



ADVANCED DIPLOMA OF ELECTRICAL AND INSTRUMENTATION (E&I) ENGINEERING FOR OIL AND GAS FACILITIES

MODULE DETAILS

MODULE 20: Industrial Data Communications

Nominal duration: 3 weeks (24 hours total time commitment)

This time commitment includes the preparation reading, attendance at each webinar (1 hour plus 15-30 minutes for discussion), and the time necessary to complete the assignments and further study.

MODULE PURPOSE

The objective of this module is to outline the best practice in designing, installing, commissioning and troubleshooting industrial data communications systems. In any given plant, factory or installation there are a myriad of different industrial communications standards used and the key to successful implementation is the degree to which the entire system integrates and works together.

With the vast number of different technologies and standards currently on the market, the debate is not “what is the best”, but rather how does industry assess and select the most appropriate for given applications. The next challenge is to ensure that best practice is followed in designing, installing and commissioning the data communication links to ensure they run fault-free.

The industrial data communications systems in a plant underpin the entire operation. It is critical that personnel apply best practice in designing, installing, troubleshooting and fixing any problems that may occur. The most critical component of any industrial data communications system is, in fact, the medium (i.e. the fiber or copper cable). This module outlines the critical rules followed in installing the data communications media, and then ensuring that the installation will be trouble-free for years to come.

Delegates are not required to know the minute details of the actual protocols used, but rather how to select, install and maintain the system in the most cost-effective and beneficial manner.

PRE-REQUISITE MODULES/UNIT(S)

None

ASSESSMENT STRATEGY

To evaluate the achievement of the learning outcomes; written assignments, group projects and practical exercises are set.



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**SUMMARY OF LEARNING
OUTCOMES**

1. Explain the fundamentals of data communication systems [20.1]
2. Select appropriate standards, technologies and methodologies for the selection and installation of Industrial Data Communication Systems [20.2]
3. Describe the commissioning, testing and troubleshooting of Industrial Data Communication Systems [20.3]

Learning Outcome 1

Explain the fundamentals of data communication systems [20.1]

Assessment Criteria

1. Examine and discuss the general attributes of Industrial Data Communication Systems [20.1.1]
2. Describe measures for noise and Ingress Protection [20.1.2]
3. Discuss the use of copper and fiber media in Industrial environments [20.1.3]
4. Describe the attributes of common Physical Layer standards [20.1.4]
5. Describe the basic attributes and applications of Industrial networks [20.1.5]
6. Examine and discuss the various protocols used in Industrial Data Communication Systems [20.1.6]
7. Discuss the use of wireless technologies in Industry [20.1.7]

Learning Outcome 2

Select appropriate standards, technologies and methodologies for the selection and installation of Industrial Data Communication Systems [20.2]

Assessment Criteria

1. Identify standards and technologies to use at device, operator, and enterprise level [20.2.1]
2. Select standards to use for long-distance SCADA/telemetry links [20.2.2]
3. Examine and discuss system design, installation, tips, tricks and pitfalls for: [20.2.3]
(a) Copper cabling and connectors



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- (b) Fiber cabling and connectors
- (c) Wireless

Learning Outcome 3 **Describe the commissioning, testing and troubleshooting of Industrial Data Communication Systems** **[20.3]**

Assessment Criteria

- 1. Describe the methods used for commissioning, testing and troubleshooting of:
 - (a) Copper infrastructure [20.3.1]
 - (b) Fiber infrastructure [20.3.2]
 - (c) Wireless infrastructure [20.3.3]
- 2. Discuss troubleshooting of networks at various layers of the OSI model [20.3.4]

Delivery Mode

A combination of asynchronous and synchronous e-learning delivery comprising a judicious mix of interactive online web conferencing, simulation (virtual labs) software, remote online labs, online videos, Power Points, notes, reading and study materials (in pdf, html and word format) accessed through the Moodle Learning Management System (LMS).