



2022 – Denver, Colorado, USA

69th Conference

Petroleum and Chemical Industry
Committee Technical Conference
and Standards Committee Meetings

September 26 – 29, 2022

Conference Program

Industry Standards Working Group Meetings – September 22nd to 25th, 2022

Petroleum and Chemical Industry Committee Conference – September 26th to 29th,

PCIC Conference Tutorials – September 29th, 2022



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THE IEEE IAS PETROLEUM AND CHEMICAL INDUSTRY COMMITTEE CONFERENCE, DENVER, COLORADO

The Institute of Electrical and Electronics Engineers (IEEE), Industry Application Society (IAS), Petroleum and Chemical Industry Committee Conference (PCIC) invites you to attend its Annual Conference in Denver, Colorado. The IEEE-IAS-PCIC 2023 Conference takes place from **September 26 to 29, 2022**. In conjunction with the IEEE-IAS-PCIC Conference there are several related Industry and IEEE Standards meetings being held from September 22 to 24, 2022.

Under the sponsorship of the Industry Applications Society, the Petroleum and Chemical Industry Committee Conference is the premier annual application meeting for practicing electrical engineers in the petroleum and chemical industry. Respected for the high quality and practical application of its technical papers, IEEE-IAS-PCIC attracts a worldwide audience. The 2022 technical program features a slate of **60 papers** that focus on the technology and issues faced by electrical engineering in the petrochemical industry. The IEEE-IAS-PCIC also sponsors several IEEE and related industry standards development activities during the conference.

The first IEEE PCIC Conference was held in Tulsa, Oklahoma in 1954, with Denver hosting the 69th Conference. While the 2020 PCIC Atlanta Conference was unable to host a technical program due to the COVID pandemic, Atlanta did have a virtual awards program in 2020.



Welcome to Denver IEEE/IAS/PCIC 2022

The PCIC 2022 Local Conference Committee wants to welcome all those who journeyed to beautiful Denver, Colorado to participate in this year's conference. The fall is a wonderful time to be in the Rocky Mountains and to spend time in Denver with many opportunities to experience some of its old west heritage along with exploring many of its modern sites and experiences.

The Sheraton Denver Downtown Hotel, our conference hotel, has just completed an \$80M upgrade which is sure to delight even the most travelled conference attendees. Located at the end of the popular 16th Street Pedestrian Mall, the hotel offers access to some of the best attractions Denver has to offer, including baseball at Coors Field, the Denver Art Museum, dining, nightlife, entertainment, and Denver's Capitol Building topped with a 24kt gold dome. Visit <https://www.denver.org/things-to-do/> for more ideas on how to spend your time in Denver.



Denver is the Mile High City, and I wouldn't be a good host if I didn't mention that Altitude Sickness is a real thing. We hope you enjoy your time here but ask that you stay hydrated by drinking plenty of water, easing into any physical activity, monitoring your alcohol intake,

and using sunscreen when out and about. The sun in Denver can keep temperature quite comfortable during the day but as it sets it can become chilly rather quickly, so we recommend dressing in layers or bringing a jacket if plans have you outside after dark.



The local committee has arranged for a number of great guest activities to provide an opportunity to explore some of Denver's history as well as take in some of the natural beauty of the surrounding areas. Daily excursions have been arranged each day to begin the morning and have guests back in the afternoon. If an excursion isn't your cup of tea, a short walk to the historic Brown Palace Hotel for High Tea will make your day.

We are excited to again be hosting an in-person conference providing a platform for learning and networking with the many electrical professionals and technical experts that have been supporting PCIC Conferences for over 60 years. We look forward to seeing many of our friends and colleagues that were unable to attend the last several years and hope to continue this tradition. We are committed to ensuring a safe event where everyone can feel secure in creating new friendships and continuing ongoing collaborations that drive a culture of learning and the transfer of knowledge.

I am excited to welcome you to Denver and hope you have a wonderful experience!

Andrew

Andrew Ackerman, Local Committee Chair
IEEE/IAS-PCIC 2022 Annual Conference

aackerman@ieee.org



69th IEEE IAS Petroleum and Chemical Industry Committee Conference**Petroleum and Chemical Industry Committee Officers**

Chair	Jim Bowen	MMT Services
Vice Chair	Kevin Peterson	P2S Inc.
Secretary	Paul Sullivan	DuPont

IEEE-IAS-PCIC Subcommittees

Advisory & Awards Chair	Dennis Bogh	Bogh Consulting, PLLC
Awards Nominating Chair	Dave Stewart	WS Nelson
Codes and Regs Chair	Rich Holub	DuPont
Emeritus Chair	Leo Berg	L Berg Technical Services
Facilities Planning Chair	Dave Depasquale	Siemens
Financial Chair	Pam Gold	GIAC Group
Historical Chair	Rick Bried	Shell Pipeline Co. LP – Retired
Information Technology Chair	Carson Bates	NEI Electric Power Engineering
Marketing Chair	Jackie Sanders	Fin Electric
Membership Chair	Bill Stewart	Chevron (Retired)
Papers Review Chair	Brant Cassimere	ExxonMobil
Publications Chair	Mike Caruso	ABB Baldor
Standards Chair	Robert Durham	THEWAY Labs
Chemical Technical Subcommittee Chair	Keith Lyles	Praxair
Electrochemical & Emerging Technologies Technical Subcommittee Chair	Andrew Ackerman	NEI Electric Power Engineering
International Technical Subcommittee Chair	Allen Gibson	CAPE Industries
Marine Industry Technical Subcommittee Chair	Chris Heron	TECO Westinghouse
Production Technical Subcommittee Chair	Shelly DeGrate	Powell Industries
Refining Technical Subcommittee Chair	Clinton Roache	Iris Power – Qualitrol LLC
Safety Technical Subcommittee Chair	Clifton Oertli	NEI Electric Power Engineering
Transportation Technical Subcommittee Chair	Brandon Cassimere	Nacerol
Tutorials Chair	Daleep Mohla	DCM Consulting Services, Inc
Young Engineers Development Chair	Danny Zepeda	Valero

Denver 2022 IEEE-IAS-PCIC Local Conference Committee

Local Committee - Chair	Andrew Ackerman	NEI Electric Power Engineering
Local Committee - Vice Chair	Clifton Oertli	NEI Electric Power Engineering
Finance - Chair	Stacey Thompson	NEI Electric Power Engineering
Finance - Vice Chair	Pam Gold	GIAC Group
Facilities - Chair	John Nelson	NEI Electric Power Engineering
Facilities - Vice Chair	Carson Bates	NEI Electric Power Engineering
Registration - Chair	Tyrone Varga	ABB
Registration - Vice Chair	Vanessa Weygandt	Power Equipment Specialists
Audio/Visual and Technical Program - Chair	Andrew Depperschmidt	Halker Consulting
Audio/Visual and Technical Program - Vice Chair	Joseph Thao	Halker Consulting
Mobile App - Chair	Grant Agee	Power Equipment Specialists
Marketing Communications and Website - Chair	Hank Esser	Power Equipment Specialists
Marketing Communications and Website - Vice Chair	Adam Hall	Roxtec
Catering and Conf Social - Chair	Tim Monteith	WEG Electric Corporation
Catering and Conf Social - Vice Chair	Mary Pat Monteith	
Vendor Hospitality and Contributions - Chair	Nehad El Sharif	MNKYBR Technologies Inc.
Vendor Hospitality and Contributions - Vice Chair	Matt Beck	Power Equipment Specialists
Publications, Publicity and Printing - Chair	Mike Caruso	ABB
Conference Mailer and Program - Chair	Marty Cole	Hubbell
Signage - Chair	Marlin Copeman	Okonite
Guest Activities - Chair	Linda Foley	Technical Consultants Group
Guest Activities - Vice Chair	Mike Foley	Technical Consultants Group
Emeritus Liaison - Chair	Daleep Mohla	DCM Electrical Consulting
Logistics - Chair	Laith Hodi	ABB and Baldor Reliance
YEDS Local Chair	Jeff Gaspar	Siemens
YEDS Local Vice Chair	Sidra Malik	

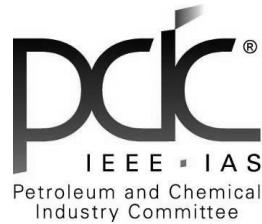
IEEE IAS Petroleum and Chemical Industry Committee Conference Mission

To provide an international forum for the exchange of electrical applications technology relating to the petroleum and chemical industry, to sponsor appropriate IEEE standards activity for that industry, and to provide opportunity for professional development.

IEEE-IAS-PCIC Strategies

1. The IEEE IAS Petroleum and Chemical Industry Committee Conference Annual Technical Conference will be held in North America locations of petrochemical industry strength, and its location will be rotated annually in an effort to attract national and international participation.
2. The IEEE-IAS-PCIC will proactively promote participation by a broad base of IEEE-IAS-PCIC representatives, with an emphasis on both early-career younger and retired engineers.
3. IEEE-IAS-PCIC Conference attendees will be encouraged to participate in technical activities including authorship of papers and tutorials and participation in standards development.
4. The IEEE-IAS-PCIC develops technical standards relevant to the petroleum and chemical industry that drive technology development and standardization and coordinates these activities with the IEEE Standards Association and other standards making bodies.
5. The IEEE-IAS-PCIC will offer tutorials directed toward enhancing the technical, communication, and interpersonal skills of petroleum and chemical industry engineers.
6. The quality of the IEEE-IAS-PCIC paper offerings is essential for the IEEE-IAS-PCIC mission to succeed and will be given highest priority. Preference in paper selection will be given to practical, application-oriented papers.
7. The IEEE-IAS-PCIC will actively seek opportunities for rewarding participating members for contributions to the IEEE-IAS-PCIC and the profession.
8. Technical Subcommittee areas of specialty will be continuously evaluated and updated to reflect the evolving needs of the industry.
9. User, manufacturer, consultant, and contractor participation will be encouraged in the activities of the IEEE-IAS-PCIC to strengthen the conference technical base.
10. The IEEE-IAS-PCIC will develop international collaborative partnerships as deemed appropriate to further promote the IEEE-IAS-PCIC Mission.





Scope of the IEEE IAS Petroleum and Chemical Industry Committee Conference Technical Subcommittees

The IEEE IAS Petroleum and Chemical Industry Committee Conference technical subcommittees solicit technical papers to enable the exchange of electrical applications technology related to the petroleum and chemical industry.

Chemical Subcommittee

Technical papers related to the application, installation and/or operational experiences as they relate to electrical technology for the general chemical industry.

Electrochemical and Emerging Technology Subcommittee

Technical papers related to the electrolytic production of metals and chemicals and other emerging technologies.

General Program Subcommittee

Technical papers of broad interest to the petroleum and chemical industry.

International Subcommittee

Technical papers related to petroleum and chemical industry applications outside of North America.

Marine Industry Subcommittee

Technical papers related to ships, barges and other floating structures used in the petrochemical industry.

Transportation (Midstream) Subcommittee

Technical papers related to onshore and offshore, fixed and floating drilling, well head, and production facilities.

Refining Subcommittee

Technical papers related to petroleum refineries and petrochemical facilities.

Safety Subcommittee

Technical papers related to all aspects of electrical safety affecting the petrochemical industry.

Transportation Subcommittee

Technical papers related to pipelines, pumping stations and terminals as well as other means of transporting oil and gas.

General Information

Registration – Check-in

Registration will be in the Exhibit area located in the Plaza Building, Concourse Level of the Sheraton Denver Downtown Hotel. Hours:

- Saturday, September 24 (online registration package pick-up only) _____ 11:00 a.m. – 5:00 p.m.
- Sunday, September 25 _____ 10:00 a.m. – 5:00 p.m.
- Monday, September 26 _____ 7:00 a.m. – 4:00 p.m.
- Tuesday, September 27 _____ 7:00 a.m. – 12:00 p.m.
- Wednesday, September 28 _____ 7:00 a.m. – 12:00 p.m.
- Thursday, September 29 (for tutorial attendees not registered at conference) _____ 7:00 a.m. – 8:00 a.m., 12:00 p.m. – 1:00 p.m.

Attendee Breakfasts

Registered attendees and guests can enjoy a complimentary breakfast each morning of the conference in the Plaza Ballroom on the Concourse Level of the Sheraton Denver Downtown Hotel from 7:00 am to 8:00 am. The IEEE-IAS-PCIC appreciates the companies that support these breakfasts.

Guest Breakfasts

Registered guests attending the conference are welcome and encouraged to join their partners at the main conference breakfast or a light breakfast in the Guest breakfast area located in the Directors I room of the Sheraton Denver Downtown Hotel .

IEEE-IAS-PCIC Orientation Breakfast (Note: Pre-registration is required)

First time attendees and others interested in learning more about the IEEE-IAS-PCIC are encouraged to attend the “*IEEE-IAS-PCIC Orientation Breakfast*” on Monday, September 26 from 7:00 a.m. to 8:00 a.m. in Columbine room on the Tower Terrace Level of the hotel. A presentation and a discussion take place on the history of IEEE-IAS-PCIC, how it functions, on ways that you can become more involved, and many other suggestions on how to enhance your conference experience. You must check the “YEDS IEEE-IAS-PCIC Orientation Breakfast” box during registration if you plan to attend.

Conference Record

The registration fee includes a one-time free download of the Conference Record during the conference. Papers can be downloaded directly using the PCIC App during the conference.

Information for Authors and Presenters

Registration

At least one contributing author must be registered for the conference and present on the day their paper is scheduled to be presented. Any additional persons involved in the presentation of their paper must be similarly registered for the conference.

Authors’ Screening Room

Screening rooms with projection systems are provided for authors to confirm their equipment is compatible with Audio Visual systems used by the conference. Please note presenters are required to use their own presentation device that is compatible with projection technology used by IEEE-IAS-PCIC (e.g. laptop, tablet, etc.). For information on A/V systems being used at the conference, contact Facilities and A/V Chair Andrew Depperschmidt (andrew@halker.com) or Facilities and A/V Vice-Chair Joseph Thao (josephthao@halker.com).

The authors’ screening rooms are in the Biltmore and Capitol Tower Rooms of the Sheraton Denver Downtown Hotel.

Sunday, Monday, and Tuesday: _____ 7:00 a.m. – 9:00 p.m.

Wednesday: _____ 7:00 a.m. – 4:00 p.m.

Thursday: _____ 7:00 a.m. – 12:00 p.m.

Authors’ Breakfast

A complimentary breakfast will be served at 7:00 a.m. for the authors of the papers being presented on that day in Tower Court D.

NOTE: All authors and presenters must attend this breakfast **on the day their paper is being presented (only)** to meet their session chair to review session logistics, audio video compatibility of their equipment and to receive their PCIC certificate and authors’ memento.

About the IEEE IAS Petroleum and Chemical Industry Committee Conference

The annual IEEE-IAS-PCIC conference is an exchange of technical ideas – not a trade show – that brings together professionals with a common focus on electrical installations and safety. The IEEE-IAS-PCIC Executive and Local Conference Committees take great pride in providing a high-quality conference while keeping registration and participation costs reasonable. IEEE-IAS-PCIC is the best educational value for anyone working in the petrochemical electrical field. Here's why:

- Conference papers and tutorials are authored by many of the most respected minds in the industry. Great care is taken to ensure that presentations are free of commercial content.
- Many IEEE-IAS-PCIC members participate in writing industry standards. Working groups meet prior to the start of the conference to work on standards for the IEEE, API and other organizations. These meetings are open to all conference registrants.
- Vendors are an integral part of IEEE-IAS-PCIC. They support the technical and professional goals of the conference, author papers, sponsor conference functions and host evening hospitality events. Vendor participation is encouraged and welcomed. All vendors must follow the IEEE-IAS-PCIC etiquette rules.

Conference Activities Dress Code:

- For Conference papers, tutorials and working group/standards meetings, **business casual attire** is acceptable and appropriate.
- Technical session leaders and paper presenters must wear **professional business attire**. (For gentlemen, this means a suit or sports jacket with tie; for ladies this means a dress, business suit, etc.)
- For the Monday Night Social, **semi-formal attire is required**.

