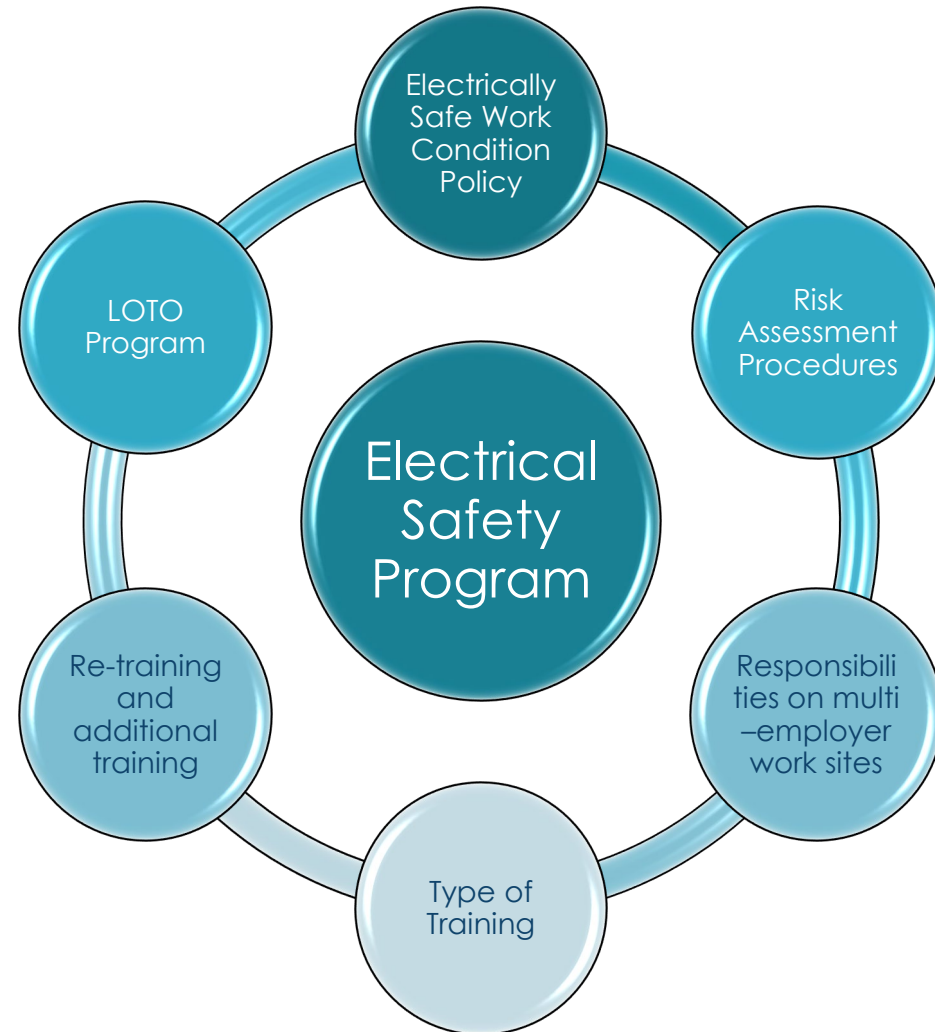
LOTO Program – Company ESP must include or have reference to your LOTO program

Risk Assessment Procedure
Identifying when a second person could be required

Responsibilities/Documentation – On multiple employer work sites safety is a shared responsibility (Article 110.7 (C))

Type of Training - Classroom training can now include interactive web-based training

Additional Training and Retraining



Training

Article 110.6(A)(3) **Additional Training and Retraining:** An expansion on the concept of training and whether it is material covered before or if it is something new to the trainee in which it would be classified as additional or supplemental training not covered prior.

Article 110.6(A)(4) Type of Training



Informational Note: *Classroom training can include interactive electronic or interactive web-based training components.*

Multi-Employer Worksites

Article 110.7 Host and Contractor Employer's Responsibilities.

New Informational Note to 110.7: On multi-employer worksites (in all industry sectors), more than one employer can be responsible for identifying hazardous conditions and creating safe work practices.

