System Design Course

Robust and reliable networks all begin with great system design. Learn system design techniques following a top-down approach. This course will enable you to design a system that is reliable, maintainable, expandible, and minimizes the impact of control system or network failures. The course will also cover the use of network monitoring devices for fast fault and failure notification.

Case studies and examples from manufacturing, process plants, water treatment plants, material handling, and automated sorting, storage and retrieval systems are used in this course to provide you with real-world application experience.

The course ends with a written theory test. Successful students will be certified by PROFIBUS and PROFINET International as a Certified PROFIBUS System Designer.

Upon completion of this course, the student shall be able to:
- Understand the many trade-offs in designing a system.
- Be able to calculate the network availability.
- Understand the importance of network monitoring.
- Design a reliable PROFIBUS and PROFINET network.

Course outline

- General system design requirements
- The control system lifecycle
  - Maintenance
  - Health checks
  - Fault finding features
  - Communication and transmission technologies
  - Environmental considerations
  - Choice of appropriate devices, cables, and connectors
- PROFIBUS and PROFINET network layout and design
- PROFIBUS and PROFINET network architectures
  - Performance, maintenance, and reliability
  - Integration of operation, supervision, and engineering information in the control system
- PROFIBUS and PROFINET profiles
  - How profiles simplify system design and maintenance
  - Provide vendor independence
  - Use of GSD files and DTMs
- Hazardous areas
  - Essential requirements
  - Available design options
  - Intrinsically safe RS485 and MBP segments
- Redundancy and high availability systems
  - Basics of component and system reliability
  - Reliability modelling techniques
  - Evaluation of practical solutions
  - Limitations and essential needs
- Fiber optics, infra-red, and wireless
  - Basics of transmission
  - Connector and cable types
  - Design and application of typologies
  - Solutions for redundant systems
- Safety related systems
  - Essential requirements
  - Design options
- Control system and network timing
  - Sampling and timing considerations
  - DP and PA cycle time
  - Jitter estimation
  - Effect of gateways and couplers
- Isochronous cycle timing
  - Characteristics and applications
- Modern solutions for network monitoring
- Documentation and drawing standards

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Design Exercises

- Layout exercise
- Fiber optic design exercise
- FISCO exercise
- Availability Exercise
- Timing exercise
- Tutorial exercise

Class Day Information

- Attendees must bring a laptop or tablet which can read a USB drive.
- Attendees will receive a support USB drive with an electronic version of the materials plus key PI documents.
- Students will receive a certificate of attendance and 30 verifiable professional development hours
- A Certificate as a Certified PROFIBUS System Designer. The certificate is given only if the student passes the in-class theory test.
- Attendees will also receive a copy of *'Catching the process Fieldbus – An introduction to PROFIBUS and PROFINET'* co-written by the instructor James Powell
- Class size is limited to a maximum of 10 people.

Course duration

This course is delivered over three and half days. Each day requires 7.5 hours of instruction which includes two 15 minute breaks and one 30 minute lunch break.

Scheduled Classes

- On-site or On-demand classes are available upon request
- Please check our website for scheduled classes or contact us to arrange a training date

Course code and Prerequisites

- Course code: C-DESIGN-04
- There are no prerequisites for this course. However, it is highly recommended that the student has been introduced to PROFIBUS, PROFINET and have had some experience with basic network design before.

Instructor

James Powell, P.Eng., is the principal engineer and owner of JCOM Automation Inc. He has written many articles and two books: *HART Communication Protocol – a practical guide,* and *Catching the process fieldbus – An introduction to PROFIBUS and PROFINET*. James is a certified PROFIBUS DP, PA, and PROFINET network engineer, PROFIBUS System Design Engineer and has over 20 years of experience with PROFIBUS, PROFINET, EtherNet/IP, Modbus, and HART installations.

JCOM Automation is a member of PROFIBUS PROFINET North America and is a certified PROFIBUS and PROFINET training center and Competence Center.

To book this course for yourself or your team, please contact JCOM Automation at admin@jcomautomation.ca **or +1-705-868-8745.**

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