Conference attendees work hard during the day but after the technical sessions conclude there's time to unwind, reconnect with old friends and network through after-hours socializing. Events listed in the IEEE-IAS-PCIC Hospitality and Social Calendar are open to all attendees that are registered for the full conference along with their guests at no additional charge. Major conference events include:

- **Thermon's Conference Welcome Reception** is being held in Plaza Exhibit Hall on the Concourse Level, Sunday afternoon. This long running event welcomes attendees and guests in a comfortable and relaxed setting from 1:00 p.m. until 5:00 p.m.
- **Tailgate Parties** are long running event which attendees and their guests in a fun, sport themed party setting. This year there are two tailgate parties, with Appleton's starting at 11:00 a.m. followed by Toshiba's immediately afterwards to provide a full day of fun.
 - **Tailgate Party #1**, hosted by **Appleton** is in Plaza Ballroom Room A/B on the Concourse Level from 11:00 a.m. to 2:00 p.m.
 - **Tailgate Party #2** hosted by **Toshiba** is in Plaza Ballroom Room D/E on the Concourse Level from 2:00 p.m. to 5:30 p.m.
- **The Monday Night Social** is IEEE-IAS-PCIC's premier social event. This year's event is sponsored by the Local Committee and features some of Denver's local food and beverages. You don't want to miss this opportunity to meet friends and colleagues in an entertaining, elegant cocktail party setting. The Social is being held in Plaza Exhibit Area on the Concourse Level from 6:00 p.m. to 7:30 p.m. **Note: The dress code for the Conference Social is semi-formal.**
- **Vendor Hosted Events and Hospitality Suites.** Many vendors host major hospitality events and hospitality suites in the evenings where a good time can be had by all. The Events and Suites are open in the evening after the conference sessions. Consult the Social Calendar or the PCIC App for the days, times, and location of these.

Nametags and lanyards are provided in the registration packet for the attendee and their guest. These items identify you as a registered conference participant. Nametags are required when attending all IEEE-IAS-PCIC breakfasts, meetings, luncheons, social functions, or vendor hosted events and hospitality suites. Attendees and guests must be over the age of 21 to participate in social functions and vendor hosted events and hospitality suites where alcohol is being served.

Note: The IEEE-IAS-PCIC Conference Social for attendees and one guest is included for those registered for the full conference. Admittance to the Social is not included for "one-day" registrations: Additional Conference Social tickets may be pre-purchased separately at the registration desk. (Note: "Monday and Tuesday Only" registrants may pre-purchase Conference Social tickets during on-line registration).

Please remember: all attendees and guests must wear their conference nametag to be admitted to any PCIC activity.

Petroleum and Chemical Industry Committee Conference App

The official IEEE IAS-PCIC Conference App will be available for download to mobile devices in the Google App Store and through the Apple App Store. The App title is “**PCIC2022**”.

The app is your interactive guide to the IEEE-IAS-PCIC Conference, including:

- Paper Presentations
- IEEE-IAS-PCIC & Standards Meetings
- Tutorials
- Hospitality Events
- Attendee and Guest Meals
- Registration, Help, and Safety Information
- Guest Tours and guest social events
- Interactive maps for navigating conference events
- A Directory of Attendees, Guests, Authors, and others
- Web links to hotels, conference center, airport, and other sites
- Links for downloading the entire Conference Record or individual presentations
- Alerts for last minute changes and updates



The IEEE IAS Petroleum and Chemical Industry Committee Conference 2022 App (PCIC2022) can also be accessed from any Laptop, PC, tablet, or mobile device through any web browser at the website: www.eventmobi.com/pcic2022.

Each attendee **MUST** register for the conference with a unique email address. It is highly recommended any attendee guests are added to the registration using a unique email address so they access the PCIC App and view the Guest Events and any alerts or notices.

When accessing the App for the first time you will be instructed to enter the email address that you used to register for the conference. You will also be instructed to create and enter your own one-time unique password. You may choose any password that you like. If you should later forget your password, there will be a link for you to update it. It may take a few days to activate your App access once you have registered for the conference.



Guest Information

The local IEEE-IAS-PCIC committee takes pride in how they accommodate the guests of the attendees by making their time at the conference as pleasant and entertaining as possible and offering a variety of off-site activities while attendees participate in the daily sessions.

Who is a Guest? A guest is a spouse/significant other, friend, or child that is not involved in an electrical industry related occupation. Authors, co-workers or associates that are involved in any related industries cannot be registered as a guest. Guests must be registered for the conference to attend the Monday Social and to participate in guest-designated functions, such as the guest hospitality room, tours, vendor hospitality events, etc. Guest Registration does not include attendance at paper presentations or special meal functions (e.g., meals for Authors, YEDS or Emeritus). Tickets for conference luncheons are available for guests to purchase if they chose to do so.

The Guest Hospitality Suite: The Guest Hospitality Suite is in the Directors H room on Plaza Concourse level of the Sheraton Denver Downtown Hotel and is open from 7:30 a.m. until 4:00 p.m. A light breakfast is available in Directors I room Tuesday & Wednesday morning. **Monday Morning Guest Welcome and Orientation Event** in Plaza Ballroom. Here registered guests can receive their Guest Bag and Cookbook and a light breakfast will be available from 8:15 until 10:00.

Opening Hours and food services:

Sunday:	10:00 a.m. to 4:00 p.m.	This is great place to meet other guests – No Food Service
Monday:	8:30 a.m. to 11:00 a.m.	Plaza Ballroom E – Guest Welcome and Orientation
Tuesday:	7:30 a.m. to 4:00 p.m.	Light Breakfast served for Guests only from 7:30 a.m. to 9:00 a.m.
Wednesday:	7:30 a.m. to 4:00 p.m.	Light Breakfast served for Guests only from 7:30 a.m. to 9:00 a.m.

***NOTE:** Complimentary gift bags are provided to registered guests only. Note, complimentary gift bag quantity is limited.

Guest Tours are offered by the Local Committee on Monday, September 26, 2022, through Wednesday, September 28, 2022, of the conference. These tours were selected to allow participants to meet other guests while experiencing some of the local areas of interest. See page 33 for tour details and pricing.

Important Notes about the PCIC Denver Tours:

- Tour tickets are non-refundable but may be exchanged or sold between guests.
 - Exchange information is available in the Guest Hospitality Suite.
- Tours are subject to cancellation if registrations do not meet minimum capacity levels (with a full refund).
- Some venues may require that masks be worn while inside their facility or shop.

The check-in for all tours will be in the Guest Hospitality Suite in Directors H on the Registration Level of the hotel.

Complimentary Guest Breakfasts: Registered guests attending the conference are welcome and encouraged to join their partners at the main conference breakfast. A light breakfast will be served in the Guest Hospitality Suite at the times posted above.

IEEE-IAS-PCIC On-line Surveys

On-Line Surveys – IEEE-IAS-PCIC encourages feedback from the attendees to ensure that the Conference remains one of the premier conferences sponsored by IEEE and IAS. Following the conference, surveys will either be available on the IEEE-IAS-PCIC web site (www.ieeeptic.com) or on the conference app (available at www.eventmobi.com/pcic2022) or you will be contacted with an alternate location.

The following surveys are offered:

- ✓ General Survey
- ✓ Authors Survey
- ✓ Guest Survey
- ✓ First Time Attendees Survey

You only need to fill out one of the surveys, so please pick the one that is most appropriate.



Condensed Etiquette Rules for Vendor Entertainment

Vendor participation is welcomed at the IEEE-IAS-PCIC conference. Etiquette rules are designed to prevent a conflict of vendor activities with the technical programs. Conduct at the conference must comply with the complete IEEE-IAS-PCIC Rules of Etiquette which are available at www.ieeeepcic.com. Following is a summary of those rules:

- All vendor personnel and their guests working in a hospitality suite must be registered for the conference.
- Hospitality rooms must be closed during all official conference functions (technical sessions, official luncheons, Conference Social, Subcommittee meetings, etc.)
- Commercial demonstrations and commercial literature distribution must be confined to the hospitality suite.
- Vendor activities outside the conference hotel must not host more than 25 conference delegates (exclusive of guests and host company personnel) from 7:00 a.m. Monday through 5:00 p.m. Wednesday.
- A mandatory "Vendor pre-meeting" will be held prior to the conference. Vendors will be contacted with details.

Emeritus Subcommittee Luncheon

The Emeritus Subcommittee luncheon will be held on Tuesday, September 27, 2022, in the Tower Court B room on the Tower second level of the Sheraton Denver Downtown Hotel. Attendance is limited to those who have been confirmed as Emeritus members by the IEEE-IAS-PCIC Chair. The Emeritus Subcommittee is composed of IEEE-IAS-PCIC members who have retired at least once from our industry. Members are required to consistently volunteer their services in support of various IEEE-IAS-PCIC activities. If you are interested and feel you qualify, contact Leo Berg, Chair of the IEEE-IAS-PCIC Emeritus Subcommittee at leoberg@ieee.org.

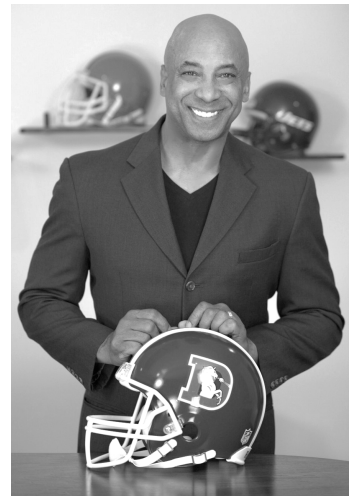
Wednesday Luncheon Speaker – Denver Bronco's Vance Johnson

A member of the famed "Three Amigos" that saw the Denver Broncos advance to three Super Bowls during the 1980's.

Vance Johnson, originally from Trenton, New Jersey, was blessed to have an amazing athletic career, landing him on the biggest and brightest stages; including first place in the NCAA Track & Field Championships, Gold Medal in the Pan American Games, alternate in the Olympics, Pima County Sports Hall of Fame, and 10 years in the NFL, and three Super Bowl appearances.

Battling childhood trauma, addictions, mental illness, jail time, domestic issues, he was lost for most of his adult life in the throes of these problems. Losing a 19-year-old son to a motorcycle accident after being struck by someone impaired. Vance ended up overdosing and putting himself into a 28-day induced coma. Vance was lost to the darkest depths of humanity in his mental illness & addictions. Thankfully, by the Grace of God, using human intervention he sought treatment and had an eye-opening experience through admitting in full transparency his battles.

Celebrating 9 years in recovery, Vance is now a Certified Christian Counselor, Recovery Ambassador and has been performing Interventions around the country for the past 7 years. He believes everyone can have a life free from the bondage of mental health issues and addictions.



Young Engineers Development Subcommittee (YEDS)

The Young Engineers Development Subcommittee is an administrative subcommittee of the IEEE IAS Petroleum and Chemical Industry Committee and is abbreviated as “YEDS”. The subcommittee was formed in 1996 with its charter to, “promote participation in IEEE-IAS-PCIC technical conference and provide personal professional growth opportunities.” YEDS focuses on the needs of first-time IEEE-IAS-PCIC attendees, regardless of age and sponsors two major conference activities:

- **IEEE-IAS-PCIC YEDS Orientation Breakfast** (Monday, September 25 – 7:00 a.m. to 8:00 a.m.). YEDS members, and others interested in learning more about the IEEE-IAS-PCIC are encouraged to attend the “*IEEE-IAS-PCIC YEDS Orientation Breakfast*” in Salon J. A presentation and discussion take place on the history of IEEE-IAS-PCIC, how it functions, ways to become more involved, and many other suggestions on how to enhance your conference experience. Remember to check the “YEDS IEEE-IAS-PCIC Orientation Breakfast” box during registration if you plan to attend.
- **IEEE-IAS-PCIC YEDS Luncheon** – Tuesday, September 27 – 11:15 a.m. to 12:45 p.m. in Salon D. First time attendees are encouraged to attend this luncheon. It focuses on soliciting feedback from participants on how IEEE-IAS-PCIC can better encourage first-time attendee participation; improve professional development through IEEE-IAS-PCIC and discussing new ideas for future IEEE-IAS-PCIC conferences. Remember to check the “YEDS Tuesday PCIC Luncheon” box on the registration form if you plan to attend.

Survival Guide – For those new to IEEE-IAS-PCIC, the committee publishes a “survival guide”. The guide explains the goal of the conference, the structure, daily events and meetings, dress codes and ways to plan your time to gain the most out of the conference. The IEEE-IAS-PCIC Survival Guide can be downloaded at: <http://2022conference.ieeepcic.com/survival-guide.html>

Tutorials – IEEE-IAS-PCIC is offering eight half-day technical tutorials on Thursday, September 29, 2022. after the main conference. First time attendees registered for the full conference are eligible to attend one tutorial at a reduced rate. A second tutorial can be attended at the regular price. See page 26 for more information on the IEEE-IAS-PCIC Tutorials and requirements to pre-register for tutorials.

First-time IEEE-IAS-PCIC attendees are welcome to participate in all YEDS and IEEE-IAS-PCIC activities and we encourage you to post about your conference experience on LinkedIn, Facebook or Twitter. Welcome to Denver!!



Myron Zucker Travel Grant

It is vital for the ongoing success of the IEEE-IAS Petroleum and Chemical Industry Committee to attract young, new Electrical Engineering talent who would greatly benefit from attending but are prevented from participating due to financial restrictions. Recognizing this, the PCIC has arranged with the IEEE Industrial Applications Society to sponsor up to six co-op/Intern students or recent graduates to attend the conference through the Myron Zucker Travel Grant.

The Myron Zucker Travel Grant, which is administered by the Young Engineers Development Subcommittee (YEDS), provides the following benefits for the winning recipients:

- ✓ \$600 travel allowance
- ✓ Free Hotel Registration
- ✓ Free Conference Registration as a Student
- ✓ One Free Tutorial

In order to be considered for the program the applicants shall:

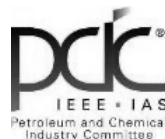
- ✓ Be an engineering co-op/Intern student, or have graduated less than 2 years ago from a recognized university, college or technical school.
- ✓ Be 21 years of age or older.
- ✓ Complete the application form, which is available on-line at;
<http://ieeepcic.com/operating-subcommittees/young-engineers/#Myron-Zucker-Student>
- ✓ Submit, with the application form, a 200-word essay describing the importance of attending the IEEE-IAS-PCIC technical conference.
- ✓ Be an Intern or be involved as a co-op worker for a company with one or more IEEE members who are full IEEE-IAS-PCIC Conference registrants; one of whom will vouch for the applicant on the application form.
- ✓ Be a student member of IEEE.
- ✓ Become a member of the Young Engineers Development Subcommittee (YEDS) by attending the IEEE-IAS-PCIC YEDS Orientation Breakfast on the Monday of the conference and IEEE-IAS-PCIC YEDS Luncheon on Tuesday of the conference.
- ✓ Attend the Monday and Wednesday Conference Luncheons.
- ✓ Attend the general program meeting, technical paper presentations and one sub-committee meeting.

Applicants who are presenting papers at the conference or otherwise require full Registration are not eligible for the Myron Zucker Travel Grant as the program will only pay for student registrations.

The recipient employers must be willing to pay the applicant their normal salary while they are at the conference, and only one recipient per company will be allowed.

The selection of the Myron Zucker Travel Grant Program recipients will be selected based on the quality of the submitted essays.

Applications including the mandatory essays are required no later than July 31, 2022. The applicants will be informed of the outcome of their applications by August 15, 2022.



Professional Development Hours (PDH) and Continuing Education Units (CEU)

Many professional engineering organizations require continued learning to stay current with changing technology, procedures, practices, standards, and equipment. Most jurisdictions use Professional Development Hours (PDHs) and Continuing Education Units (CEUs) to measure and log training and education. Currently, thirty states require Professional Development Hours to maintain P.E. licensure, encouraging engineers to seek CEUs for their participation in Continuing Education programs. CEUs readily translate into PDHs (1CEU=10 PDHs).

Evidence of participation in the IEEE-IAS-PCIC Conference, standards activities, and/or tutorials may meet part or all of your organization's requirements for ongoing training and education. The PDH and CEU certification processes are managed separately, completely independent of each other within IEEE-IAS-PCIC.

Professional Development Hours (PDH)

IEEE-IAS-PCIC has a process for attendees to log and receive a PDH certificate for attendance at conference papers, participation in standards activities, authoring and presenting papers, performing technical paper reviews, and technical leadership. Many organizations accept PDH hours as evidence of continued education. It is the responsibility of the attendee to determine what conference activities meet their organization's educational requirements.

IEEE-IAS-PCIC charges attendees a \$40.00 fee for processing a PDH certificate. When an attendee registers for a PDH certificate, a form for logging your participation at events during the conference will be included with your registration packet. Instructions are provided on the form for submitting the completed worksheet. At the end of the conference submit the form to IEEE-IAS-PCIC for processing and you will be issued a PDH certificate.

Continuing Education Units (CEU)

Continuing Education Units (CEUs) are available for the IEEE-IAS-PCIC tutorials attended. These are available from IEEE providing the required fee is paid and all CEU requirements are completed and submitted.

IEEE-IAS-PCIC provides an opportunity for attendees to earn 0.35 CEU's for participation in each tutorial. These units are based on documented participation and competency testing and are issued through IEEE. CEU's can only be offered for participation in tutorials, as testing is a requirement of the CEU process.

IEEE-IAS-PCIC charges attendees a fee of \$40.00 to cover the CEU processing costs at the time of registration. A CEU certificate will be provided for each tutorial attended directly by IEEE to attendees who complete CEU requirements (See note 3 below).