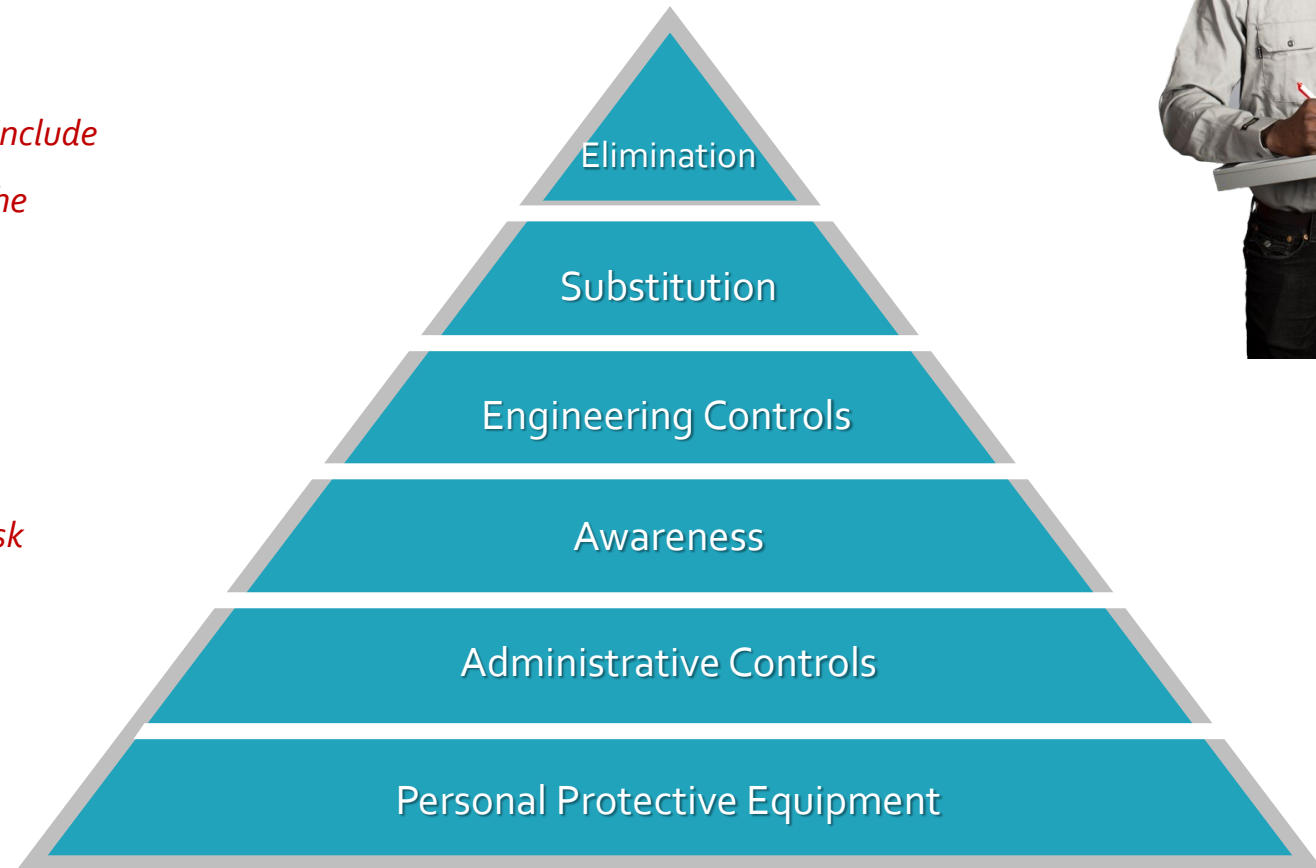


Risk Assessment Procedure

Article 110.5 (H)(1) Elements of a Risk Assessment Procedure

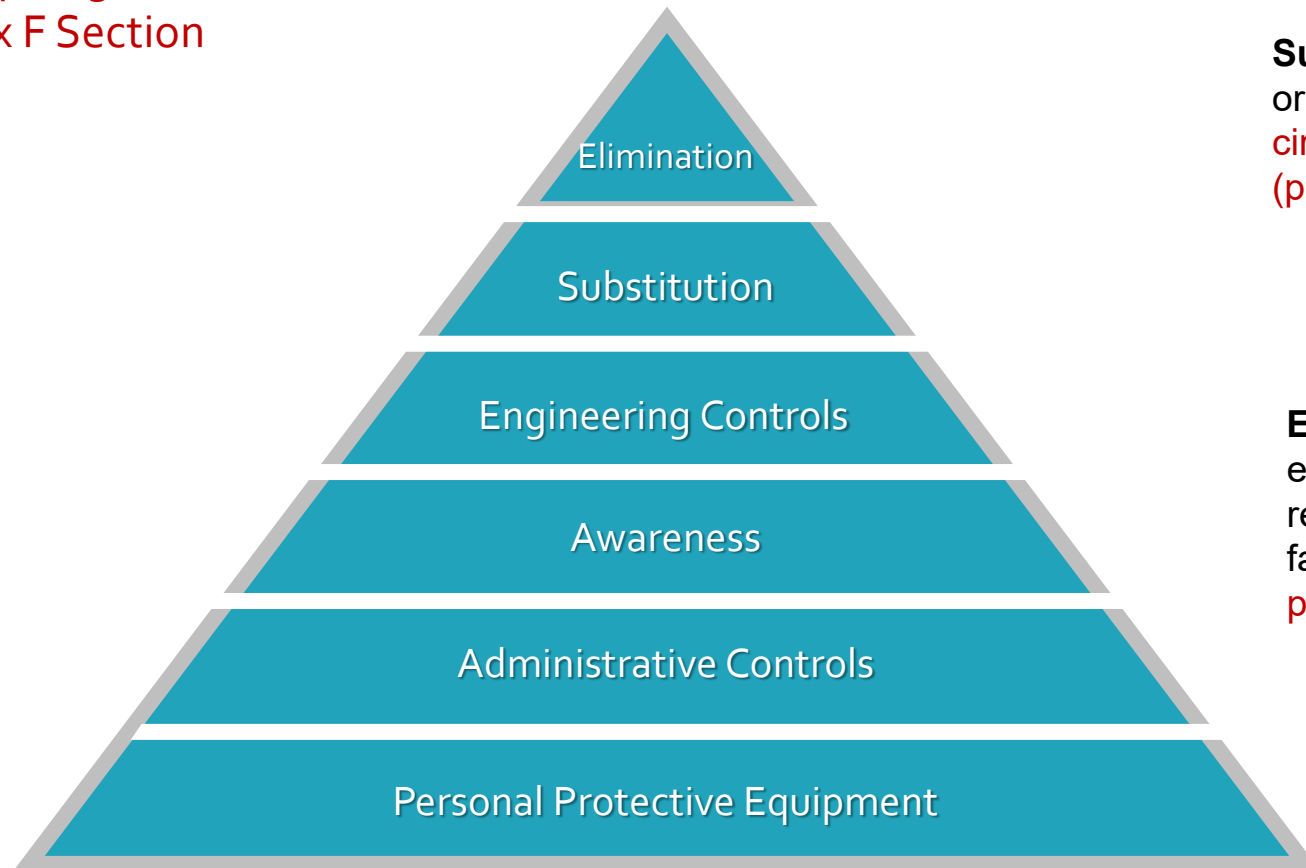
Informational Note 1: *Risk assessment procedure could include identifying when a second person could be required and the training and equipment that person should have. (First Aid ,CPR, Safe Release of Victims)*

Informational Note 2: *For more information regarding risk assessment and the hierarchy of risk control, see Informative Annex F for examples of risk reduction methods.*



Hierarchy of Risk Control Methods

Examples given in Table F.3
Annex F Section



Substitution – Less hazardous equipment, system or energy, (reduce energy by replacing 120V control circuitry with a 24 Vac or Vdc control circuitry) (place controls on the outside)

Engineering – Guard (Physically obstruct) energized electrical conductors and circuit parts to reduce the likelihood of electrical contact or arcing faults ,remote operators (Barrier on, line side/ primary side)

Danger Labels

130.7(C)(1) Personal Protective Equipment Informational Note

Informational Note: Where the estimated incident energy exposure is greater than the arc rating of commercially available arc rated PPE, then for the purpose of testing for the absence of voltage, the following examples of risk reduction methods could be used to reduce the likelihood of occurrence of an arcing event or the severity of exposure:



 DANGER	
ENERGIZED WORK PROHIBITED	
179	cal/cm ² @ 18"
31 ft 9 in	Arc Flash Boundary
480 VAC	Nominal System Voltage
42 inches	Limited Approach Boundary
12 inches	Restricted Approach Boundary
Bus: MAIN SWGR LINE SIDE Prot: MaxTrip Time @2.0s	
866-772-6770	Analysis conducted by SEAM Group
2021	

Danger Labels Article 130.7(C)(1)

Examples of Risk Reduction Methods

Example I

Use a non-contact proximity test instrument or measurement of voltage on the secondary side of a low voltage transformer mounted in the equipment before using a contact test instrument to test for the absence of voltage below 1000 volts

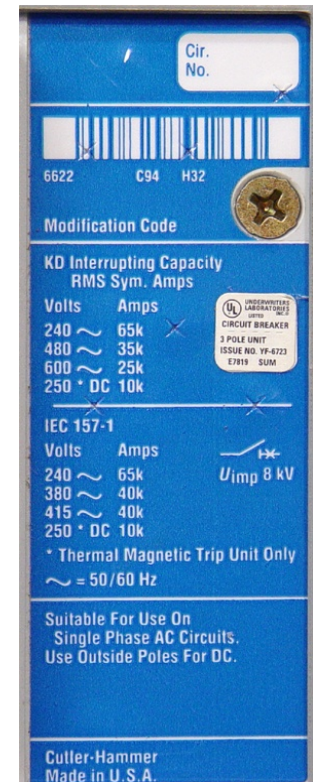


Example II

- If equipment allows, observe visible air gaps between equipment conductors and circuit parts and the electrical source supply

Example III

- Increase the working distance
- Use current limiting devices within the system design to reduce the incident energy level.
- CB put in maintenance mode



PPE Changes

Table 130.5(G) & Table 130.7 (C)(15)(c)



For footwear: Footwear other than leather or dielectric shall be permitted to be used provided it has been tested to demonstrate no ignition, melting, or dripping at the estimated incident energy exposure.



For Outerwear "Safety Vests": The arc rating of outer layers worn over arc rated clothing as protection from the elements or for other safety purposes, and that are not used as part of a layered system, shall not be required to be equal to or greater than the estimated incident energy exposure.

Balaclava



Definition Changed: (The words hood, and sock removed)

New Definition:

An arc rated head-protective fabric that protects the neck and head except for a small portion of the facial area.

New Informational Note:

Some balaclava designs protect the neck and head area except for the eyeswhile others leave the eyes and nose area unprotected.

Voltage Rated Rubber Insulated Gloves With Leather Protectors

NEW Table 130.7(C)(7)(a)



Glove Class (00), (0), (1) etc.