IMPORTANT NOTES REGARDING PDHs AND CEUs:

1. **Pre-registration is mandatory** to obtain these certificates. Please check the appropriate box on the registration form to receive the appropriate documentation with your registration package.
2. **All PDH documentation/forms must be completed and submitted by the Attendee prior to October 14th, 2022.** If this information is not received prior to that date, it will not be possible to issue a certificate. All PDH documentation and/or certificates will be emailed after the conference
3. **To Obtain CEU Credits** attendees must be registered and attend the tutorial. **A completed CEU evaluation form must be given to the presenter** at the end of each tutorial attended **otherwise the CEU cannot be issued.** Late forms are not permitted
4. PDH and CEU credits are optional, and no action is required if these are not required

CEU certificates are issued for participation in tutorials only. IEEE requirements do not permit CEU certificates to be issued for time spent attending papers, standards, technical meetings, or for presenting papers.

IEEE-IAS-PCIC Schedule at a Glance

	Conference Breakfasts	Technical Sessions	Luncheons	Evening Events
Monday Sept. 26, 2022	7:00 a.m. – 8:00 a.m.	8:00 a.m. - 11:15 a.m.	11:45 a.m. - 1:30 p.m.	6:00 p.m. - 7:30 p.m.
	⑤ Authors' Breakfast – Tower Court D	General Program I – Tower Ballroom 1, 2	① IEEE-IAS-PCIC Awards Luncheon – Plaza Ballroom A,B,D,E	② Conference Social – Exhibit Area
	④ YEDS PCIC Orientation Breakfast – Plaza Ballroom D	2:00 p.m. - 5:00 p.m.		5:00 p.m. - 6:00 p.m. and 7:30 p.m. – Closing
	① Attendees' Breakfast – Plaza Ballroom A,B,D,E	General Program II – Tower Ballroom 1		Visit Vendors Hospitality Suites
		Chemical Session I – Tower Majestic		
		Mining Session I – Tower Vail		
Refining Session I – Tower Ballroom 2				
Transportation (Midstream) Session I – Tower Windows				
Tuesday Sept. 27, 2022	7:00 a.m. – 8:00 a.m.	8:15 a.m. - 11:15 a.m.	11:15 a.m. - 12:45 p.m.	5:00 p.m. – Closing
	⑤ Authors' Breakfast – Tower Court D	Electrochemical & Emerging Session I – Tower Majestic	① Attendees Lunch – Plaza Ballroom A,B,D,E	Visit Vendors Hospitality Suites
	① Attendees' Breakfast – Plaza Ballroom A,B,D,E	International Session I – Tower Columbine	④ Emeritus – Tower Court B	
		Marine Session I – Tower Windows		
		Production Session I – Tower Ballroom 2	③ Abstract Selection – Tower Court A	
		Safety Session I – Tower Ballroom 1		
12:45 p.m. - 5:15 p.m. IEEE-IAS-PCIC Subcommittee Meetings See Meeting Schedule		④ YEDS – Tower Court D		
Wednesday Sept. 28, 2022	7:00 a.m. – 8:00 a.m.	8:15 a.m. - 11:15 a.m.	11:45 a.m. - 1:30 p.m.	5:00 p.m. – Closing
	⑤ Authors' Breakfast – Tower Court D	Electrochemical & Emerging Session II – Tower Majestic	① IEEE-IAS-PCIC Luncheon Plaza Ballroom A,B,D,E	Visit Vendors Hospitality Suites
		International Session II – Tower Columbine		
	Marine Session II – Tower Windows			
	Production Session II – Tower Ballroom			
	Safety Technical Session II – Tower Ballroom			
	2:00 p.m. - 5:00 p.m.			
	Chemical Session II – Tower Ballroom 2			
Mining Session II – Tower Windows				
Refining Session II – Tower Ballroom 1				
Transportation (Midstream) Session II – Tower Majestic				
Thursday Sept. 29, 2022	7:00 a.m. – 8:00 a.m.	8:00 a.m. - 5:00 p.m.	12:00 p.m. - 1:00 p.m.	Notes ①- Only Registered Attendees and Guests are permitted to attend breakfasts. Luncheons are limited to registered attendees only. ② Single day registrations do not include entry to the Conference Social ③ Committee Members Only ④ Must be pre-registered to Attend this event ⑤ Open to Authors & Specific IEEE- IAS-PCIC Committee Members Only ⑥ Open to Tutorial Attendees only
	⑥ Tutorial Presenters' Breakfast – Governors 17	③ IEEE-IAS-PCIC Annual Business Meeting Governors 15	③ IEEE-IAS-PCIC Executive Committee Lunch – Governors 15	
	⑥ Tutorial Attendees Breakfast Plaza Ballroom A,B,C	8:00 a.m. – 11:45 a.m.	⑥ Tutorial Luncheon– Plaza Ballroom A,B,C	
		Tutorial T1 – Plaza Ballroom D		
		Tutorial T3 – Plaza Ballroom E		
		Tutorial T5 – Plaza Ballroom F		
	③ IEEE-IAS-PCIC Executive Committee Breakfast – Governors 12	Tutorial T7 – Governors 14		
		1:00 p.m. - 4:45 p.m.		
Tutorial T2 – Plaza Ballroom D				
Tutorial T4 – Plaza Ballroom E				
Tutorial T6 – Plaza Ballroom F				
Tutorial T8 – Governors 14				

2022 IEEE-IAS-PCIC Standards Working Group and Technical Subcommittee Meeting Schedule

The IEEE-IAS-PCIC Standards Subcommittee coordinates the activities of approximately 50 IEEE and other industry related standards. The individual Standard Committees establish a Working Group to meet, discuss and make the technical decisions necessary to form and maintain their standard. Many of these Working Groups arrange their meeting schedule a few days before or after the IEEE-IAS-PCIC annual conference.

The key to any standard is the quality and commitment of its members. Technical knowledge or expertise is just a part of what constitutes being a good member. Consistent participation, the ability to listen, to discuss, and to understand, along with a willingness to accept the ideas of others, is just as important.

The IEEE-IAS-PCIC encourages all attendees, especially new attendees, to increase their value from the IEEE-IAS-PCIC conference by actively participating in the various Working Group meetings. You are welcome to attend as a guest or better yet, to join as a member to influence the outcome of the next revision, or to work on the development of a completely new standard. Active participation provides a greater insight and understanding of the industry issues that are addressed in the development and updating of these Standards.

The IEEE-IAS-PCIC Technical Subcommittees solicit and review technical papers that support the exchange of electrical applications technology related to the petroleum and chemical industry. If you are not presently a member of one of these subcommittees, we also invite you to attend one of the Tuesday afternoon sessions that are of interest and to join as a member.

The individual meeting schedule is listed below. IEEE-IAS-PCIC Registered attendees are invited to attend any of these meetings, with the exception of those restricted to specific groups or subcommittee members, which are indicated by an **asterisk (*) and gray background**.

Please note: Rooms are subject to change. Please check the final program or PCIC2022 APP to confirm.

Thursday September 22, 2022		
8:00 a.m.– 5:00 p.m.	API 500/505 – Area Classification	Directors I
8:00 a.m.– 5:00 p.m.	API Motors – 541/546/547	Directors H
Friday September 23, 2022		
8:00 a.m.– 3:00 p.m.	API 500/505 – Area Classification	Directors I
8:00 a.m.– 3:00 p.m.	API Motors – 541/546/547	Directors H
3:15 p.m. – 5:00 p.m.	API SOEE (Subcommittee on Electrical Equipment)	Directors H
Saturday September 24, 2022		
10:00 a.m.– 11:00 a.m.	IEEE 303 – RP for Auxiliary Devices for Rotating Machines in Div. 2/Zone 2 Locations	Governors 15
10:00 a.m.– 12:00 p.m.	IEEE P1717	Governors 12
11:00 a.m.– 12:00 p.m.	IEEE 1458 - RP for the Selection, Field	Governors 14
1:00 p.m.– 2:00 p.m.	IEEE P2455 – RP for the Repair and Maintenance of Direct Current Electric Machines	Governors 15
1:00 p.m.– 3:00 p.m.	IEEE P1584.1 – Guide for Performing Arc Flash Hazard Calculations	Governors 14
2:00 p.m.– 4:00 p.m.	IEEE 841 Severe-Duty, Totally Enclosed Squirrel Cage Induction Motors 0.75 kW to 370 kW	Governors 15
2:00 p.m.– 4:00 p.m.	IEEE P2740 – Selection & Installation of Electrical Cables & Cable Systems in Hazardous (Classified) Locations on Oil and Gas Land Drilling Rigs	Governors 12
3:00 p.m.– 5:00 p.m.	IEEE 515/515.1 & IEC/IEEE 62395, IEC/IEEE 60079-30 – Trace Heating	Governors 9
3:00 p.m.– 5:00 p.m.	IEEE 1814 – RP for Electrical System Design Techniques to Improve Electrical Safety	Governors 14
4:00 p.m.– 5:00 p.m.	IEEE 1349 – Electric Motors in Hazardous Locations	Governors 15
4:00 p.m.– 5:00 p.m.	IEEE 1017, 1018, 1019 – Submersible Equipment Standards Meeting	Governors 12

Sunday September 25, 2022		Room
8:00 a.m.–9:00 a.m.	<i>Awards Nominating Meeting*</i>	Governors 15
9:00 a.m.–11:00 p.m.	IEEE P1566 - Standard for Performance of Adjustable Speed AC Drives Rated 375 kW & Larger	Governors 12
9:00 a.m.– 12:00 p.m.	Advisory & Awards Subcommittee*	Governors 15
9:00 a.m.– 12:00 p.m.	Facilities Planning and Finance Subcommittees joint meeting*	Governors 14
3:00 p.m.– 4:00 p.m.	Vendor Hospitality Pre-event Meeting	Governors 12
3:30 p.m.– 5:00 p.m.	Codes & Regulations	Governors 14
4:00 p.m.– 5:00 p.m.	Tutorials Subcommittee Meetings	Governors 15
Monday September 26, 2022		
7:00 a.m.–8:00 a.m.	<i>Authors' Breakfast*</i>	Tower Court D
7:00 a.m.–8:00 a.m.	Attendees' Breakfast	Plaza Ballroom A,B,C
7:00 a.m.–8:00 a.m.	IEEE-IAS-PCIC Orientation Breakfast – YEDS (Must pre-register to attend, <i>see page 10</i>)	Plaza Ballroom D
8:00 a.m.–11:15 a.m.	General Technical Session I	Tower Ballroom 1, 2
11:45 a.m.–1:30 p.m.	IEEE-IAS-PCIC Awards Luncheon	Plaza Ballroom A,B,D,E
2:00 p.m.–5:00 p.m.	General Technical Session II	Tower Ballroom 1
2:00 p.m.–5:00 p.m.	Chemical Technical Session I	Tower Majestic
2:00 p.m.–5:00 p.m.	Transportation (Midstream) Technical Session I	Tower Windows
2:00 p.m.–5:00 p.m.	Mining Technical Session I	Tower Vail
2:00 p.m.–5:00 p.m.	Refining Technical Session I	Tower Ballroom 2
6:00 p.m.–7:30 p.m.	Conference Social	Exposition
Tuesday September 27, 2022		
7:00 a.m.–8:00 a.m.	<i>Authors' Breakfast*</i>	Tower Court D
7:00 a.m.–8:00 a.m.	Attendees' Breakfast	Plaza Ballroom A,B,C
8:15 a.m.–11:15 a.m.	Electrochemical and Emerging Technology Technical Session I	Tower Majestic
8:15 a.m.–11:15 a.m.	International Technical Session I	Tower Columbine
8:15 a.m.–11:15 a.m.	Marine Technical Session I	Tower Windows
8:15 a.m.–11:15 a.m.	Mining Technical Session I	Tower Vail
8:15 a.m.–11:15 a.m.	Production Technical Session I	Tower Ballroom 2
8:15 a.m.–11:15 a.m.	Safety Technical Session I	Tower Ballroom 1
11:15 a.m.–12:45 p.m.	Attendees Lunch (Box Lunch)	Plaza Ballroom A,B,D,E
11:15 a.m.–12:45 p.m.	<i>Emeritus Lunch* (Emeritus Subcommittee members only)</i>	Tower Court B
11:15 a.m.–12:45 p.m.	<i>Abstract Selection Lunch*</i>	Tower Court A
11:15 a.m.–12:45 p.m.	<i>YEDS Lunch* (Must pre-register to attend, see page)</i>	Tower Court D
12:45 p.m.–2:15 p.m.	Standards Subcommittee Meeting	Tower Ballroom 1
2:15 p.m.–3:45 p.m.	Chemical Subcommittee Meeting	Tower Ballroom 1
2:15 p.m.–3:45 p.m.	Electrochemical and Emerging Technologies Subcommittee Meeting	Tower Majestic
2:15 p.m.–3:45 p.m.	International Subcommittee Meeting	Tower Columbine
2:15 p.m.–3:45 p.m.	Marine Subcommittee Meeting	Tower Windows
2:15 p.m.–3:45 p.m.	Refining Subcommittee Meeting	Plaza Ballroom F
2:15 p.m.–3:45 p.m.	Transportation (Midstream) Subcommittee Meeting	Tower Ballroom 2

Tuesday September 27, 2022 (continued)		
3:45 p.m.–5:15 p.m.	Safety Subcommittee Meeting	Tower Ballroom 1
4:00 p.m.–5:00 p.m.	IT Subcommittee	Tower Court A
Wednesday September 28, 2022		
7:00 a.m.– 8:00 a.m.	<i>Authors' Breakfast*</i>	Tower Court D
7:00 a.m.–8:00 a.m.	Attendees' Breakfast	Plaza Ballroom A,B,C
8:15 a.m.– 11:15 a.m.	Electrochemical & Emerging Technology Technical Session II	Tower Majestic
8:15 a.m.– 11:15 a.m.	International Technical Session II	Tower Columbine
8:15 a.m.– 11:15 a.m.	Marine Session II	Tower Windows
8:15 a.m.– 11:15 a.m.	Mining Technical Session II	Tower Vail
8:15 a.m.– 11:15 a.m.	Production Technical Session II	Tower Ballroom
8:15 a.m.– 11:15 a.m.	Safety Technical Session II	Tower Ballroom
11:45 a.m.– 1:30 p.m.	IEEE-IAS-PCIC Luncheon	Plaza Ballroom A,B,D,E
2:00 p.m.– 5:00 p.m.	Chemical Technical Session II	Tower Ballroom 2
2:00 p.m.– 5:00 p.m.	Refining Technical Session II	Tower Ballroom 1
2:00 p.m.– 5:00 p.m.	Transportation (Midstream) Technical Session II	Tower Majestic
5:00 p.m.– 7:00 p.m.	<i>IEEE-IAS-PCIC Executive Committee & Local Committee* Turnover Meeting</i>	Tower Windows
Thursday September 29, 2022		
7:00 a.m.– 8:00 a.m.	<i>IEEE-IAS-PCIC Executive Committee Breakfast*</i>	Governors 12
7:00 a.m.– 8:00 a.m.	<i>Tutorial Presenters' Breakfast</i>	Governors 17
8:00 a.m.– 9:00 a.m.	<i>IEEE-IAS-PCIC Annual Business Meeting*</i>	Plaza Governors 15
7:00 p.m.– 8:00 a.m.	Tutorial Attendees Breakfast (Tutorial Attendees Only)	Plaza Ballroom A,B,C
8:00 a.m.– 11:45 a.m.	Tutorial T1 – <u>Wiring Methods in the 2023 National Electrical Code for Conductors and Cables up to 35,000 volts</u>	Plaza Ballroom D
8:00 a.m.– 11:45 a.m.	Tutorial T3 – <u>AC Power Substation Grounding: Analysis and mitigation for Touch and Step Voltage Hazards</u>	Plaza Ballroom E
8:00 a.m.– 11:45 a.m.	Tutorial T5 – <u>The National Electrical Code 2023 Significant Changes</u>	Plaza Ballroom D
8:00 a.m.– 11:45 a.m.	Tutorial T7 – <u>Rethinking Medium Voltage (MV) adjustable speed drive (ASDs) for Motor Control</u>	Governors 14
9:00 a.m.– 5:00 p.m.	IEEE-IAS-PCIC Executive Committee Meeting*	Governors 15
12:00 p.m.– 1:00 p.m.	Executive Committee Lunch*	Governors 12
12:00 p.m.– 1:00 p.m.	Tutorial Luncheon* (Tutorial Attendees and Presenters Only)	Plaza Ballroom A,B,C
1:15 p.m.– 5:00 p.m.	Tutorial T2 – <u>Standby Battery Chemistries, Construction, and Sizing Concepts</u>	Plaza Ballroom D
1:15 p.m.– 5:00 p.m.	Tutorial T4 – <u>Repairs / Reconditions / Replacements of AC Electric Motors in Petroleum and Chemical Industries</u>	Plaza Ballroom E
1:15 p.m.– 5:00 p.m.	Tutorial T6 – <u>Metric Development for Electrical Power Systems</u>	Plaza Ballroom D
1:15 p.m.– 5:00 p.m.	Tutorial T8 – <u>An Introduction to Digital Switchgear</u>	Governors 14

2022 IEEE-IAS-PCIC CONFERENCE TECHNICAL PROGRAM

The following is a list of technical papers that will be presented at the 2022 IEEE PCIC Conference.
Any last-minute changes to the final program can be found on the PCIC 2022 Denver Conference website or the Conference App.