Maximum Voltage use ac & dc

Minimum distance between Rubber glove and leather protector

 Minimum Distance



Circuit Breaker Operation

Installation of new a circuit breaker or switch or completion of maintenance ex:(bolts tightened, parts replaced)



Table 130.5(C)



Task:

Operation of a CB or switch the first time after installation or completion of maintenance in the equipment

Equipment Condition:

Any

Likelihood of an arc flash occurrence

Yes

Normal Operating Condition

Article 130.5 moved to
Article 110.4 (D)



New article 110.12 Equipment Use:
Equipment shall be used in accordance with the
manufacturer's instructions

Article 130.5 Information Note: No 2:

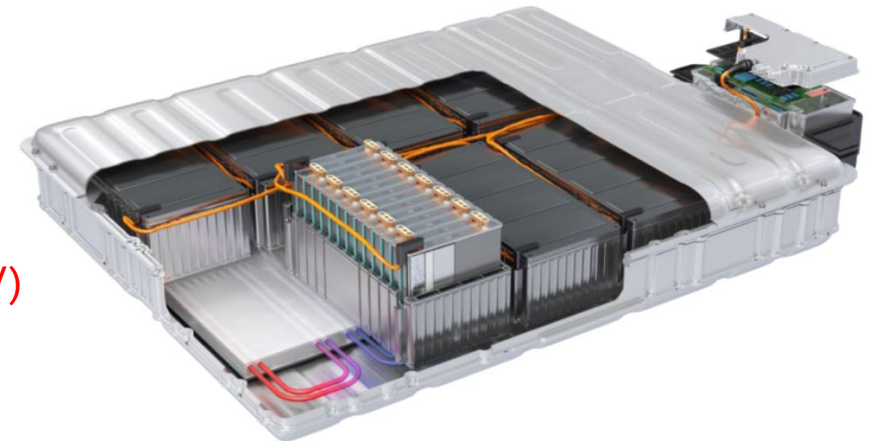
Inadequate maintenance of electrical equipment can result in increased opening time of overcurrent protective device increasing the incident energy.

Battery Safety

Assessing Hazards Associated with Work on Batteries Annex F

Flow Chart

- System Voltage 100 volts or above
- Can batteries be segmented (put into separate groups to get below 100V)
- Arc flash risk assessment completed
- Arc flash risk assessment must be completed by an engineer
- Wear appropriate PPE for arc flash and shock protection



Article 120.4(B)(2) Stored Energy

Informational Note: *For more information on methods and procedures to place capacitors in an electrically safe work condition, see Article 360 and Informative Annex R, Working with Capacitors.*

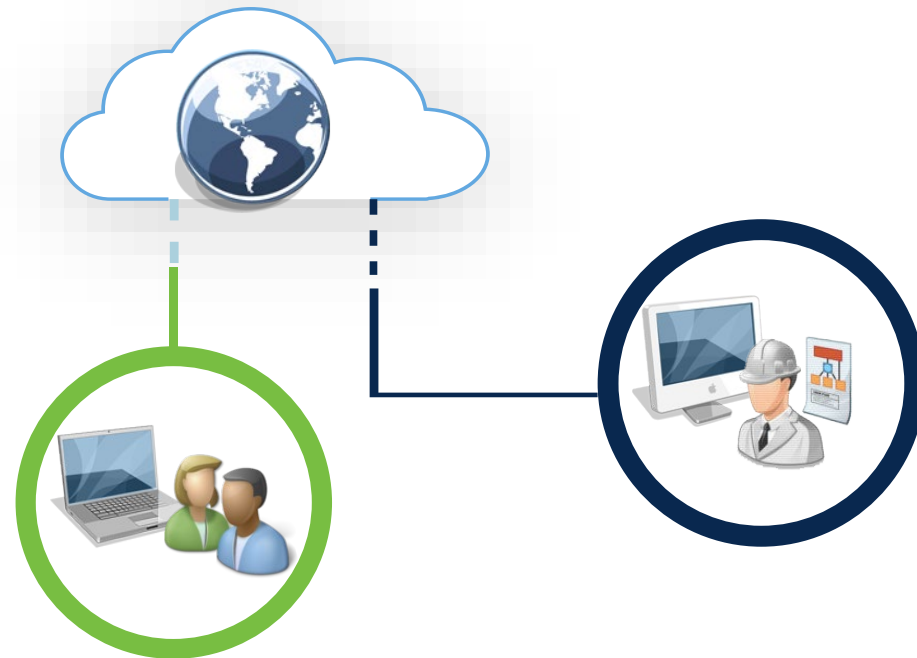
Two new additions

Article 360 & Annex R

Capacitor safety
(how to safely discharge capacitor with a grounding sticks)



Training Through E-Learning, Webinars, and In-Person



Training Options



- Live Training Events

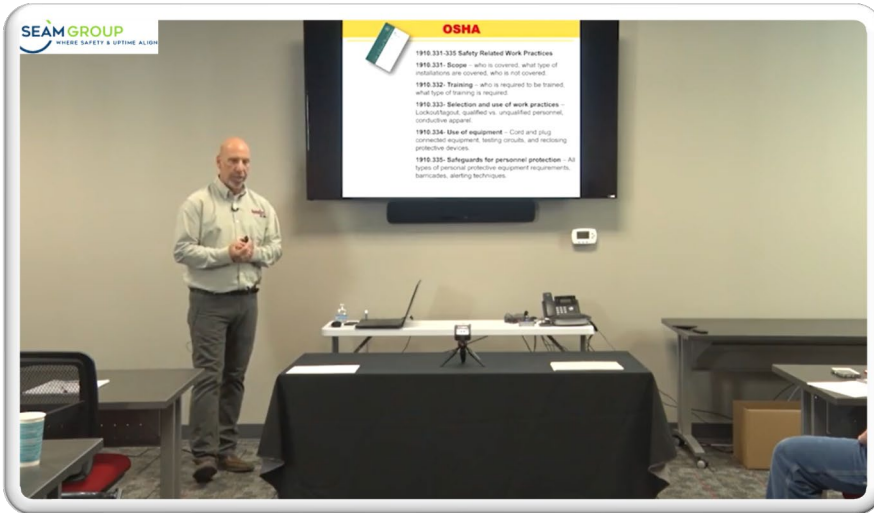


- Remote Webinars



- E-Learning

Live Training

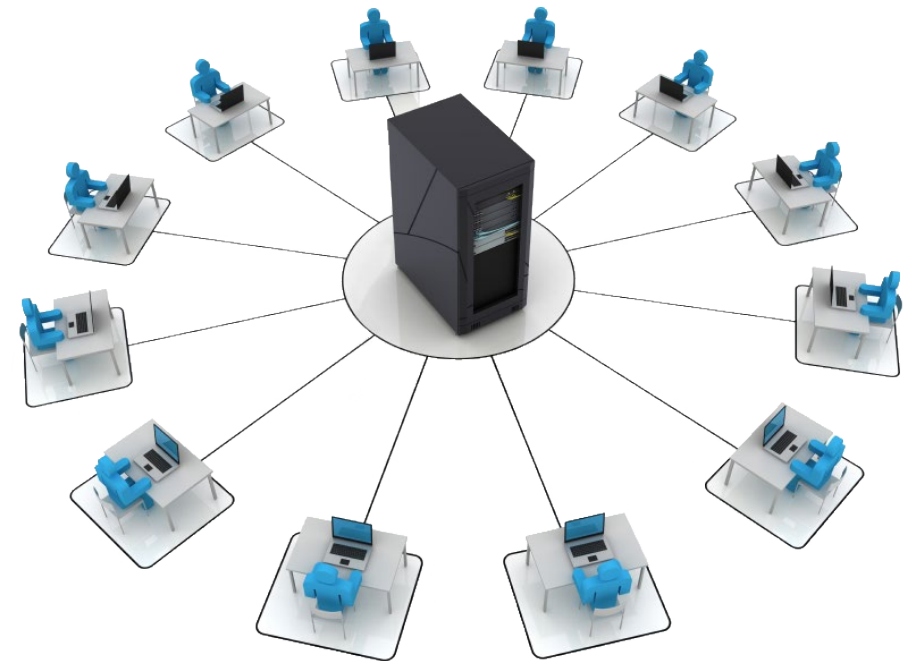


- Hands on activities
- Personal, one-on-one attention
- Customized to client site