Note: All papers presentations will take place at the Sheraton Denver Downtown Hotel

GENERAL TECHNICAL SESSION I

Monday, September 26, 2022 – 8:00 a.m. to 11:15 a.m.

Presiding Jim Bowen: PCIC Chair

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|---------------------|---|---|
| PCIC-2022-01 | Reflections on a 50 Year Journey in Electrical Safety
H. Landis Floyd II | The University of Alabama at Birmingham |
| PCIC-2022-02 | Integrating Renewable Energy Behind the Meter in Upstream Oil and Gas Operations - Part 1
Alonzo Alvarez Meola
Patrick Collie
Zach McKinney
Ricardo Rangel | Chevron Technical Center
Algonquin (Liberty) Power
Chevron Technical Center
Chevron Technical Center |
| PCIC-2022-03 | Spacing Between Substations and Liquid Type Transformers: How Close is too Close?
Paul "Eddie" Guidry
Richard Anderson
Jinesh Malde
Travis McClung | Fluor Enterprises, Inc.
Fluor Enterprises, Inc.
M&I Materials Inc.
Marathon Petroleum Co., LP |

GENERAL TECHNICAL SESSION II

Monday, September 26, 2022 – 2:00 a.m. to 5:00 p.m.

Presiding: Kevin Peterson, PCIC Vice-Chair

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|---------------------|---|--|
| PCIC-2022-04 | Lightning Protection at Petrochemical Facilities – Part 3 Alternative Protection Systems
Robert Durham
Marcus Durham
Tommy Gillespie | THEWAY Labs
THEWAY Labs
Donato, Brown, Poole, Molemonn |
| PCIC-2022-05 | Extending the Operating Life of Critical High Voltage Motors
Terry Perilloux
Keith Lyles
Tom Reid
Saeed Ul Haq | Marathon Petroleum
Marathon Petroleum
Integrated Power Services
GE Power Conversion |
| PCIC-2022-06 | Keep on Running—Select Motor Relay Settings to Balance Protection and Operation
Krithika Bhuvaneshwaran
Derrick Haas
Edgardo Miguel, Jr.
Jim Payne | Schweitzer Engineering Laboratories, Inc.
Schweitzer Engineering Laboratories, Inc.
Phillips 66
Phillips 66 |

CHEMICAL TECHNICAL SESSION I

Monday, September 26, 2022 – 2:00 a.m. to 5:00 p.m.

Presiding: Keith Lyles, Chair

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|---------------------|---|--|
| PCIC-2022-07 | Solving the Synchronization Problem of Line Start Permanent Magnet Motors
Robert McElveen
Rick Budzyski
Jukka Jarvinen
William E. Martin | Consultant
ABB, Inc.
ABB, Inc.
ABB, Inc |
|---------------------|---|--|

PCIC-2022-08 DOE Motor and Drive Assessment Leads to Energy Savings for Power Drive Systems
 John Malinowski ABB Motors & Drives - Retired
 Bill Finley Siemens Industry, Inc
 Rick Huddle Cadeo Group LLC
 Prakash Rao Lawrence Berkeley National Laboratory

PCIC-2022-09 Comparing On-Line Partial Discharge Monitoring Solutions for a Critical 6.6 KV Motor
 Marc Foxall HVPD Ltd.
 Malcolm Seltzer-Grant HVPD Ltd.
 Young Wee Lee Air Products
 Nico van Luijk Air Products

REFINING TECHNICAL SESSION I	
Monday, September 26, 2022 – 2:00 a.m. to 5:00 p.m.	Presiding: Clinton Roache, Chair

PCIC-2022-10 How to Specify a Motor with the Smorgasbord of Standards
 Donald Dunn WS Nelson
 Dennis Bogh Consultant
 Barry Wood Chevron - Retired

PCIC-2022-11 Enabling Digital Substations Through Substation Standardization
 Shebin Jalal Schneider Electric USA Inc
 Angela A. Brown ExxonMobil, EMRE
 Kasey Herman ExxonMobil, UIS

PCIC-2022-12 Optimizing Transformer Specification Based on Application and Rating
 Shankar Nambi Bechtel Energy, Inc.
 John K John Virginia Transformer Corp
 Balakrishnan Mani Virginia Transformer Corp

TRANSPORTATION (MIDSTREAM) TECHNICAL SESSION I	
Monday, September 26, 2022 – 2:00 a.m. to 5:00 p.m.	Presiding:

PCIC-2022-13 Decarbonizing Turbine Powered Oil and Gas Processes with Electrical Adjustable Speed Drive Systems
 Jeremy Andrews Siemens
 Fernando Arias-Gavilano Bechtel
 Navid Banesh ABB
 Dragan Ristanovic Bechtel

CIC-2022-14 Compressor Applications in the Decarbonization Discussion
 Ranier Kurz Solar Turbines Incorporated
 Marybeth McBain Kinder Morgan Incorporated
 Jay Mistry Solar Turbines Incorporated
 Matt Lubomirsky Solar Turbines Incorporated

PCIC-2022-15 Hybrid ASD Comparison with Conventional – Significant Efficiency Improvements are Still Available
 Mark Chisolm ELIN Motors
 Manoj Biswas Worley
 Wissam Moubarak J.M. Voith SE & Co.

MINING TECHNICAL SESSION I	
Monday, September 26, 2022 – 2:00 a.m. to 5:00 p.m.	Presiding: Galina Mirzaeva, Chair

PCIC-2022-16	Advanced Electric Mining Dredge Designs	Kent Zehr Eliot Castanza Damon Gonzales Ken McConachie	384310 Alberta Ltd DSC Dredge LLC DSC Dredge LLC SS Engineering Ltd.
PCIC-2022-17	Matrix Converters: Challenges and Solutions	Galina Mirzaeva Yuan Liu	The University of Newcastle The University of Newcastle
PCIC-2022-18	Model Predictive Control for Industrial Drive Applications	Galina Mirzaeva Yuan Liu	The University of Newcastle The University of Newcastle

ELECTROCHEMICAL AND EMERGING TECHNOLOGIES TECHNICAL SESSION I	
Tuesday, September 27, 2022 – 8:15 a.m. to 11:15 a.m.	Presiding – Andrew Ackerman, Chair

PCIC-2022-19	Strategies for Increasing Energy Efficiency of Electrical Aux Loads in LNG And Petrochemical Facilities	Shankar Nambi Matt Armand Jerzy Kazmierczak Robert Ramsey	Bechtel Energy, Inc. Bechtel Energy, Inc. Hitachi Energy Bechtel Energy, Inc.
PCIC-2022-20	The Green Hydrogen Revolution - Integrating Hydrogen into Industrial Applications	Terry Tadlock Dragan Ristanovic Omar Rubio	Bechtel Energy Inc. Consultant Siemens Energy
PCIC-2022-21	Specifying Battery Storage Solutions for Industrial Facilities	Carson Bates Clifton Oertli Jeremy Smith	NEI Electric Power NEI Electric Power BP Innovation & Engineering

INTERNATIONAL TECHNICAL SESSION I	
Tuesday, September 27, 2022 – 8:15 a.m. to 11:15 a.m.	Presiding – Allen Kachurowski, Chair

PCIC-2022-22	Practical Applications for the Essential Generator Monitoring and Protection System	Youngsu Kim Kezunovic Mladen	SK energy Texas A&M University
PCIC-2022-23	Harmonic Mitigation in Offshore Power Systems; 24 Pulse VFDs is not Necessarily the Answer	Rakan El-Mahayni Cory Helfrich Yasser A. Howeish	Saudi Aramco Saudi Aramco Saudi Aramco

PCIC-2022-24	Slow Rolling of Multiple Pump Motors at a Large Petrochemical Complex	
	Etienne Tremblay	Shell Canada Energy
	Richard Paes	Rockwell Automation
	Nicholas Stewart	Shell Canada Energy
	Bryan Tremblay	Cybertech Automation

MARINE TECHNICAL SESSION I	
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Tuesday, September 27, 2022 – 8:15 a.m. to 11:15 a.m.	Presiding – Chris Heron, Chair
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PCIC-2022-25	Incorrect Transformer Differential Operation Due to System Grounding	
	JC (Jacobus) Theron	GE Energy Connections
	Lorne Clark	University of Alberta
	David Roh	University of Alberta

PCIC-2022-26	Analysis of Offshore Current Transformer Failures	
	Alok Gupta	BP America Inc.
	Mustafa Demiroglu	BP America Inc.
	Nick Issacs	BP America Inc.

PCIC-2022-27	Long Cable Applications with PM Motors and MV Drives	
	Mukul Rastogi	Siemens Industry, Inc.
	Richard Broderick	Shell
	David Liney	Shell
	Richard Osman	Siemens Industry, Inc.

PRODUCTION TECHNICAL SESSION I	
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Tuesday, September 27, 2022 – 8:15 a.m. to 11:15 a.m.	Presiding – Dane Martindale, Chair
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PCIC-2022-28	Case Studies on Ground-Fault Protection of Microgrid Power Systems with Diverse Power Sources	
	Dirk Danninger	Schweitzer Engineering Laboratories, Inc.
	Fernando Calero	Schweitzer Engineering Laboratories, Inc.
	Scott Manson	Schweitzer Engineering Laboratories, Inc.
	Ceeman Vellaithurai	Schweitzer Engineering Laboratories, Inc.

PCIC-2022-29	Comprehensive Protection of Windings and Bearings for ASD Fed Motors	
	John Houdek	Allied Industrial Marketing, Inc.
	Randy Herche	Helwig Carbon Products
	Nitin Kulkarni	Helwig Carbon Products

PCIC-2022-30	IEEE 1349-2021 – Electric Machines in Hazardous Locations – Worldwide Applications	
	Lorraine Padden	Padden Engineering, LLC
	Paul S. Hamer	Chevron - Retired
	Bill Lockley	Lockley Engineering, Lt
	Bharat Mistry	GE - Retired

SAFETY TECHNICAL SESSION II	
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Tuesday, September 27, 2022 – 8:15 a.m. to 11:15 a.m.	Presiding – Thomas Papallo, Chair
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| PCIC-2022-31 | Taking Medium Voltage Motor Control Centers to New Levels of Safety | |
| | John Kay | Rockwell Automation |
| | Navinchandra Bhatt | Rockwell Automation |
| | Jeffery Fowler | Rockwell Automation |
| | David Mazur | Rockwell Automation |
| PCIC-2022-32 | Approved, Listed, and Field Evaluated - Requirements for Low Voltage Electrical Equipment used for Power Distribution and Motor Control | |
| | Todd Sauve | Rockwell Automation |
| | Ken Sellars | e-Hazard Management, LLC |
| PCIC-2022-33 | Taking the Heat: IEEE Standard 80 and Bimetallic Conductors | |
| | Robert Southey | SafEngServices & technologies ltd. |
| | Farid Dawalibi | SafEngServices & technologies ltd. |
| | Jeffrey Jordan | Copperweld Bimetallics |

ELECTROCHEMICAL & EMERGING TECHNOLOGY TECHNICAL SESSION II	
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Wednesday, September 28, 2022 – 8:15 a.m. to 11:15 a.m.	Presiding – Greg Clement, Vice-Chair
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| PCIC-2022-34 | Visualizing Fault Induced Traveling Waves in Medium Voltage Systems | |
| | Kumaraguru Prabakar | National Renewable Energy Laboratory |
| | Monte Lunacek | National Renewable Energy Laboratory |
| | Yaswanth Nag Velaga | National Renewable Energy Laboratory |
| | Akanksha Singh | National Renewable Energy Laboratory |
| PCIC-2022-35 | Considerations for the Protection of Adjustable Speed Drive Installations | |
| | Bhairavi Pandya | Schweitzer Engineering Laboratories, Inc. |
| | Iulian Constantin | Tengizchevroil |
| | Derrick Haas | Schweitzer Engineering Laboratories, Inc. |
| | Anil Pandya | Tengizchevroil |
| PCIC-2022-36 | Challenges in Designing a 10 KV Skin Effect Trace Heating System | |
| | Paul Becker | nVent Thermal Management |
| | Florian Koch | Physikalisch-Technische Bundesanstalt |
| | Frank Lienesch | Physikalisch-Technische Bundesanstalt |
| | David Parman | nVent Thermal Management |

INTERNATIONAL TECHNICAL SESSION II	
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Wednesday, September 28, 2022 – 8:15 a.m. to 11:15 a.m.	Presiding – Allen Gibson, Vice-Chair
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| PCIC-2022-37 | CO2 Emission Reduction in Chemical and Petrochemical Plants by Steam- and Gasturbine Replacement with Electrical Drives | |
| | Hartmut Walter | Siemens AG |
| | Bart Sauer | Siemens Industry Inc. |
| | Travis Tyer | Williams Pipeline |
| | Jon Kitchel | Chevron |

PCIC-2022-38 Risk Assessment of Electrical Defects in MV Switchgear using Partial Discharge Diagnostics

G. Amjad Hussain	American Uni. of Kuwait
Waqar Hassan	Uni. Of Engg & Tech
John A. Kay	Rockwell Automation - Retired
Farhan Mahmood	Uni. Of Engg & Tech

PCIC-2022-39 Lightning and Grounding Issues Impacting Safety and Performance of Liquefied Natural Gas Supplied Power Generation Plants

José M. Vallejo	Universal Star Energy Services
José A. Hernandez Batista	AES Panama
David Shipp	Capstone Power Systems Engineering

MARINE TECHNICAL SESSION II

Wednesday, September 28, 2022 – 8:15 a.m. to 11:15 a.m.	Presiding – Ethan Dong, Vice-Chair
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PCIC-2022-40 Introducing Connected Lighting into Hazardous Locations for Sustainability and Maintenance Optimization

Edward Brann	Emerson Electric
Ravindra Gurjar	Emerson Innovation Center

PCIC-2022-41 What are the Driving Forces in the Selection of a Hazardous Location Electric Motor - Divisions Vs. Zones?

Rajendra Mistry	Siemens Industry Inc.
Paul S. Hammer	Chevron - Retired
William G. Lawrence	FM Approvals LLC
Bharat Mistry	GE - Retired / Consultant

PCIC-2022-42 A Novel Method to Executing Main-Tie-Main LV Secondary Selective Systems

Gautami Bhatt	Bechtel Energy
Matt Armand	Bechtel Energy
Vincent Duong	ABB

PRODUCTION TECHNICAL SESSION II
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Wednesday, September 28, 2022 – 8:15 a.m. to 11:15 a.m.	Presiding – Matthew Marchiano, Vice-Chair
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PCIC-2022-43 Extending the Life of Low Voltage Adjustable Speed Drives

John A. Kay	Grace Technologies, Inc.
Bhanu Srilla	Grace Technologies, Inc.

PCIC-2022-44 Transformer Sympathetic Inrush Effect on Radially Fed Off-Shore Oil Production Platform: A Case Study?