The Benefits of Training Using E-Learning & Webinars

- Less disruption for client site and people
- Reduced costs
 - No travel requirements
 - More attendees / wider geographic impact
 - Off hour access
- Increased retention and impact
- Rich metrics and measurable results
- Gives SEAM Group a persistent presence in the client's organization

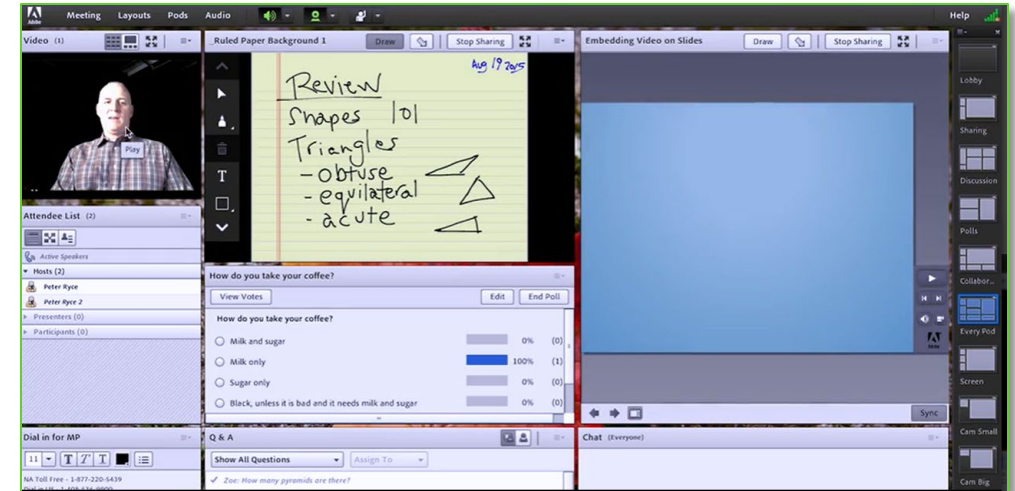
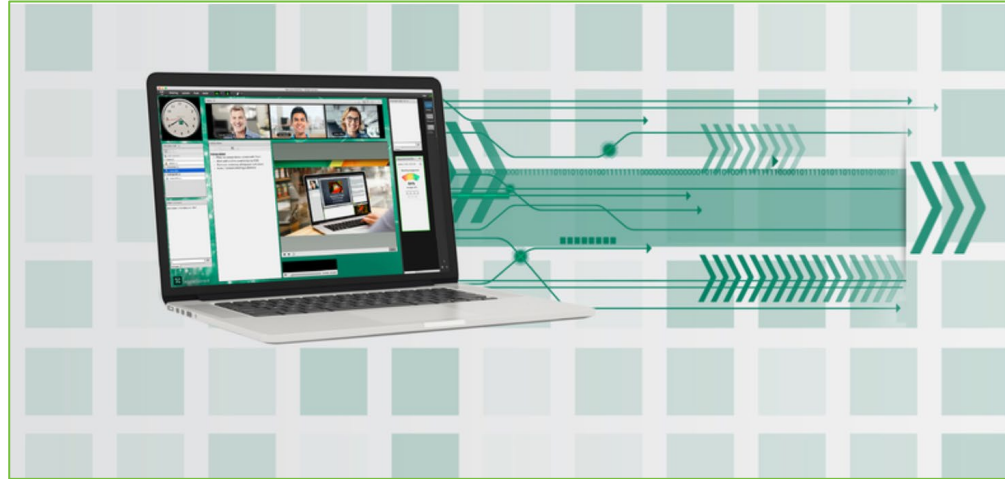


Webinar Based Training



- Less disruptive for client business
- No travel costs and reduced scheduling issues
- Rich analytics and engagement activities

GoTo Webinars & Virtual Classrooms



Secure - Serving the most regulated industries running mission critical operations online with our Multilayered Security approach.

Engaging - Drive and measure audience engagement unlike any other tool. Add interactivity to your sessions with multiple chat pods, polls, quizzes, simulations, breakout rooms, games and more.

Powerful - Leverage Backstage & Prepare Mode to allow presenters and hosts to collaborate behind the scene during live session. Leverage limitless functionality and extensibility with custom apps.

Persistent - Create a virtual room customized to client specific needs.

Registration Management

- Templates for web pages and emails
- Create custom registration forms
- Email options such as invitations, reminders, and follow-ups.

TimeZone (America/New York) ▾

Event Info | Speaker Info | **Event Registration**

verizon

Electrical Workplace Safety

Verizon: Electrical Workplace Safety for Qualified Persons – 10/1 Thursday, October 1, 2020 09:00 AM - 03:00 PM

Fields marked with (*) are mandatory.

Register using Email

Email Address *

First Name *

Last Name *

* Please check your inbox once you register to join with your individual link via Adobe Connect

We are pleased to confirm your registration for Verizon: Electrical Workplace Safety for Qualified Persons – 7/23/20.

verizon

Electrical Workplace Safety

Please join the meeting using your registered e-mail address.

When: Thursday 23 July 2020, 09:00 AM - 03:00 PM
Time Zone: (GMT-08:00) Central Time (US and Canada) (Please note that Daylight Saving Time (+01:00 hr) is in effect during this time)
Joining URL: <https://meet633666375.adobeconnect.com/epgz6bwg450v/event/login.html?login=thomas.w.jaslowek%40verizonwireless.com>

Prerequisite: Please take the prerequisite online course (about 40 minutes) prior to attending the instructor-led training. You can enroll [at this link](#).

You will have to download the Adobe Connect App and then dial-in.

Audio Bridge Information:

1. Dial-In Telephone: +1800-832-0736
2. Meeting Room Number: 2983431
3. Once you join the phone bridge, please click on the "I" icon at the top right of the Adobe Connect session. Please enter the token key in phone (starts with a "05") to identify yourself in the meeting. Adobe Connect will then automatically merge the users name and number.

*Please note, you will need your phone for the duration of the courses. If you are using a mobile phone, make sure it is fully charged.

During the live training, be sure to check-in using the GEMS code provided during class.

To know more about the event, the speakers for the event and to stay updated, please visit: https://meet633666375.adobeconnect.com/epgz6bwg450v/event/event_info.html

You can add this event to your calendar.

**Thank you,
SEAM Group**

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TimeZone (America/New York) ▾

Event Info | Speaker Info | **Event Registration**

verizon

Electrical Workplace Safety

Verizon: Electrical Workplace Safety for Qualified Persons – 10/1/20
You are logged in as jesparza@seamgroup.com. If you want to join this event as a different user, please [logout](#).

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Event Info | Speaker Info | **Event Registration**

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Electrical Workplace Safety

John Marks

John Marks has been a full-time instructor in the electrical industry for the past 15 years. He began his electrical career in 1981. He began a commercial contracting business for the next two decades on projects ranging from mall store outfits to complete retail store outfits from the ground up.