Omar Alarfaj	Saudi Aramco
Hossam Al-Dossary	Saudi Aramco
Hajhouj Al-Shammari	Saudi Aramco
Rakan El-Mahayni	Saudi Aramco

PCIC-2022-45 Options for Converting Sound Power Levels to Sound Pressure Levels at 3 Feet

Fred Reiter, Jr.	ABB, Inc.
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SAFETY TECHNICAL SESSION II	
Wednesday, September 28, 2022 – 8:15 a.m. to 11:15 a.m.	Presiding: Tony Parsons, Vice-Chair

- PCIC-2022-46 Arc Flash Exposure Outside of Enclosed Equipment**
 Clinton Carne Schneider Electric
 Hank Clark Chevron Pipe Line & Power Company
 Michael McConnell Schneider Electric
- PCIC-2022-47 Applying Arc Fault Standard IEC 62477-2 Annex AA to High Voltage Adjustable Speed Drives**
 Christopher Johnson Siemens Industry Inc.
 Paul Barnhart UL, LLC
 Tory Parvino Chevron USA
 Daniel Petersen Siemens Industry Inc.
- PCIC-2022-48 Practical use of Protective Relays to Enhance Personnel Safety in Process Industries**
 Michael Pilon GE Grid Solutions
 Brian Morgan Irving Paper
 Palak Parikh GE Grid Solutions
 Thomas Welmore Irving Paper

CHEMICAL TECHNICAL SESSION II	
Wednesday, September 28, 2022 – 2:00 a.m. to 5:00 p.m.	Presiding: Jason Obermeyer, Vice-Chair

- PCIC-2022-49 Ensuring Accuracy and Quality when Performing Arc Flash Studies on Low-Voltage Power Distribution Equipment**
 Ryan Downey CBS Field Services
 Cecil Gordon Enbridge
 James Niethammer Enbridge
 Nicholas Weber Enbridge
- PCIC-2022-50 How to Safely Island a Chemical Facility**
 Assad Mohammad Schweitzer Engineering Laboratories, Inc.
 Aaron Fontenot The Dow Chemical Company
 Nigel Jordan The Dow Chemical Company
 Hariharan Subramanian Schweitzer Engineering Laboratories, Inc.
- PCIC-2022-51 Expanding Availability Horizons: New Battery Technologies in Industrial UPS Systems**
 Joe Marquardt ExxonMobil UIS
 Elena Chernetsova CHLORIDE Industrial
 Emiliano Paolin FZSONICK SA
 Pierre Queyroi CHLORIDE Industrial

REFINING TECHNICAL SESSION II	
Wednesday, September 28, 2022 – 2:00 a.m. to 5:00 p.m.	Presiding: Thomas Papallo, Vice-Chair

- PCIC-2022-52 Active Detection and Identification of Incipient Faults in Liquid Filled Transformers**
 Emilio Morales Cruz Qualitrol
 Radu Udrescu Iris Power LP a Qualitrol Company

PCIC-2022-53 Operating in the 'Danger Zone': Contactor Dropout vs. Fuse Clearing Time

John Webb	ABB Inc.
Andrea Delpozso	ABB S.p.A.
Ilaria Dognini	ABB S.p.A.
Christian Reuber	ABB AG

PCIC-2022-54 Electric Motors for use in Hazardous/Explosive Atmosphere need to Meet the Relevant Safety Requirements for Industrial Equipment or Safe Locations

Bharat Mistry	Independent Consultant- GE Retired
William G. Lawrence	F.M. Approvals LLC
Paul Anderson	Toshiba International Corporation

TRANSPORTATION (MIDSTREAM) TECHNICAL SESSION II**Wednesday, September 28, 2022 – 2:00 a.m. to 5:00 p.m.****Presiding: Manish Verma, Vice-Chair****PCIC-2022-55 Optimization of AC Substation Ground Grid Design and Calculations**

Amnit Dhindsa	Enbridge Pipelines Inc.
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PCIC-2022-56 A Case Study on Lifetime Assessment of Stator Windings in Large Machines can be a Critical and Effective Tool in a Predictive Maintenance

Cajetan T. Pinto	ABB S.A.
Vijay Anand	ABB Inc.
Robert N. Strickler	Chevron Products Company

PCIC-2022-57 High Torque Low Inrush Current Motor Design or Voltage Recovery Dependence for Loaded Start Conditions

Fredemar Rünco	WEG
Michael Bachmeyer	WEG
Miguel Sarris	Doris Inc.
Adrain Stafford	Modec

MINING TECHNICAL SESSION III**Wednesday, September 28, 2022 – 2:00 a.m. to 5:00 p.m.****Presiding: Hélder de Paula, Vice-Chair****PCIC-2022-58 DC and AC Microgrids for Mining Applications**

Galina Mirzaeva	The University of Newcastle
Dmitry Miller	Ampcontrol CSM

PCIC-2022-59 Electrostatic Shield to Mitigate the High Frequency Circulating Bearing Current – A Study for Design Guidelines

Marco T. A. Évo	Federal University of São João Del Rei
Hélder de Paula	Federal University of Uberlândia
Caio Eduardo Silva	Federal University of Uberlândia
Isabela O. Zapparoli	Federal University of Uberlândia

PCIC-2022-60 Electrostatic Shielding for Bearing Current Mitigation - An Analysis of its Thermal Impact on the Motor

Marco T. A. Évo	Federal University of São João Del Rei
Arismar M. G. Júnior	Federal University of Uberlândia
Hélder de Paula	Federal University of Uberlândia
Caio Eduardo Silva	Federal University of Uberlândia



The premier international forum for the exchange of electrical technology applications for the petroleum and chemical related industries

**IEEE-IAS-PCIC
Annual Technical Conference
New Orleans, LA USA
September 11 - 14, 2023**

2023 IEEE-IAS-PCIC Conference Call for Papers

The IEEE-IAS-PCIC is the premier conference for practicing electrical engineers and other professionals that deals with electrical installations in the oil and gas industry. It is highly regarded for providing top quality papers on a variety of relevant subjects aimed at the all-important electrical industry.

Abstracts are being requested on topics related to the practical application of electrical technology, standards, equipment and systems of interest in the petroleum and chemical industries within the scope of the IEEE-IAS-PCIC Technical Subcommittees. **All papers are required to be "IEEE-IAS-PCIC Presentation First"** as original works that have not been previously presented. They will be subject to thorough technical and peer reviews. Papers accepted will be published in the conference record.

The following information must be included with all paper proposals:

1. Complete all pertinent information on the webpage (See below; **All Fields marked with "*" must be completed**).
2. A maximum of **four (4)** authors can be entered per paper.
3. Post your abstract using unformatted text. Copying and pasting bullets or other special formatting may result in less-than-ideal presentation during the Technical Program meeting.
4. Important Notice: An acknowledgement will be sent to confirm receipt of all proposals from this system. If you do not receive this communication, contact Dennis Bogh, IEEE-IAS-PCIC Vice-Chair.

Submission Deadlines:

- Authors submit abstracts to Technical Program Chair _____ September 1, 2022
- IEEE-IAS-PCIC notifies authors of acceptance status _____ October 30, 2022
- Authors submit finished paper for peer review _____ January 30, 2022
- Authors submit final manuscripts for final check _____ April 7, 2022

NOTE: If a paper is accepted, at least one contributing author must be registered for the conference and present on day their paper is scheduled to be presented. Any additional persons involved in the presentation of a paper must be similarly registered for the conference.

To Submit a Proposal Go To: <https://forms.gle/rrfQrD9A4TjKRT489>

Papers are also evaluated for subsequent publication in either the **IEEE Transactions on Industry Applications** or **Industry Applications** Magazine. For more information, visit the IEEE-IAS-PCIC website at; www.ieeepcic.com

For Further Information Contact: Paul Sullivan, IEEE-IAS-PCIC Vice-Chair and IEEE-IAS-PCIC Technical Program Chair
Email: paul.b.sullivan@ieee.org

2022 IEEE-IAS-PCIC Conference Tutorials

The Tutorial Subcommittee of the IEEE-IAS-PCIC Technical Conference is sponsoring six half-day tutorials on **Thursday, September 29, 2022**. Continuing Education Units, (0.35 CEU) will be awarded to each participant who pre-registers for a CEU credit, successfully completes a course and submits the required CEU form. Light refreshments will be provided during the sessions. A lunch will be provided between the morning and afternoon sessions, (12:00 p.m. to 1:00 p.m.) for all tutorial registrants. The price of lunch is included in the price of the tutorial, so plan to end your morning session or begin your afternoon session by having lunch with your fellow attendees.

First time attendees registered for the entire conference are eligible to attend one tutorial for the reduced rate of \$50.00. A second tutorial can be attended by paying full registration cost. This must be indicated on the registration form and completed prior to September 1, 2022; otherwise, the full tutorial fee will apply. (**NOTE: To ensure there are enough handout materials for all participants, those not pre-registered will be charged full price at the door.**)

Tutorial PCIC 2022-1: Wiring Methods in the 2023 National Electrical Code for Conductors and Cables up to 35,000 volts

8:00 a.m. – 11:45 a.m.

Abstract: This presentation will cover the use, installation, construction specifications, and ampacity requirements for non-shielded conductors up to 2000 volts and shielded medium-voltage conductors and cables rated 2001 volts up to 35,000 volts, nominal.

Included are the type designations, insulation types, wiring methods, and installation requirements for commonly used conductors and wiring methods in the 2023 National Electrical Code. Specifically included will be thermoplastic and thermoset insulations, copper and aluminum conductors, cable and conduit wiring methods, and cable tray installations. Ampacity calculations, uses permitted and not permitted, and changes to the National Electrical Code will be discussed.

Instructors:

Chris Hunter is Vice President of Engineering for Cerrowire and has over 25 years of experience in the electrical industry, including manufacturing, utility and regulatory positions. She serves on NFPA National Electrical Code panels 6 and 13, NFPA 70B, NFPA 73, NFPA 921, and UL Standards Technical Panels 62, 83, 719 and 4703. Chris is a Certified Standards Professional, Master Electrician, and LEED Accredited Professional. Chris is a senior member of IEEE, serves as the President for the Southern Nevada Chapter of IAEEI, and is actively involved with many other industry organizations.

Bruce Miller is Chief Engineer for High Voltage and Specialty Cable for Marmon Utility LLC, manufacturer of Kerite Power Cable. Bruce has 40 years of experience with Kerite, with 20 of those years in Kerite Cable Services dealing with installation of power cables. Areas of expertise include 5kV through 138kV EPR insulated power cables, including sub-sea cables. Bruce is a voting member of ICEA and a member of IEEE.

Tutorial PCIC 2022-2: Standby Battery Chemistries, Construction, and Sizing Concepts

1:00 p.m. – 4:45 p.m.

Abstract: This tutorial presents a comprehensive overview of industrial standby batteries commonly used in oil and gas applications. Topics covered include battery basics and history, overview of commonly used chemistries, selection criteria, and battery sizing considerations. Chemistries covered include lead-acid, nickel-cadmium, and lithium-ion.

Instructors:

David Hood has been in the standby battery and power industry for 34 years including 8 years with UPS and charger OEM's in engineering, sales, and management. He worked as a battery sales rep for 18 years representing the Saft battery line and has been Saft's Oil and Gas sales manager for the last 5 years. David is on the Energy Storage and Stationary Battery Committee of the IEEE Power & Energy Society. He is on the standards development working group for various battery and DC system related standards.

Nick Shanley has spent over 10 years working in the Energy and Power Industry in both application and field sales support. He has experience with backup applications in a wide range of markets from Utility Power Plants and Substations, Data Centers, and Healthcare. Nick is currently specializing in applying advanced battery technologies within a variety of Standby Applications. Nick holds a bachelor's degree in Mechanical Engineering from the Fulton School of Engineering at Arizona State University.

Tutorial PCIC 2022-3: AC Power Substation Grounding: Analysis and mitigation for Touch and Step Voltage Hazards

8:00 a.m. – 11:45 a.m.

Abstract: Electric grounding system design for outdoor medium voltage and high voltage AC power substations owned and operated by the Electric Power utilities and large industrial users is primarily derived with compliance to IEEE Std 80 “IEEE Guide for Safety in AC Substation Grounding.” This tutorial provides a technical discussion of the standard and the steps to evaluate a grounding system to efficiently reduce touch and step voltages to permissible limits as described in IEEE 80.

This tutorial discusses industry standard practices for evaluating new and existing systems and outlines the methods and protocol for soil data measurements, calculation of ground fault current, and evaluation of resulting ground potential rise and design of grounding system to mitigate touch and step potential.

Instructors:

David Lewis P.E. is a Grounding and Power Systems Engineer focusing on electrical studies for power transmission and distribution system analysis. He has experience in various infrastructure studies including substation and facility grounding studies, Arc Flash analysis, and AC electromagnetic interference studies for systems up to 345 kV. His experience with the simulation and measurements for various power system studies supports the development of a commercial software. David graduated with a B.S. in Electrical Engineering from the University of Portland in 2011 and a member of IEEE.

Jeffrey D. Drummond, P.E. is the CTO / Principal Engineer for E&S Grounding Solutions, Inc. He has been a grounding consultant and grounding instructor for clients around the world since 2002. His publications include National Electric Code 2014 Grounding & Earthing Handbook and the chapter “Grounding / Earthing Systems” in the McGraw Hill Standard Handbook for Electrical Engineers, 16th Edition. He graduated from Harvey Mudd College in Claremont, California with B.S. and Master of Engineering (M.Eng.) degrees. He is a member Tau Beta Pi, NFPA, and IEEE.

Tutorial PCIC 2022-4: Repairs / Reconditions / Replacements of AC Electric Motors in Petroleum and Chemical Industries:

1:00 p.m. – 4:45 p.m.

Abstract: Overview of AC Electric motors is presented to cover various construction such as types of enclosures, major components like rotors, stators along with critical accessories. Types of classified installations and their critical requirements are explained in brief. Various potential failures such as mechanical, electrical, and terminal box are discussed with examples. Detailed evaluation including level of repairs, reconditions, refurbishment and rewinds scenarios are covered referring to IEEE 1068 and AR100 standards. Responsibilities, preliminary assessment, post repairs and field repairs are discussed. Testing and validation following with various IEEE standards are explained. Replacement of existing motors requirement/challenges are discussed where replacement/repairs/reconditions/rewind not possible. Preventive measures/maintenance are discussed to avoid all above following the applicable IEEE 62.2, IEEE 1415 standards. The key applicable IEEE standards are also identified supporting the subject topics.

Instructors:

Bharat Mistry Graduated in Electrical Engineering in 1972 from India. Serving as the Professional Engineer in Ontario, Canada. Retired at General Electric in 2017. Previously worked for Franklin Electric, Reliance Electric. Served industries for more than 35 years in design and application of electric rotating machines. Involved in developing industry standards such as CSA, UL, IEC, NEMA, IEEE. Published many technical papers and tutorial in IEEE PCIC conferences in USA, Canada, Europe and Middle East. Presently chairing CSA C22.2 No. 100 standard of motors and generators, Canadian IEC/TC2 mirror committee.

Javier Portos graduated from U.A.N.L, Mexico with a BSME & EE degree in 1990. He has 30 years' experience on designing large electric induction and Synchronous machines. His areas of expertise include design, application engineering, manufacture, high voltage insulation systems, repair, test and field service for large rotating equipment. Involved in developing industry standards IEEE 112, 1349 & 1068 & API 541 & 546. Mr. Portos has

published technical papers in IEEE/PCIC conferences. Mr. Portos joined IPS group in Oct 2012 as VP of Engineering for Southern Region responsible for repairs, reconditions and replacements of electric rotating machines.

Chris Heron received his BSCEE degree from the University of New Brunswick, Canada in 1989. His career covers more than 30 years of machine and systems design for industrial and specialty applications. As a member of AIST, ASME, IEEE, and IAS he is an active participant in the ongoing development of several consensus standards related to the specification, design, manufacture, protection, refurbishment, and testing of AC and DC electrical equipment in industrial applications.

Chris Stinson is Director of Electrical Systems and Services with Air Liquide Americas and holds a Bachelor of Science in Electrical and Computer Engineering from Clarkson University in Potsdam, NY. Upon graduating in 1989 he worked for General Electric Company's Apparatus Service Division. There he focused on the repairing and maintaining of customers' electrical equipment. He joined Air Liquide America in 1998 as an electrical engineer for maintenance where he helped integrate electrical work activities for the Reliability Centers. In 2004 he was recognized as an International Group Expert for electrical and again in 2008 as an International Senior Group Expert with Air Liquide. He currently leads Air Liquide's Center of Technical Experts Electrical Team for the Americas Pole.

Tutorial PCIC 2022-5: The National Electrical Code 2023 Significant Changes

8:00 a.m. – 11:45 a.m.

Abstract: This tutorial will review the significant changes of the 2023 version of the National Electrical Code (NEC). The session will explore changes and offer background that contributed to reasoning behind the change. The attendee of the tutorial will understand these changes and why they were implemented as well as understand how they will impact the design of power distribution systems for various types of occupancies.

The NEC impacts how an engineer will design the power system. The NEC has seen significant changes over the last 2 – 3 Code cycles with a growth of requirements that impact service entrance equipment, working space, shock, and incident energy. These changes will impact designs in many applications and if not considered could result in incurred costs due to red tags and associated modifications. The NEC is addressing a growth of technology from arc flash reduction to power over ethernet, and much more. Proper understanding of the requirements and technologies are important to ensuring we meet these new requirements and address the safety concerns they seek to address.

This session will also look at some significant changes that have occurred over multiple cycles that interrelate to each other and help the NEC continue to change to address electrical hazards. Many requirements can be leveraged to increase practical safeguarding of persons and property from hazards arising from the use of electricity – a principle that forms the basis of the Code.

Instructors:

Thomas A. Domitrovich is an Electrical Engineer within Eaton Corporation's electrical group with experience in engineering, sales & marketing, business development and product management. Domitrovich is actively involved with various electrical industry organizations and focuses on the continued growth of electrical safety. Domitrovich is an author with a wide range of trade magazine articles. He sits on NFPA Code Making Panels 2 and 10 for the continued development of the National Electrical Code (NFPA 70). He is also on other NFPA committees including NFPA 70B, 73, 78, 1078, 110, and 111 and chairs various committees for other electrical industry organizations. Domitrovich is a LEED® Accredited Professional, a licensed Professional Engineer and holds a Bachelor of Electrical Engineering from Gannon University.