John has taught for recognizable firms such as:

- Northrup Grumman
- Lockheed Martin
- NASA
- Amazon
- Universal Studios
- IEC (Independent Electrical Contractors)

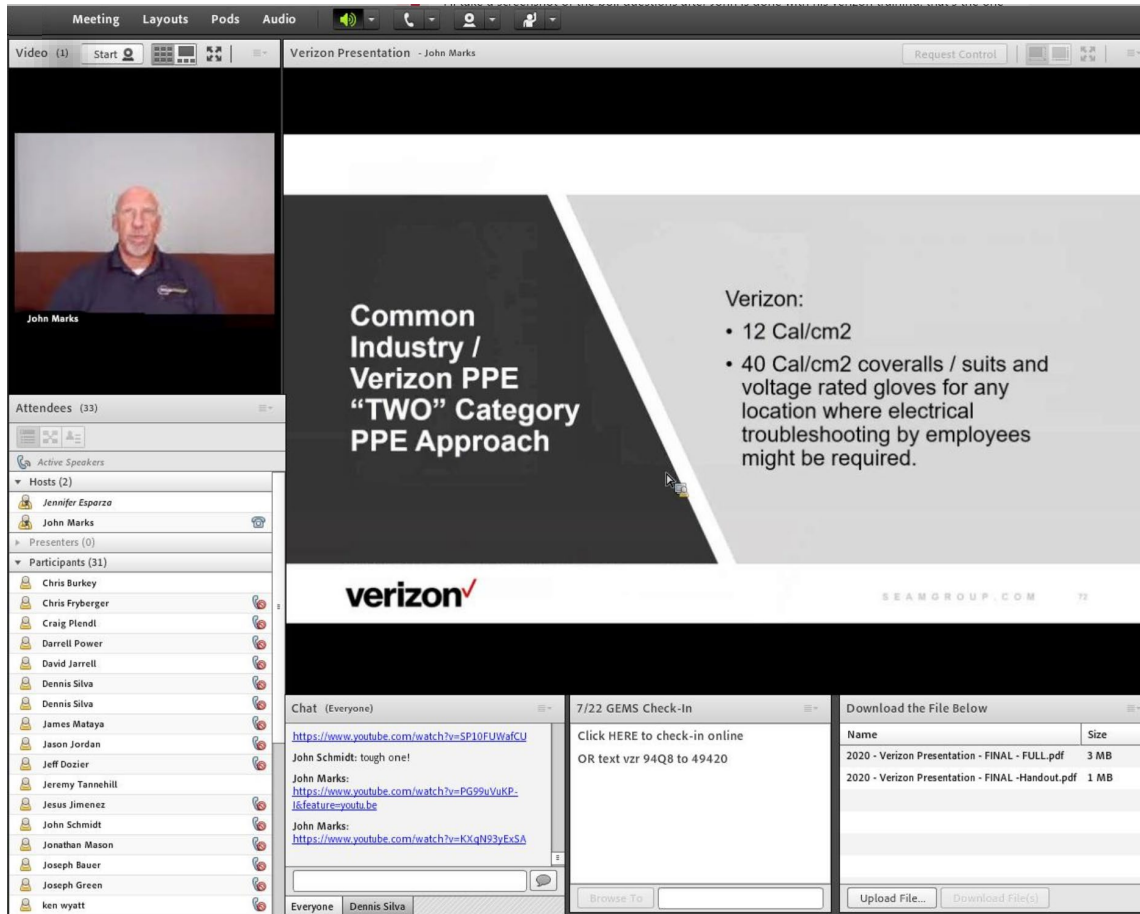
John has also developed a 500-hour electrical pre-apprenticeship curriculum that was taught from 2006 to 2012 for Anne Arundel Community College.

John has received the Certificate of Educational Achievement from NFPA for the 2009, 2012, and 2015 cycles of the NFPA 70E and for the 2008, 2011 and 2014 National Electric Code NFPA 70.

If you've never used Adobe Connect, get a quick overview: <http://www.adobe.com/products/adobeconnect.html>

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User Interface



Meeting Layouts Pods Audio

Video (1) Start [Icons] Verizon Presentation - John Marks Request Control [Icons]

John Marks

Common Industry / Verizon PPE "TWO" Category PPE Approach

Verizon:

- 12 Cal/cm2
- 40 Cal/cm2 coveralls / suits and voltage rated gloves for any location where electrical troubleshooting by employees might be required.

verizon SEAMGROUP.COM

Attendees (33)

Active Speakers

Hosts (2)

- Jennifer Esparza
- John Marks

Presenters (0)

Participants (31)

- Chris Burkey
- Chris Fryberger
- Craig Plendt
- Darrell Power
- David Jarrell
- Dennis Silva
- Dennis Silva
- James Mataya
- Jason Jordan
- Jeff Dozier
- Jeremy Tannehill
- Jesus Jimenez
- John Schmidt
- Jonathan Mason
- Joseph Bauer
- Joseph Green
- ken wyatt

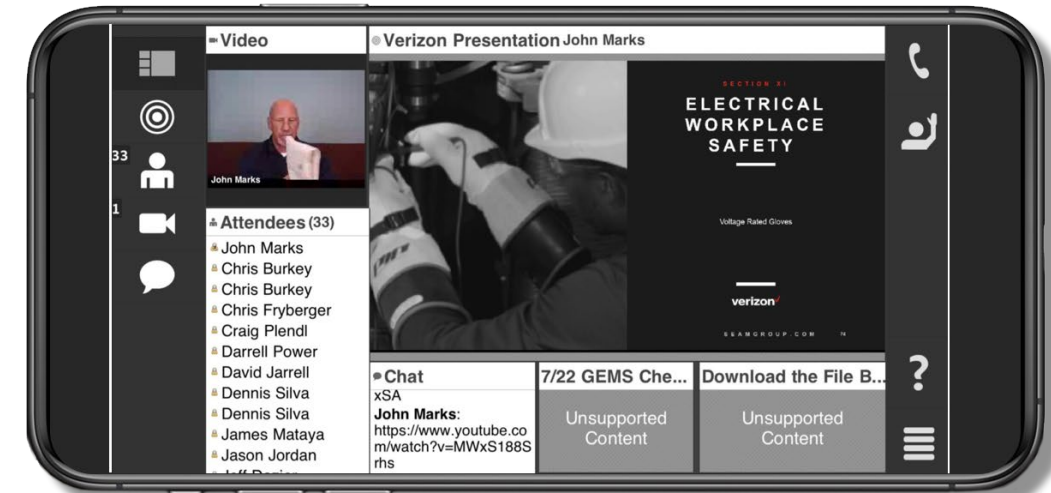
Chat (Everyone)

7/22 GEMS Check-In

Click HERE to check-in online
OR text vtr 94Q8 to 49420

Download the File Below

Name	Size
2020 - Verizon Presentation - FINAL - FULL.pdf	3 MB
2020 - Verizon Presentation - FINAL -Handout.pdf	1 MB



Video

Verizon Presentation John Marks

John Marks

Attendees (33)

- John Marks
- Chris Burkey
- Chris Burkey
- Chris Fryberger
- Craig Plendt
- Darrell Power
- David Jarrell
- Dennis Silva
- Dennis Silva
- James Mataya
- Jason Jordan
- Jeff Dozier