Kevin S. Arnold, P.E. is the Manager of Codes & Standards and Industry Relations for Eaton. He is a registered professional electrical engineer, licensed electrical contractor and licensed master electrician involved in the development of installation codes and products standards such as NEC and UL standards. He is currently a member of NEC code making panels 10 and 13. He is an STP voting member for UL 943 the standard for Ground-Fault Circuit-Interrupter protection. He is actively involved in NEMA sections as well as chairing several of the technical committees and product sections. He is involved with the adoption of the NEC at the state level. He has had articles published in various trade magazines on topics such as Arc-Flash, Selective Coordination, Ground-Fault Circuit-Interrupter Protection and general Overcurrent Protection.

Tutorial PCIC 2022-6: Metric Development for Electrical Power Systems

1:00 p.m. – 4:45 p.m.

Abstract: Petrochemical and process industries rely on electrical power to produce their product(s). Interruption of electrical power can cause environmental, safety, production, and economic issues. To determine the extent of these issues, the petrochemical and process industries need to understand the cause, the frequency, and the severity of electrical power interruptions affecting their site(s). This tutorial will look at how to measure, assess, and predict electrical power interruptions for their sites.

Instructors:

Rick Mendler graduated from Christian Brothers University, Memphis Tennessee in 1975 with a BSEE degree and received a Master of Engineering Technology certification in 1999. He is retired from Phillips 66. He is a Life Member of the IEEE and active in the IAS, PES, and PCIC. He is an Emeritus Member of the Process Industry Practices Electrical Function Team. He is a Professional Engineer in the State of Texas. He has authored several PCIC and IAS papers, has been published in the Industry Application Magazine and in the Transactions on Industry Applications, and has presented PCIC several tutorials.

Gary Osborne graduated from Texas Tech University, Lubbock Texas in 1981 with a BSEE degree and received a Master of Engineering Technology certification in 1999. He was awarded the ConocoPhillips Spirit of Performance Award. He is retired from INEOS Olefins & Polymers USA. He is a member of the IEEE and IAS. He is a registered Professional Engineer in the State of Texas. He has authored several PCIC papers and has been published in Industry Application Magazine.

John Trotte graduated from Stevens Institute of Technology, Hoboken, New Jersey in 1989 with a BEEE degree and 1994 with an MS Technology Management degree. He is currently the Electrical Engineer Team Leader for the Reliability Engineering Group at Phillips 66 Bayway Refinery, Linden, NJ. He is a member of the IEEE, IAS, a member of the IEEE PCIC Refining subcommittee, and a member of NFPA. He is a Professional Engineer in the State of New Jersey. He has authored several PCIC and IAS papers and has been published in Industry Application Magazine.

Tutorial PCIC 2022-7: Rethinking Medium Voltage (MV) adjustable speed drive (ASDs) for Motor Control

8:00 a.m. – 11:45 a.m.

Abstract: Industrial facility management is more complex than ever. Companies are navigating competing priorities of lowering cost, delivering optimal product, reducing energy usage, and Co2 emissions. The electric motor is the heart of the facility, and it has a material impact on energy use and the power delivery apparatus. Adjustable speed drives (ASD) offer a viable path to meet the above goals. While it is well known that ASDs are used for energy savings, the tutorial hopes to open new lines of techno-commercial thinking around applying MV drives and how the underlying drive topologies and their installation treatments can go beyond simple energy savings, but also in improving power factor, eliminating HVACs and bring even more value to the installation. The tutorial will start from the basics and over the course of the session develop into ways of how to look at ASD not merely as a black or grey box, but as a strategic equipment that can contribute to a facility's sustainable goals.

Instructors:

Manish Verma, Business Development Specialist at TMEIC, provides technical guidance and consultation for new products from idea generation through product launch for Medium Voltage power conversion equipment. He has authored numerous technical papers published in internationally recognized journals and magazines. Manish is a senior member of IEEE, contributes to peer-reviewing papers, presents at technical conferences, serves on IEEE 1566 standard development, and is the secretary and associate editor at the IEEE Petrochemical conference (PCIC). He received the IEEE Outstanding Young Professional Achievement Award and was named one of the "Top 10 Professionals to Watch" by Pumps & Systems magazine. Manish holds BSEE and MSEE degrees from Virginia Tech.

Douglas Phares holds a BSEE and a MS in computer science from Virginia Tech. He worked for GE and now TMEIC Corporation for over 40 years in the Variable Speed Drives business. Doug began his career in system engineering and moved through roles in quality control, manufacturing, and sourcing. For the past 15 years, Doug has worked as a Sr. Sales/Application engineer and Marketing Leader, focusing on medium voltage variable frequency drive systems for cement, utilities, petrochemical and mining. He serves as the national chair of the IEEE IAS cement industry committee.

Tutorial PCIC 2022-8: An Introduction to Digital Switchgear
1:00 p.m. – 4:45 p.m.

Abstract: Medium voltage (MV) switchgear is a key element of the electrical energy distribution system. The Digital Switchgear concept, for MV distribution, presents many operational advantages and is inherently safe. It is based on the combination of technologies such as current and voltage sensors and IEC 61850 incorporated into modern numerical IEDs. When these technologies are combined in an optimal way the advantages of digital switchgear include increased safety, space, weight and energy savings, flexibility towards changing load flows, the ability to easily handle load changes, quicker delivery times and the possibility of late customization. In this tutorial, we will cover the background and characteristics of Digital Switchgear and contrast it with conventional switchgear. Two key component technologies, current and voltage sensors and IEC 61850 based protection and control will be covered in depth. The practical experiences from the early projects in the field will be presented.

Instructors:

Dr. Harshavardhan (Harsh) Karandikar has over 30 years of experience in research, engineering and product management of industrial products and services and with a focus in the last decade on technologies for medium voltage electrical power distribution. He currently is the Global Product Manager for Medium Voltage ANSI switchgear and for ANSI Digital Initiatives for ABB's Distribution Solution business. Harsh holds a number of patents and has authored or co-authored over seventy technical publications in journals and conferences. Harsh holds a Ph.D. from the University of Houston. He is a Senior Member of IEEE and a Fellow of the ASME.

Joemoan (Joe) Xavier is currently the Global Product Manager for the ANSI portfolio of ABB Digital Substation Products & Digital Systems. After receiving his B.Tech. degree in Electrical & Electronics Engineering, he started his career as a protection relay engineer. He has over 28 years of experience with Power System protection and automation applications, business development and product management. Joe has authored, co-authored, and presented several technical papers on Protection, Automation & IEC 61850 applications and is an active member of IEEE PES Power System Relaying and Control Committee.



Tutorial Proposal – for PCIC 2023

The Tutorial Subcommittee strives to offer a tutorial slate that will appeal to a wide cross section of PCIC attendees depending upon their experience, discipline and responsibilities. All tutorials are presented by experts and are intended to help experienced professionals update or refresh their knowledge base and to accelerate development of those new to the profession. The tutorial program is intended to provide all PCIC attendees with an opportunity to expand their PCIC experience, providing even more value as a result of their tutorial participation.

Any individual (s) interested in presenting a tutorial of topics relevant to PCIC attendees, is encouraged to fill out the form below. PCIC guidelines for non-commercialism available at the PCIC website are required to be followed for all presentations and handout materials. Due to limited time available for tutorials, each tutorial shall be of four hours duration.

The Lead Instructor is responsible for submitting the completed form electronically to the Tutorial Subcommittee Chair.
All tutorial instructors are required to register for the PCIC Conference

Schedule:

- Lead Instructors submit proposals to Tutorial SC Chair _____ November 1, 2023
- Tutorial SC Chair notifies lead instructor of tutorial status _____ February 1, 2023
- Lead Instructor submits CV of all Instructors _____ March 1, 2023
- Lead Instructor submits finished tutorial for non-commercialism check _____ August 15, 2023

Simple Steps to follow to submit a tutorial proposal

- Or complete the 2023 PCIC Tutorial Proposal form below, and email it to;
 Daleep Mohla DCM Electrical Consulting Services, Inc. – Chair, PCIC Tutorial Subcommittee
d.c.mohla@ieee.org, cc: Draycrow@aol.com; nbhatia@bechtel.com
- Or go to <http://ieeepcic.com/operating-subcommittees/tutorials> and complete the on-line form 2023 Tutorial Proposal



PCIC 2023 Tutorial Submission Form

1.) **Title of Tutorial:** *(maximum of 100 characters including spaces)*

2.) **Abstract** *(maximum of 1000 characters including spaces)*

3.) **Lead Instructor:** *(see notes 3, 4 below)*

Name: _____ Title: _____

Company: _____ Telephone: _____

Address: _____

City/State/Zip: _____

Email: _____



4.) **Other Instructor(s) Name & Company affiliation:** *(see note 5 below)*

5.) **Send To: Daleep Mohla – Chair, PCIC Tutorial Subcommittee**

DCM Electrical Consulting Services, Inc.

Email to: d.c.mohla@ieee.org, cc: Draycrow@aol.com; nbhatia@bechtel.com

Notes:

1. The title should accurately reflect material to be addressed in the tutorial. It should be limited to a maximum 100 Characters with spacing.
2. The abstract limited to 1000 Characters with spaces should summarize material to be covered in the tutorial and should be in complete sentences (no bulleted list). Please note that tabs, fonts and bullets may be lost in formatting. Only the use of spaces and carriage returns will be retained.
3. **Lead instructor is responsible for all submissions and serves as the main contact for all tutorial** related correspondence. He or she is responsible to ensure that the presentation and handout material (printed or electronic) is free from any commercialism to comply with PCIC policies. This includes logos and screen savers used in the slides used during presentation.

After notification of acceptance, the lead instructor shall submit Biographies of all the instructors. The biography of the instructors should be limited to 1000 characters with spaces. If there are more than two instructors, the total characters with spaces for all instructors should not exceed 2000. Please note that tabs, fonts and bullets may be lost in formatting. Only the use of spaces and carriage returns will be retained.

4. Presenters are responsible for providing paper copies of the handout to attendees. Electronic handout material can be given to the attendees in addition to the paper copies. Power point slides should be printed a maximum of two slides per page for clarity.
5. The number of instructors for the tutorial should be a minimum of two and a maximum of four (including the lead instructor) with not more than two from any one company or organization.



Guest Tour Information

Guest Tours are offered by the IEEE-IAS-PCIC Local Committee on Monday September 26, 2022, through Wednesday September 28, 2022 of the conference. The tours allow the guest to experience local areas of interest. Tour tickets are non-refundable – unless cancelled but may be exchanged or sold between guests. Exchange information will be made available in the Guest Hospitality Suite.

NOTE: Some Venues may require masks be worn when inside their facility or shop.

Tours will operate rain or shine.

Those registered for tours will meet at the Guest Hospitality Suite in the Directors H on the lobby Level of the hotel. It is recommended guests arrive approximately 15 minutes to check in with your guide.

***Please note PCIC reserves the right to cancel tours if registrations are less than the minimum capacity levels required.**

Monday, September 26, 2022

Tour 1 – The Fort Restaurant and Adobe Tour and Cooking Program 12:01 PM – 4:30 PM \$85.00

The great-granddaughter of the founder Sam Arnold will be leading your private tour through this award-winning rustic replica of an Adobe Designed Fort.



Enjoy the atmosphere in the foothills with an actual Teepee, a real Adobe beehive oven, multiple fireplaces with wood-burning stoves. A great venue to experience the Mountain Man era.

Following your tour, you will participate in a cooking class. The Fort's award-winning menu features fine Beef, Buffalo, Game, and Seafood.

Tour 2 – Foothills Tour 12:00 noon – 5:00 PM \$55.00

Along with your Tour Guide, enjoy a visit to the RED ROCKS PARK & AMPHITHEATER, one of Denver's National Historic Landmarks just 20 miles away from Denver. Enjoy the sights of this naturally carved mountain. Continue with a short walk to the amphitheater for a spectacular overview of the entire foothills, city, and distant plains.



Originally this area was a Ute Indian Habitat for centuries, converted into a musical venue by the Civilian Conservation Corps (CCC). Listed as one of the seven wonders of the geological world. Now a popular music venue that seats 9000 spectators.



Enjoy scenic mountain landscapes as we continue your drive through the Lookout Mountain region site of BUFFALO BILL'S GRAVE AND MUSEUM. Tour the museum's iconic old west figures, read stories of pony express riders, buffalo hunters, and the fantastic Showman Buffalo Bill. Enjoy time on your own along the Historic Washington Street, Main Street of Golden Colorado.

Tuesday, September 27, 2022

Tour 3 – Tour of the Brown Palace Hotel and Royal Palace High Tea **10:30 AM – 3:00 PM** **\$95.00**

This tour is a short walk from the hotel. It includes a Historical Tour of the Brown Palace Hotel and is followed by the Royal Palace Tea.



The Brown Palace Hotel was opened in 1892. The private tour by the hotel's docent guide will share the history of the iconic hotel and the famous guests that have stayed there during the past 100 years. A delicious Royal Tea Menu includes selected tea of your choice, a refreshing glass of Chandon Brut Kit Royals, homemade scones served with Devonshire Cream & preserves. Delight in the exquisite selection of finger sandwiches, classic tea pastries, and a dark chocolate truffle.



Tour 4 – Rocky Mountain National Park and the Village of Estes Park **7:30 AM – 5:00 PM** **\$98.00**

Along with your Tour Guide, depart the city of Denver and drive 60 miles north to the Big Thompson Canyon. Like Lewis and Clark, enjoy a spectacular drive through the Big Thompson Canyon. Take in the breathtaking views, mountain landscapes, and the sparkling reflective water of the canyon.

THE TOWN OF ESTES PARK is located on the western ridge of the Big Thompson. Drive along Elkhorn Avenue, the main street of the village, to the entrance of Rocky Mountain National Park.

During the fall season, the Aspen trees display brilliant shades of gold. As you enter the park you will see the abundance of this colorful quilted landscape. During your drive through the National Park, you will experience meadows of Wildlife sighting of Deer, Elk, and Moose. Enjoy a walk around Bear Lake with plenty of photo opportunities.



Upon your departure, at the Fall River location, you will have another photo opportunity from the motorcoach of the Historic Stanley Hotel Landmark. Back in the Village of Estes Park for time on your own to enjoy sweets, some cool beverages or lunch before you return to the hotel.

Wednesday, September 28, 2022

Tour 5 – Castles of Colorado Tour **8:80 AM – 5:00 PM** **\$98.00**

Enjoy your day visiting the Castles in Colorado. These castles are an unexpected delight. You will be transported into an elegant old world of history and beauty and costumes!

Glen Eyrie Castle

We will tour this castle and the surrounding grounds which were designed and built-in 1871. The Tudor-style castle and has its own electric power plant! When you step through the castle door, some say you are transported into a "Harry Potter" world.



Cherokee Ranch Castle

Located in Sedalia, Colorado, you will be served as a guest of the castle with tea and a private tour. This Scottish-style castle overlooks nearly the entire front range of Colorado. The castle is set on the edge of Cherokee Mountain.

Tweet Kimball established a foundation to ensure that Cherokee Ranch and Castle would remain in perpetuity as a gift for the public to enjoy. We look forward to sharing her legacy with you as you create memories with us!



We recognize and will do our best to accommodate special meals for food allergies or intolerances but cannot guarantee completely allergy-free meals.

Tour 6 – Tour of the Brown Palace Hotel and Royal Palace High Tea**10:30 AM – 3:00 PM****\$95.00**

This tour is a short walk from the hotel. It includes a Historical Tour of the Brown Palace Hotel and is followed by the Royal Palace Tea.



The Brown Palace Hotel was opened in 1892. The private tour by the hotel's docent guide will share the history of the iconic hotel and the famous guests that have stayed there during the past 100 years. A delicious Royal Tea Menu includes selected tea of your choice, a refreshing glass of Chandon Brut Kit Royals, homemade scones served with Devonshire Cream & preserves. Delight in the exquisite selection of finger sandwiches, classic tea pastries, and a dark chocolate truffle.

**Tour 7 – Vail Village Tour and Alpine Adventure****7:30 AM – 5:00 PM****\$75.00**

Adventure with your Tour Guide through the Rocky Mountains for extravagant beauty amongst the spectacle of the Rocky Mountain range, colorful fall foliage, meandering canyons, and clear streams. A breathtaking wonderful two-hour drive to Vail Colorado!

At an elevation of 8,022 ft. above sea level, you will feel the calm of the White River National Forest area and the quaint alpine charm of the village. Upon your arrival in Vail, you are invited to a tour of the Betty Ford Garden and Park. This is an informative and photographic journey through one of the most beautiful and distinguished high-altitude botanical gardens.

Take time on your own to go through the Village of Vail to enjoy a bite of lunch, some wonderful shopping, and spectacular views of the Ski Resort and Vail Mountain.



**Optional GONDOLA RIDE TO THE TOP OF VAIL MOUNTAIN. (\$45.00 additional and registered with Vail Village Tour)

Tour 8 – Victorian Mansions of Denver Tour**8:00 AM – 3:00 PM****\$75.00**

Step inside the mansions of the most elite and enhancing families of Denver, Colorado!

Molly Brown House and Museum

Walk through the home of Titanic survivor Margaret Tobin Brown. This home, in its early 20th-century grandeur, shares the story of The Unsinkable "Molly Brown." Purchased in 1894 by the lucky few who made millions in the mountains, the railroads, or the prestigious Capitol Hill neighborhood.

**Byers Evans House and Museum**

William Evans, the oldest son of Colorado's second territorial Governor John Evans, purchased the home in 1889. Members of the Evans Family continued to live in the home until 1981. This home has been donated to the Colorado Historical Society. Enjoy the two-story Italianate-style home. Presently an inspiring Women's History Center.



Relax afterward and enjoy time on your own at the Historic Larimer Square. The Historical Block of Iconic Buildings, now an eclectic set of shops and restaurants, is a delightful walk along the original site of Denver. Plenty of sitting areas in a lively pedestrian-friendly gathering place.

Tour 9 – Tour of the Brown Palace Hotel and Royal Palace High Tea**10:30 AM – 3:00 PM****\$95.00**

This tour is a short walk from the hotel. It includes a Historical Tour of the Brown Palace Hotel and is followed by the Royal Palace Tea.



The Brown Palace Hotel was opened in 1892. The private tour by the hotel's docent guide will share the history of the iconic hotel and the famous guests that have stayed there during the past 100 years. A delicious Royal Tea Menu includes selected tea of your choice, a refreshing glass of Chandon Brut Kit Royals, homemade scones served with Devonshire Cream & preserves. Delight in the exquisite selection of finger sandwiches, classic tea pastries, and a dark chocolate truffle.



IEEE-IAS-PCIC 2022 Conference Hotel Contact Information

Sheraton Denver Downtown Hotel

Sheraton Denver Downtown Hotel
1550 Court Place,
Denver, Colorado 80202 USA,
Phone: 1 303-893-3333



Facilities:

The Sheraton Denver Downtown Hotel offers access to some of the best attractions in Denver, Colorado. A mile-long pedestrian promenade brims with shopping, dining, nightlife, and entertainment. Catch a game at Coors Field, tour the Denver Art Museum or the Denver Zoo. There is a nearby light rail system that makes it easy to get around Denver. The hotel boasts a heated rooftop pool, 5,000-square-foot Sheraton Fitness center, on-site business services. Enjoy diverse dining options like Yard House, BEZEL or the 16th Street Commons Coffee Bar. The hotels rooms feature free Wi-Fi and an ergonomic, height-adjustable desk and inspiring views of downtown Denver from select suites.

Concierge Desk:

The Sheraton Denver Downtown Hotel offers Concierge Services to assist PCIC attendees with travel and entertainment arrangements while at the hotel.

COVID-19 Information

As part of Marriott International's family of brands, we have implemented a variety of new protocols and elevated practices, in response to the COVID-19 pandemic and keeping with our high standards of cleanliness and commitment to providing excellent service.

Ground transportation from Denver International Airport (DEN):

The Sheraton Denver Downtown Hotel does not provide shuttle service to the airport. Public transit and other travel options are available.

Downtown Denver is about 25 miles from the airport

Public Transportation

Denver's A-Line commuter train provides an easy way to get to downtown from the airport. The train takes about 37 minutes to get from the airport to Denver Union Station. Trains depart every 15 minutes during peak travel times and every half hour during off-hours. Tickets cost \$10.50. To catch the train, head to the Transit Center, on the ground level outside the Westin at the south end of the terminal. From Denver Union Station the 16th Street Mall Shuttle takes about 10 minutes, Uber/Lyft are available or it's about a 25-minute walk.

Shuttle Service

Airport Express (Tel: 210-281-9900) is Denver International Airport's authorized shuttle service. Shuttles depart every 15 minutes from 7 a.m. to 1:30 a.m. daily to downtown hotels. Passengers may purchase tickets at the airport's baggage claim area. Ticket rates are \$18.00 per person to downtown hotels or \$32.00 for a roundtrip ticket.; reservations suggested. To book online visit <http://www.sairportshuttle.com/>. Major Credit cards accepted.

Taxis, Limos and Rental Cars

Taxis from Denver airport use a "Zone System" with a flat one-way fare. The Sheraton Denver Downtown Hotel is in Zone A which costs about \$56.00. Taxis are in the Jeppesen Terminal on Level 5, island 1, outside doors 505, 507 and 511 on the east side, and doors 506, 510 and 512 on the west.

Lyft and Uber also serve Denver's airport, with pickup being on level 5 at island 5. Airport officials suggest waiting to request your ride until after you've claimed your luggage or have arrived on the fifth level.

Limousines can be pre-arranged, c heck-in at the limo booth located outside Jeppesen Terminal, Level 5, island 2, outside doors 505-507 and 511-513 (east side), and 504-506 and 510-512 (west side). For additional information go to https://www.flydenver.com/parking_transit/transit/limousines

Rental car shuttles pick-up and drop-off from Jeppesen Terminal Level 5, Island 4, outside doors 505-513 (east side) and 504-512 (west side).

Parking Information

Hotel On-site is available, and the parking fee is \$45.00 per day

There are several off-site self-parking facilities located within a short walking distance of the hotel. Pricing ranges from \$10 to \$40 (most have no in-out privileges).

Conference Registration Forms – (Note: All items marked with * are mandatory)

Last Name* _____ First Name* _____ Middle Initial _____

Company* _____ Badge to Read* _____

Division/Department:

If you are bringing a Guest: Name _____

Guest contact info: email and cell number (for tour updates) _____

(Note: Cost of one registered Guest attendance at Monday Social is included with Full registration)

Emergency Contact*: _____ Phone*: _____ E-mail: _____

IEEE Member Number (Required to receive member pricing) _____

PCIC ID No _____ (ID is located on mailer label. If not on mailer, leave blank)

Address* _____

Address 2 _____

City* _____ State/Province* _____

Zip/Postal Code* _____ Country* _____

Phone* _____ Fax _____ Email* _____

I agree to receiving periodic email information from IEEE-IAS-PCIC (you must select one*) Yes No

- Do not include my information in the Conference Attendee List

Registrant Industry/Occupation*:

- | | | | |
|--|------------------------------------|--|--|
| <input type="radio"/> Academic | <input type="radio"/> Contractor | <input type="radio"/> Manufacturer's Rep | <input type="radio"/> User - Corporate |
| <input type="radio"/> Certification Agency | <input type="radio"/> Distributor | <input type="radio"/> Retired | <input type="radio"/> User - Plant |
| <input type="radio"/> Consultant | <input type="radio"/> Manufacturer | <input type="radio"/> Student | |

IEEE Membership: (Check only the highest level that applies)

- | | |
|---|---|
| <input type="radio"/> IEEE Fellow | <input type="radio"/> IEEE Member |
| <input type="radio"/> IEEE Life Fellow | <input type="radio"/> IEEE Associate Member |
| <input type="radio"/> IEEE Life Member | <input type="radio"/> IEEE Student Member |
| <input type="radio"/> IEEE Life Senior Member | <input type="radio"/> Non-IEEE Member |
| <input type="radio"/> IEEE Senior Member | <input type="radio"/> Student |

Other Memberships and PCIC Status (Check all those that apply)

- | | |
|--|-----------------------------------|
| <input type="radio"/> IAS Member | <input type="radio"/> IAS Officer |
| <input type="radio"/> PCIC Emeritus Subcommittee (SC) Member | <input type="radio"/> None |

Conference Attendee Information (Check all those that apply)

- | | |
|--|--|
| <input type="radio"/> Author (2022 PCIC) | <input type="radio"/> Attended 25 or more PCIC Conferences |
| <input type="radio"/> PCIC Session Chair | <input type="radio"/> First Time Attendee (Registrant) |
| <input type="radio"/> PCIC Executive Subcommittee Member | <i>See note on tutorials on (See Page 26)</i> |
| <input type="radio"/> Local Conference Committee Member | <input type="radio"/> First Time Attendee (Guest) |

Attendance at Special Meal Functions (Pre-registration is required) (Check all those that apply)

(Cost of Special Meal Functions is included with full registration)

- | | |
|--|--|
| <input type="radio"/> YEDS Monday PCIC Orientation Breakfast | <input type="radio"/> Emeritus Tuesday Luncheon (Emeritus Subcommittee Members Only) |
| <input type="radio"/> YEDS Tuesday PCIC Luncheon | |

Registrant Special dietary needs options: o-Gluten-Free, o-Halāl/Kosher, o-Low Sodium, o-Peanut Allergy, o-Vegan, o-Vegetarian

Accessibility Requirements (Meeting Rooms): _____

Conference Registration Fee Schedule (US Dollars)

Full Registration includes: All technical sessions, all open subcommittee sessions, all luncheons, and Monday Night Social for registrant and registered guest.

One Day Registration includes: Admittance to the selected days' paper presentations, lunch and a conference CD. It does permit the registrant to visit the hospitality suites. Monday "One-Day Registrations" do not include the admittance to the PCIC Evening Social.

Bound copies of the Conference Record may be purchased with conference registrations received prior to August 22, 2022, at a price of \$40.00 for both IEEE Members and Non-Members (order below). A limited number may be available at the conference on a first-come first-serve basis.

Conference Record download will be available in the Conference Website and Conference App.

① REGISTRATION OPTIONS		IEEE Member	Non-Member	Total
<input type="checkbox"/> Early-Bird Full Registration prior to July 1, 2022		\$550.00	\$770.00	
<input type="checkbox"/> Full Registration from July 1 to August 20, 2022		\$670.00	\$890.00	
<input type="checkbox"/> Full Registration after August 20, 2022 or At-Conference		\$825.00	\$1045.00	
<input type="checkbox"/> Additional Fee for "Not being registered at the Conference Hotel" (i.e. staying elsewhere)		\$225.00	\$225.00	
PCIC Vancouver Official Hotel Confirmation Number: _____				
<i>A valid confirmation number must be provided otherwise the fee shown above will be applied: (Note: No after-the-fact rebates will be issued)</i>				
<input type="checkbox"/> IEEE Life Member or Student \$0.00		\$0.00	---	\$0.00
<input type="checkbox"/> Any One-Day Registration – <input type="checkbox"/> Monday, <input type="checkbox"/> Tuesday, or <input type="checkbox"/> Wednesday (does not include lunches or Monday social)		\$350.00	\$550.00	
<input type="checkbox"/> Certificate for Personal Development Hours (PDH) ✦		\$40.00	\$40.00	
② ADDITIONAL ITEMS		IEEE Member	Non-Member	Total
Qty	Description			
	Additional Monday or Wednesday Luncheon	\$70.00	\$70.00	
	Additional Tuesday Luncheon	\$55.00	\$55.00	
	Conference Record download	included	included	\$0.00
	Bound Copy of Conference Record	\$40.00	\$40.00	
③ TUTORIAL REGISTRATION (Thursday – ½ day each): ☆		IEEE Member	Non-Member	Total
<input type="checkbox"/> One Day Registration – Thursday (If not already registered at conference)		\$100.00	\$130.00	
<input type="checkbox"/> Tutorial 1	Wiring Methods in the 2023 National Electrical Code for Conductors and Cables up to 35,000 volts	\$120.00	\$170.00	
<input type="checkbox"/> Tutorial 2	Standby Battery Chemistries, Construction, and Sizing Concepts	\$130.00	\$150.00	
<input type="checkbox"/> Tutorial 3	AC Power Substation Grounding: Analysis and mitigation for Touch and Step Voltage Hazards	\$130.00	\$150.00	
<input type="checkbox"/> Tutorial 4	Repairs / Reconditions / Replacements of AC Electric Motors in Petroleum and Chemical Industries	\$130.00	\$150.00	
<input type="checkbox"/> Tutorial 5	The National Electrical Code 2023 Significant Changes	\$130.00	\$150.00	
<input type="checkbox"/> Tutorial 6	Metric Development for Electrical Power Systems	\$130.00	\$150.00	
<input type="checkbox"/> Tutorial 7	Rethinking Medium Voltage (MV) adjustable speed drive (ASDs) for Motor Control	\$130.00	\$150.00	
<input type="checkbox"/> Tutorial 6	An Introduction to Digital Switchgear	\$130.00	\$150.00	
<input type="checkbox"/> ✦	Continuing Educational Unit (CEU). (Only one fee required if attending more than one Tutorial)	\$40.00	\$40.00	

☆ *First time attendees registered for the entire conference are eligible to attend one tutorial for the reduced rate of \$50 if registered before September 1, 2019. Tutorial selection must be made at time of registration otherwise the full tutorial fee will apply. (See note on Page 26)*

✦ *Pre-registration is mandatory to obtain these certificates (See page 12)*

④ GUEST TOURS			
Tour #	Description	Date	Price Each
Tour #1	The Fort Restaurant and Adobe Tour & Cooking Class (50 max)	Monday, September 26, 2022	\$85.00
Tour #2	Tour and Tea at Historic Brown Palace Hotel (14 max)	Monday, September 26, 2022	\$95.00
Tour #3	Denver Foothills Tour (50 max)	Monday, September 26, 2022	\$85.00
Tour #4	Rocky Mountain National Park and Estes Park (50 max)	Tuesday, September 27, 2022	\$98.00
Tour #5	Castles of Colorado Tour and Tea (50 max)	Tuesday, September 27, 2022	\$99.00
Tour #6	Tour and Tea at Historic Brown Palace Hotel (14 max)	Tuesday, September 27, 2022	\$95.00
Tour #7	Daytrip to Vail (50 max)	Wednesday, September 28, 2022	\$95.00
Tour #7A	Gondola Ride at Vail Mountain (Must pay for Daytrip to Vail)	Wednesday, September 28, 2022	\$45.00
Tour #8	Victorian Mansions of Denver Tour (50 max)	Wednesday, September 28, 2022	\$75.00
Tour #9	Tour and Tea at Historic Brown Palace Hotel (14 max)	Wednesday, September 28, 2022	\$95.00

Note 1: Space on some tours may be limited therefore reservations cannot be guaranteed. If tour minimums not met, PCIC reserves the right to cancel the tour and will provide a full refund.

Note 2: Tickets for Guest Tours may be obtained at the conference for an additional \$10.00 per ticket if space is available.

Note 3: To participate in the Gondola ride at Vail Mountain the advanced purchase required and Daytrip to Vail Tour needs to be purchased.

CONFERENCE LOGO SHIRTS

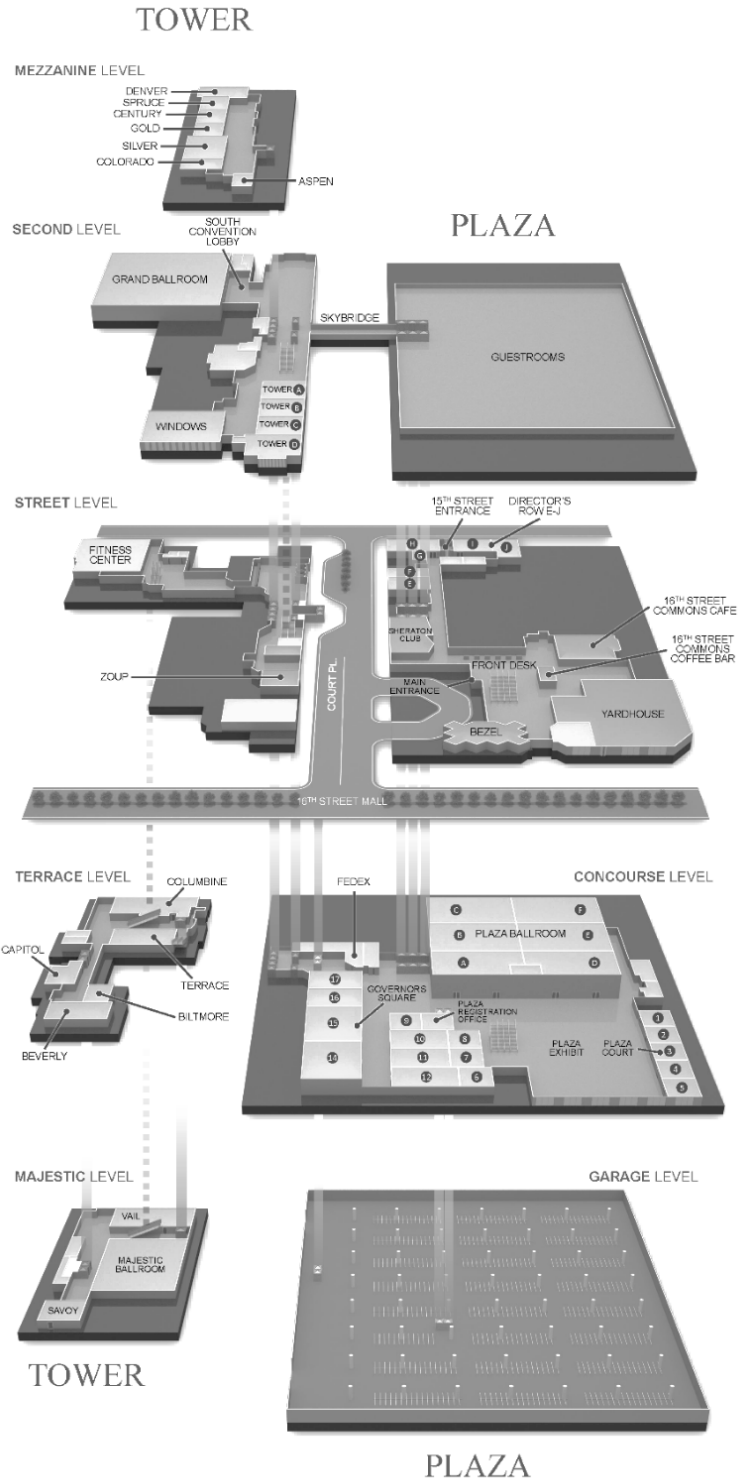
The official conference with the IEEE-PCIC Denver logo embroidered on the left chest or back. Shirts ordered prior to August 15, 2022, will be available for pick up at the conference during registration. See the conference web site for photo of the shirts.