Chat

xSA

John Marks:
<https://www.youtube.com/watch?v=MWxS188Srh5>

7/22 GEMS Che...
Unsupported Content

Download the File B...
Unsupported Content

Learner Engagement

APPLICATION	PPE DETAILS	PHOTO
Typically required at Verizon Locations for Testing (Live Exposed) or IR Scan purposes WHEN THE EQUIPMENT HAS AN ARC FLASH RATING (Label) OF 1.2 Cal/cm2 TO 12 Cal/cm2	12 CAL PPE KIT (Granger #420MS) (Salesbury SKC11L-1200-SPL) Arc Flash Coverall, AC1200 Hat, Hard Hat, Safety Glasses, Balacava, Storage Bag (Blue / Large) Arc Rated Gloves Salesbury #SALAFG12	
Typically required at Verizon Facilities for Testing (Live Exposed) or IR Scan purposes WHEN THE EQUIPMENT HAS AN ARC FLASH RATING (Label) OF 12 Cal/cm2 TO 40 Cal/cm2	40 CAL PPE Granger #420MS (Salesbury SKC40L-SPL) Arc Flash Coat, Bib Overalls, Hood, Hard Hat, Storage Bag, Safety Glasses Bag (Grey / Large) Arc Rated Gloves Salesbury #SALAFG40 (Granger #SALAFG40)	

IMPORTANT: GLOVES - If the employee will be working in the Restricted Approach Boundary (e.g. voltage readings), then voltage rated Glove Liners and gloves are also required.

These are available from a number of entities that offer Voltage Rated Gloves

Note that regular testing of these gloves is required.

Class 00 (500 VHRAC and 750 VHRDC) Gloves are suitable for use.

verizon

Engagement Dashboard

Session Time: 04:17:06

Meeting Engagement

59%

Average: 58%

0 0 3 3

Attendee Count

Which of the following work perform... 26/32

What is the purpose of an Energized ... 28/33

Meeting

Share

- Raise Hand
- Agree
- Disagree
- Step Away
- Speak Louder
- Speak Softer
- Speed Up
- Slow Down
- Laughter
- Applause
- Clear Status

- Share
- Notes
- Attendees
- Video
- Chat
- Files
- Web Links
- Poll
- Q & A

countdown.swf

Meeting Timer

Training will start in

1 moment

Stop Set Time

NFPA 70E is a:

View Votes Edit Reopen

This Poll is closed for voting. To allow participants to...

NFPA 70E is a:

- A: Code 7.41% (2)
- B: Standard 66.6... (18)
- C: Recommended practice 25.9... (7)
- No Vote

Broadcast Results

Adobe Game Show (1)

GAME SHOW

Category 1	Category 2	Category 3
100	100	100
300	300	300
500	500	500

Engagement Dashboard

Session Time: 00:03:30

Meeting Engagement

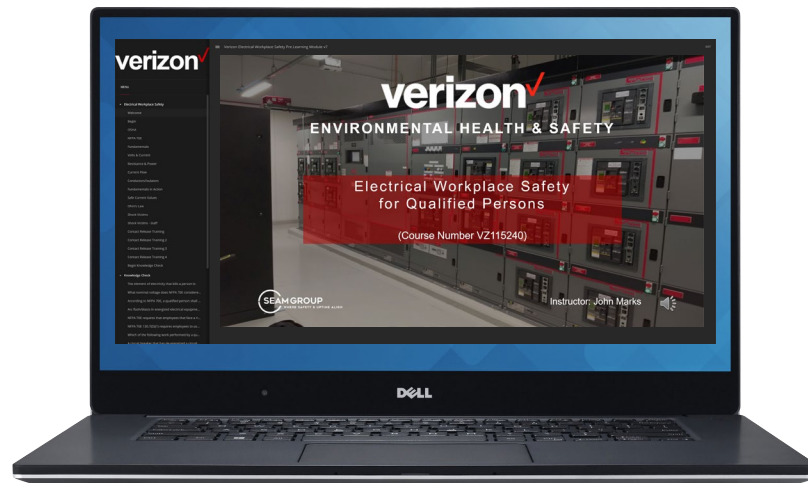
100%

Average: 95%

0 0 0 1

Attendee List (1)

E-Learning



- Self paced asynchronous learning
- Media rich and interactive
- Reporting and certification
- Learning paths through the catalog of courses

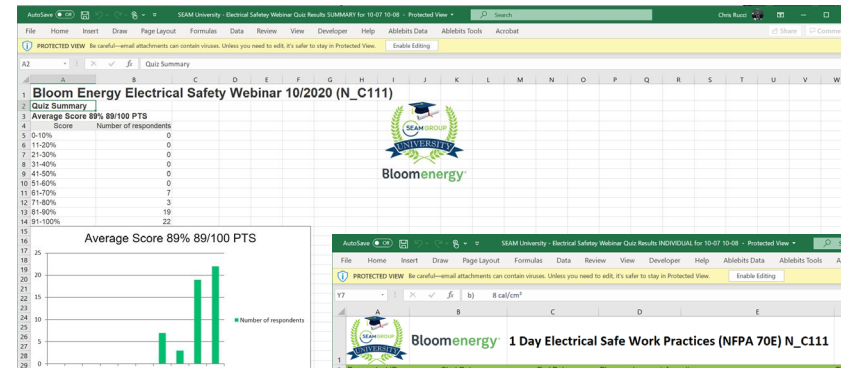
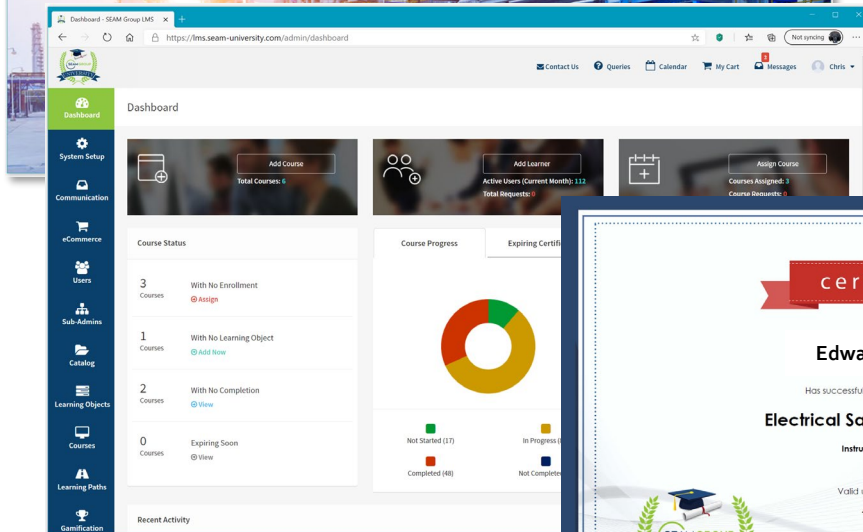
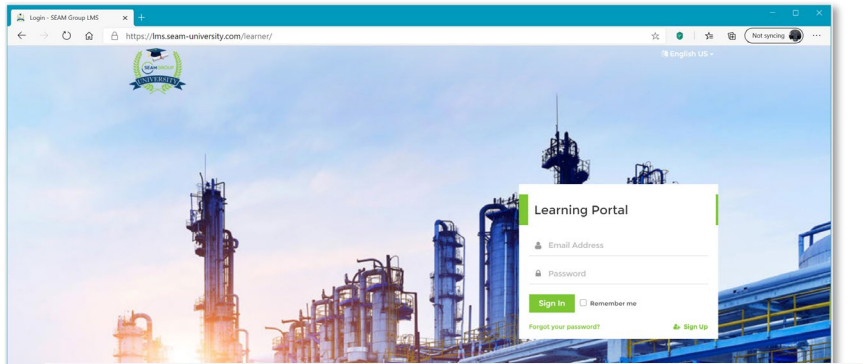
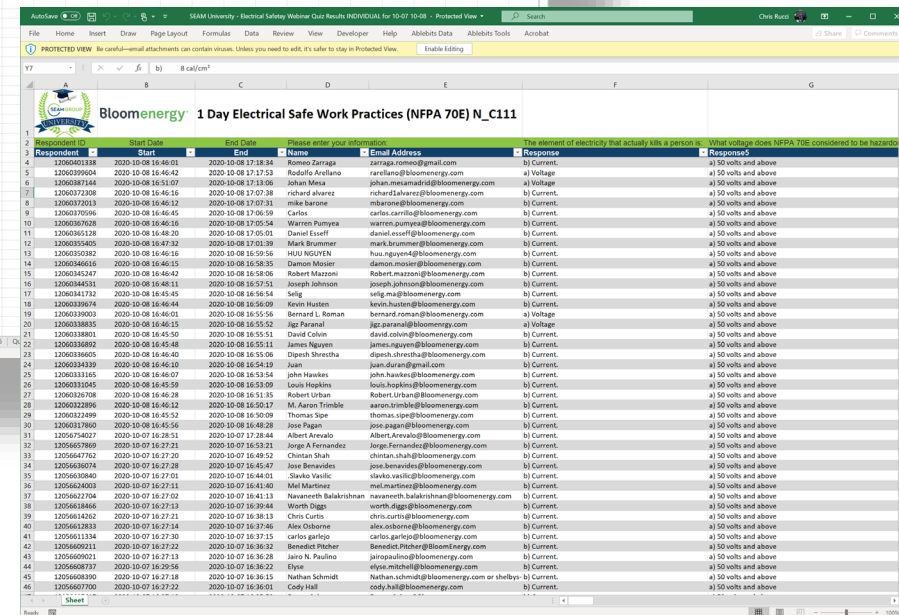
Training Catalog

- All training materials in one place
- Single sign on access
- Reporting across all courses
- Consistent user experience
- LMS access creates familiar interface and learning process



SEAM Group University Learning Management System (LMS)

- Cloud based deployment server
- User-based permissions and access
- Courses, multimedia, documents, certification
- Reporting and tracking

Respondent ID	Start Date	End Date	Name	Email Address	Response
1	2020-10-08 16:46:01	2020-10-08 17:18:34	Romero Garriga	rarriga.romed@gmail.com	b) Current
2	12000399024	2020-10-08 16:46:42	Rodolfo Arellano	rarellano@bloomenergy.com	a) Voltage
3	12000387144	2020-10-08 16:53:07	Johari Mena	johari.menamad@bloomenergy.com	a) 50 volts and above
4	1200037208	2020-10-08 16:46:16	richard alvarez	richardalvarez@bloomenergy.com	a) 50 volts and above
5	12000372013	2020-10-08 16:46:12	mike barone	mbarone@bloomenergy.com	b) Current
6	12000370506	2020-10-08 16:46:45	Carlos	carlos.carroll@bloomenergy.com	b) Current
7	12000367628	2020-10-08 16:46:16	Warren Pumyea	warren.pumyea@bloomenergy.com	a) 50 volts and above
8	12000361128	2020-10-08 16:48:20	Daniel Esaff	daniel.esaff@bloomenergy.com	b) Current
9	12000356405	2020-10-08 16:47:32	Mark Brummer	mark.brummer@bloomenergy.com	b) Current
10	12000352882	2020-10-08 16:46:16	HUU NGUYEN	huu.nguyen@bloomenergy.com	b) Current
11	12000346616	2020-10-08 16:58:55	Darwin Hooser	darwin.hooser@bloomenergy.com	b) Current
12	12000345247	2020-10-08 16:46:42	Robert Mazzoni	robert.mazzoni@bloomenergy.com	b) Current
13	12000344531	2020-10-08 16:48:11	Joseph Johnson	joseph.johnson@bloomenergy.com	a) 50 volts and above
14	12000341732	2020-10-08 16:45:45	Selig	selig.m@bloomenergy.com	b) Current
15	12000339874	2020-10-08 16:46:44	Kevin Huisten	kevin.huisten@bloomenergy.com	a) 50 volts and above
16	12000339003	2020-10-08 16:46:01	Bernard L. Roman	bernard.roman@bloomenergy.com	a) Voltage
17	12000338815	2020-10-08 16:46:15	Igor Peratal	igor.peratal@bloomenergy.com	a) Voltage
18	12000338801	2020-10-08 16:45:50	David Colvin	david.colvin@bloomenergy.com	a) 50 volts and above
19	12000338892	2020-10-08 16:45:48	James Nguyen	james.nguyen@bloomenergy.com	b) Current
20	12000338605	2020-10-08 16:46:40	Dhresh Bhaseth	dhresh.bhaseth@bloomenergy.com	a) 50 volts and above
21	12000343439	2020-10-08 16:46:10	Juan	juan.duran@gmail.com	a) 50 volts and above
22	12000331165	2020-10-08 16:46:07	John Hawkes	john.hawkes@bloomenergy.com	a) 50 volts and above
23	1200031045	2020-10-08 16:45:59	Louis Hopkins	louis.hopkins@bloomenergy.com	b) Current
24	12000326708	2020-10-08 16:46:28	Robert Urban	robert.urban@bloomenergy.com	a) Current
25	12000322896	2020-10-08 16:46:12	Rx Aaron Trimbles	aaron.trimbles@bloomenergy.com	a) 50 volts and above
26	12000324899	2020-10-08 16:45:52	Thomas Sipe	thomas.sipe@bloomenergy.com	a) 50 volts and above
27	12000317860	2020-10-08 16:45:56	Jose Pagan	jose.pagan@bloomenergy.com	b) Current
28	1205674027	2020-10-07 16:28:44	Albert Arevalo	albert.arevalo@bloomenergy.com	a) 50 volts and above
29	1205667869	2020-10-07 16:27:21	Jorge A Fernandez	jorge.fernandez@bloomenergy.com	a) 50 volts and above
30	1205647762	2020-10-07 16:27:20	Christian Stark	christian.stark@bloomenergy.com	b) Current
31	12056460274	2020-10-07 16:27:28	Jose Benavides	jose.benavides@bloomenergy.com	b) Current
32	12056030840	2020-10-07 16:27:01	Slavko Vasilic	slavko.vasilic@bloomenergy.com	b) Current
33	12056030003	2020-10-07 16:27:00	Mad Mathews	mad.mathews@bloomenergy.com	b) Current
34	12056022704	2020-10-07 16:27:02	Navaneth Balakrishnan	nvaneth.balakrishnan@bloomenergy.com	a) 50 volts and above
35	12056048466	2020-10-07 16:27:13	Worth Digg	worth.digg@bloomenergy.com	a) 50 volts and above
36	1205604262	2020-10-07 16:27:21	Chris Curtis	chris.curtis@bloomenergy.com	b) Current
37	1205602833	2020-10-07 16:27:14	Alex Osborne	alex.osborne@bloomenergy.com	a) 50 volts and above
38	1205601134	2020-10-07 16:27:30	Carlos Lopez	carlos.lopez@bloomenergy.com	b) Current
39	1205609211	2020-10-07 16:27:22	Benedict Fisher	benedict.fisher@bloomenergy.com	a) 50 volts and above
40	1205609021	2020-10-07 16:26:28	Jairo N. Paulino	jairon.paulino@bloomenergy.com	b) Current
41	1205608737	2020-10-07 16:26:56	Eyes	eyes.mitch@bloomenergy.com	a) 50 volts and above
42	1205608390	2020-10-07 16:27:18	Nathan Schmidt	Nathan.schmidt@bloomenergy.com or shetyb-	a) 50 volts and above
43	1205607700	2020-10-07 16:27:22	Cody Hall	cody.hall@bloomenergy.com	b) Current



The Business Case for E-Learning & Webinars



E-learning provides more accessible and flexible training

- There's no need to schedule specific training dates or times.
- Since it can be done when and where needed, *e-learning typically requires 40–60% less training time* than traditional classroom learning. This minimizes downtime and boosts productivity.