⑤ Conference Logo Long Sleeve Shirt / Polo	PRICE EA
Men's (<i>Long Sleeve</i>) XS, S, M, L, XL, 2XL, 3XL, 4XL, 5XL	\$60.00
Men's (<i>Polo</i>) XS, S, M, L, XL, 2XL, 3XL	\$55.00
Women's (<i>Long Sleeve</i>) XS, S, M, L, XL, 2XL, 3XL	\$60.00
Women's (<i>Polo</i>) XS, S, M, L, XL, 2XL, 3XL	\$55.00

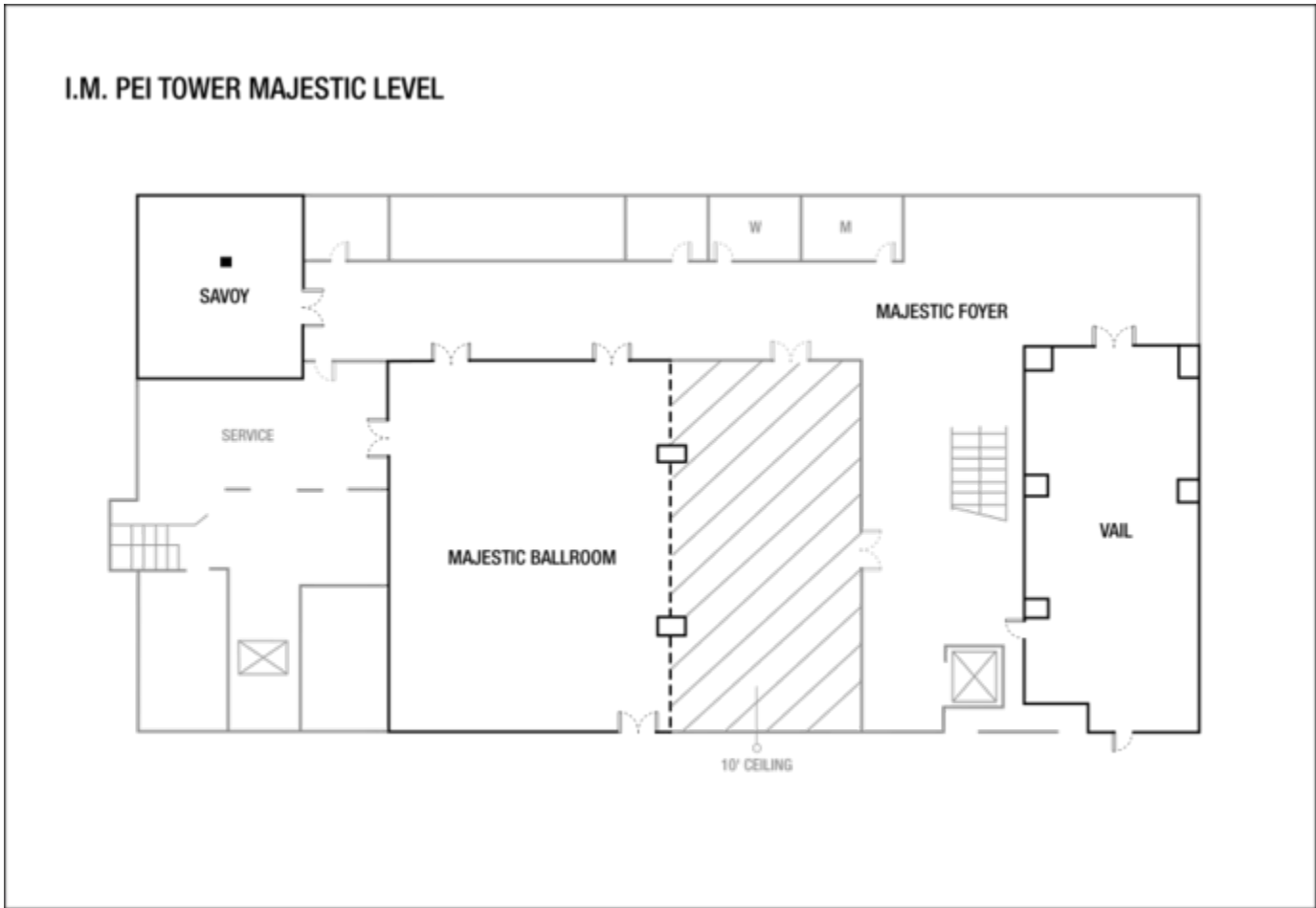
Summary of Conference Fees

Registration and Other Fees	Totals from above
① REGISTRATION OPTIONS	
② ADDITIONAL ITEMS	
③ TUTORIAL REGISTRATION	
④ GUEST TOURS	
⑤ CONFERENCE SHIRTS	
TOTAL	

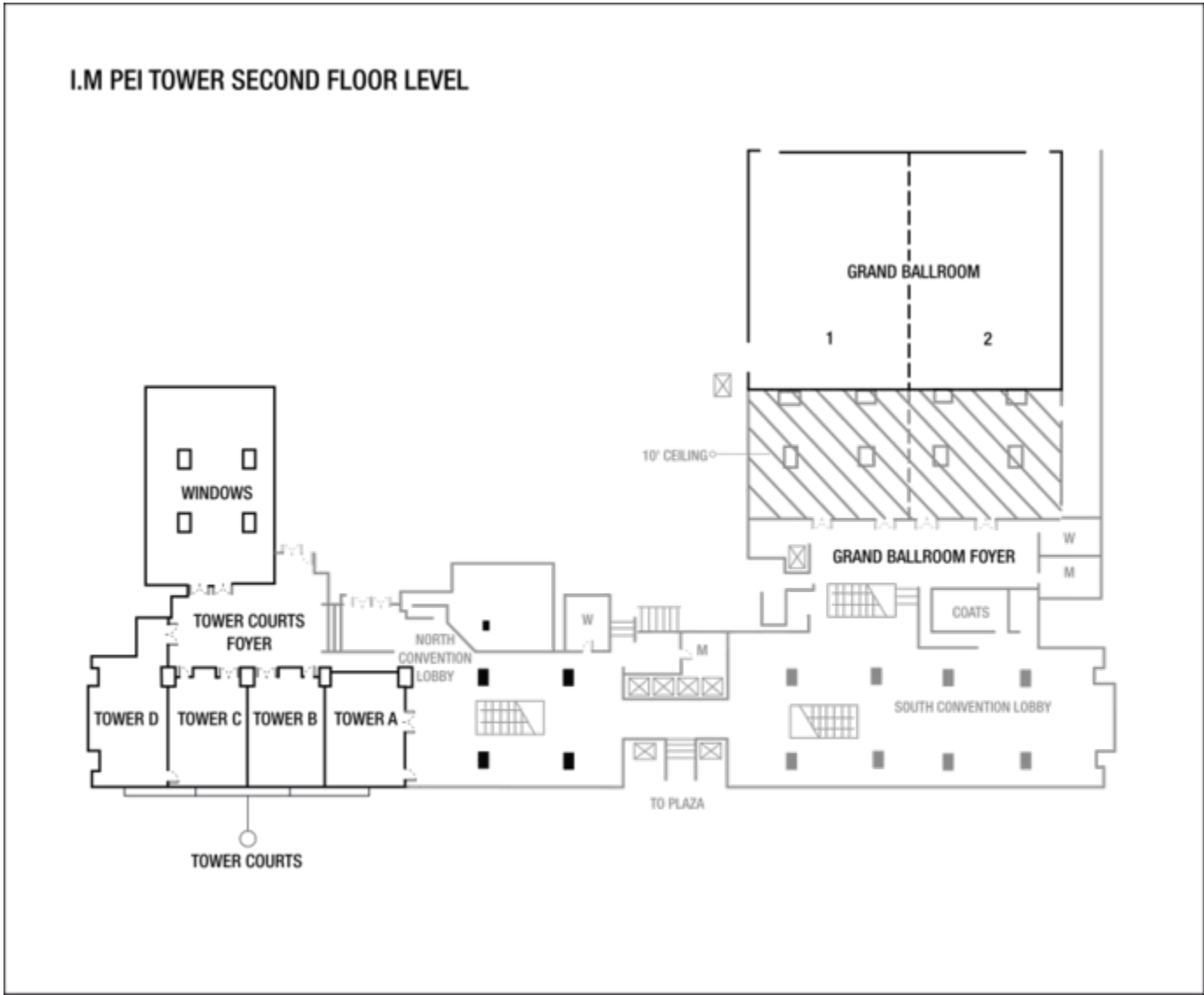
Hotel and Convention Center Layout and Room Locations



Hotel and Convention Center Layout and Room Locations

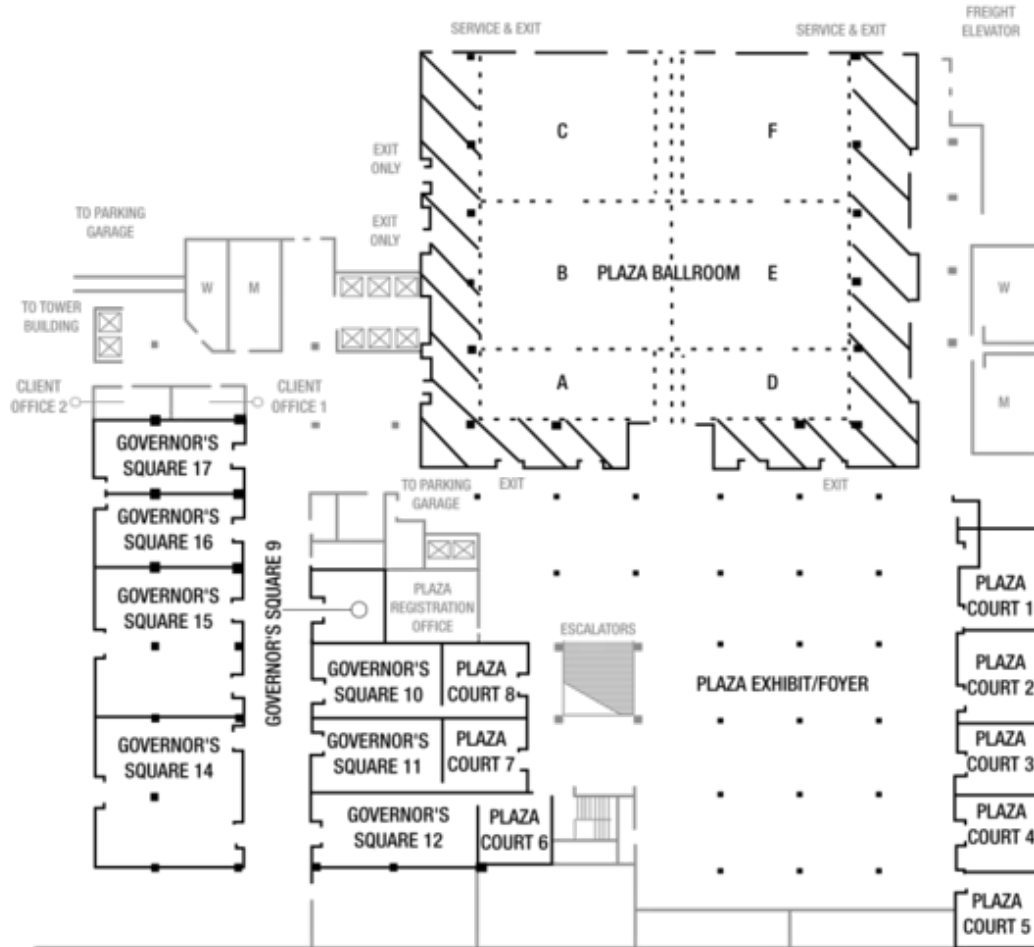


Hotel and Convention Center Layout and Room Locations



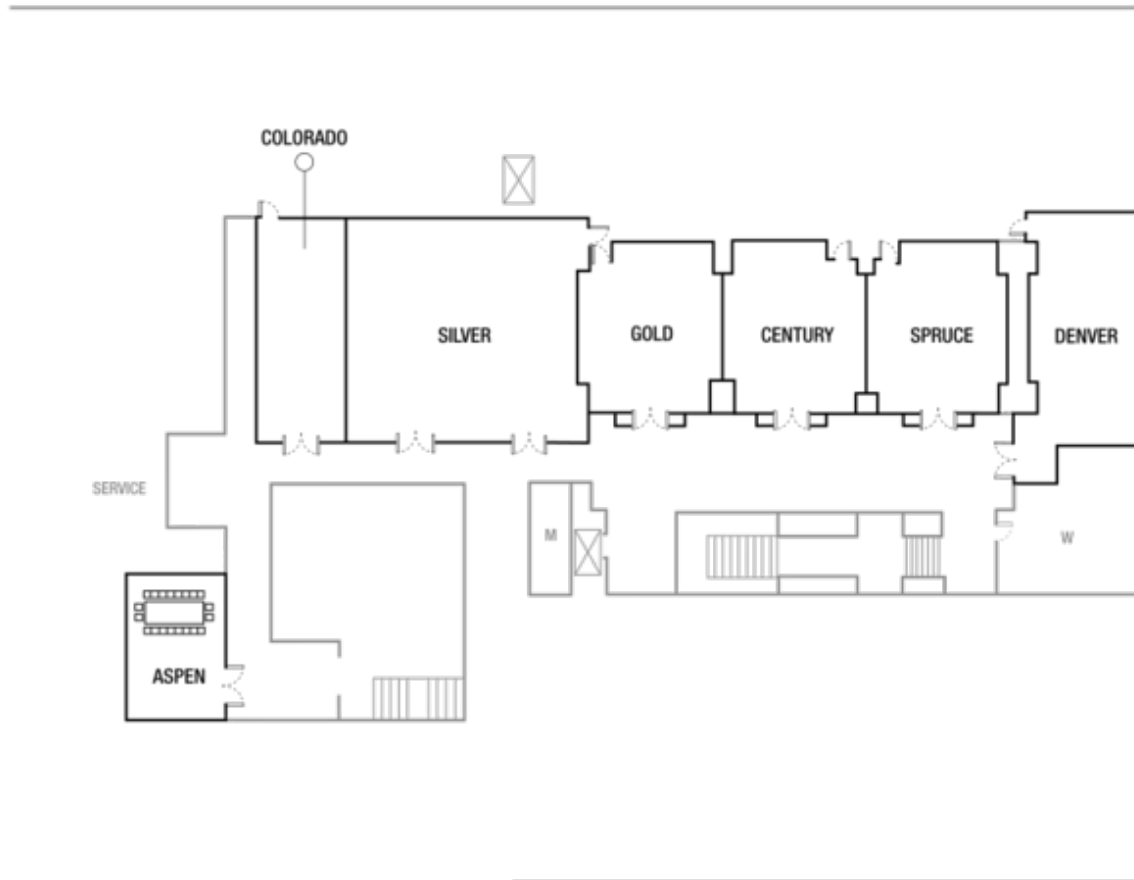
Hotel and Convention Center Layout and Room Locations

PLAZA BUILDING CONCOURSE LEVEL



Hotel and Convention Center Layout and Room Locations

I.M. PEI TOWER MEZZANINE LEVEL





*It's time to start planning to attend the
**70th IEEE IAS Petroleum and
Chemical Industry Committee
Conference***

***IEEE PCIC 2023
New Orleans, LA
September 11 to 14, 2023***