E-learning gets results

- Quality elearning provides learner-directed, learner-controlled training in which the learner initiates training when best suited for them.
- They can progress at their own pace and revisit content as needed.
- This is a primary reason why the Research Institute of America found that *e-learning increases retention rates 25–60%*, while retention rates for face-to-face training are just 8–10%.

Webinar-based training offers a larger footprint with minimal disruption

- Live on-site training requires travel logistics for the instructor and potentially for learners.
- On-site training can often cause a disruption in the client's facility as the learners are required to gather for the class (and not be on the production floor)
- Webinar based training can engage a few learners from many facilities around the world at the same time thereby getting a larger footprint while minimizing site specific disruption.

Metrics and KPIs

- Both webinar training and e-learning provide rich metrics on performance, engagement, and training outcomes.
- By assessing pre and post training, we can see the needle move!

Business Uses for E-Learning



Safety



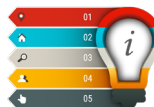
Compliance



Standardization



Metrics / Analytics

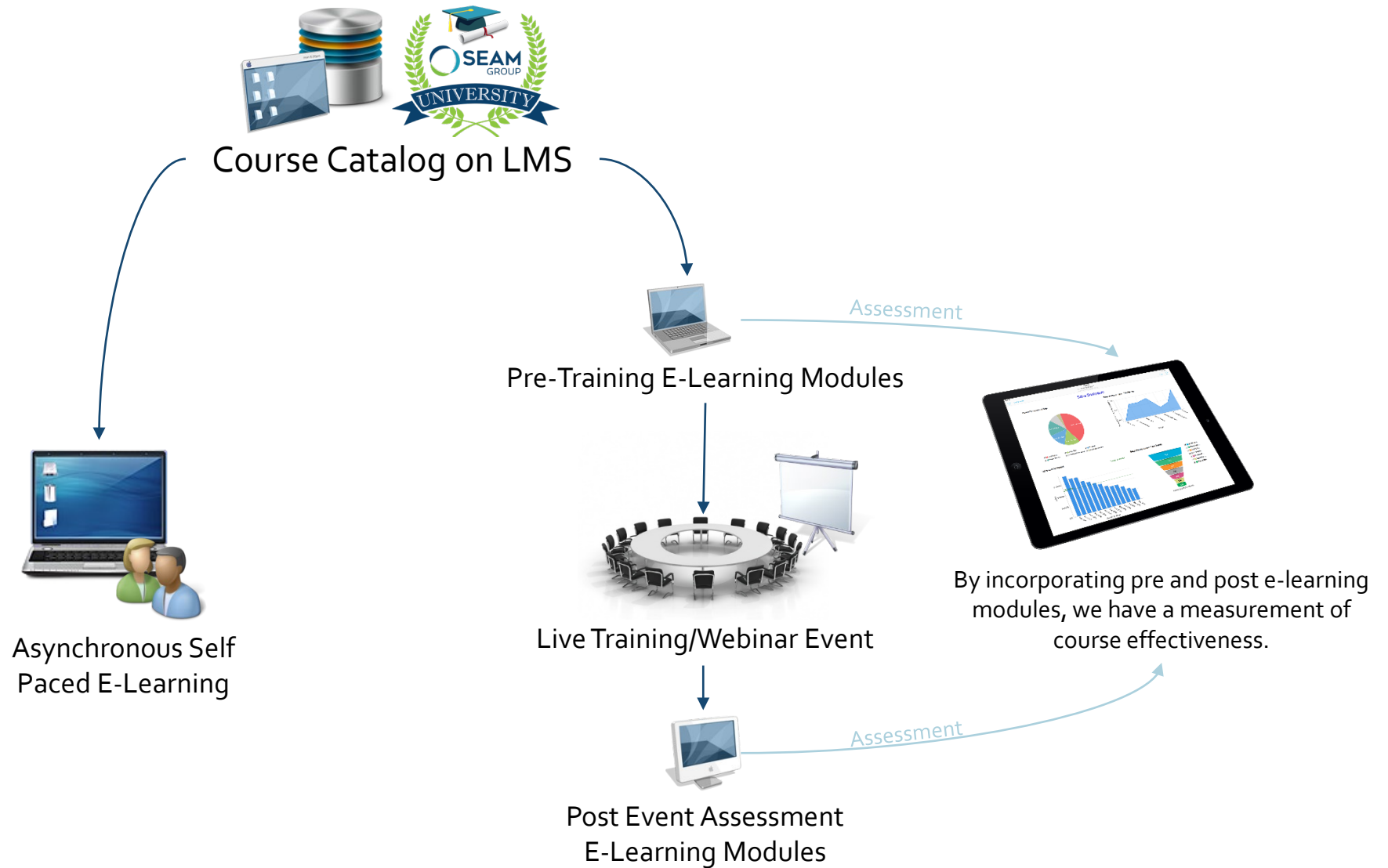


Process Training

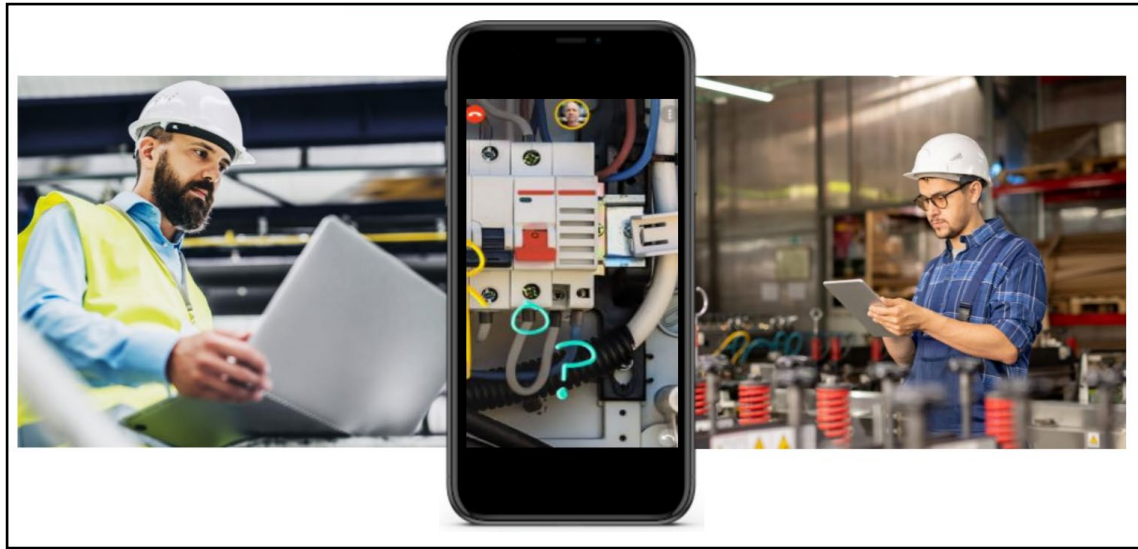


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