

# Advanced Casing Design Training Course

## Professional Development Training Course Outline

|          |             |               |                         |
|----------|-------------|---------------|-------------------------|
| Category | Engineering | Duration      | 5 Days                  |
| Base Fee | \$1,500 USD | Delivery Mode | Online / On-site Hybrid |

### Course Introduction

Advanced Casing Design Training Course is a comprehensive program designed to equip drilling engineers and other well-construction professionals with the critical skills and knowledge required to design robust and reliable casing strings for complex wells. As the industry pushes into more challenging environments including high-pressure, high-temperature (HPHT) and deep-water wells the need for expert casing design has become paramount. This course goes beyond fundamental principles to cover **advanced tubular mechanics**, **material selection**, and **load-case analysis** using modern software, ensuring participants can mitigate risks and enhance **wellbore integrity** throughout a well's lifecycle.

This intensive training is crucial for companies aiming to optimize drilling operations, reduce non-productive time (NPT), and improve overall project economics. Participants will gain a deep understanding of the **API standards** and **proprietary connections** essential for today's drilling challenges, as well as an appreciation for the factors that influence casing performance, such as **wear**, **corrosion**, and **buckling**. The program's blend of theoretical knowledge and practical application, including hands-on exercises and real-world **case studies**, prepares engineers to make informed decisions that enhance safety, operational efficiency, and long-term asset value.

### Programme Curriculum

#### Advanced Casing Design Training Course

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### Course Duration

5 days

### Course Objectives

Upon completion of this course, participants will be able to:

- Master advanced tubular design principles for complex drilling environments.
- Conduct sophisticated load-case analysis and triaxial stress analysis.
- Select appropriate OCTG (Oil Country Tubular Goods) for various well conditions.
- Apply API specifications (e.g., API 5CT) and industry best practices.
- Design casing for HPHT wells, directional wells, and extended reach drilling (ERD).
- Analyze the effects of wear, corrosion, and buckling on casing performance.
- Utilize casing design software and finite element analysis (FEA) for optimized solutions.
- Integrate casing design with wellbore stability and cementing operations.
- Perform risk assessments and select appropriate design factors.
- Minimize operational risks and non-productive time (NPT).
- Enhance well integrity and long-term well safety.
- Develop cost-effective casing programs to optimize project economics.
- Understand the impact of new technologies like AI and machine learning on well design.

### Organizational Benefits

- Reduced risk of casing failure, blowouts, and environmental incidents.
- Lower capital expenditure through optimized material selection and reduced non-productive time (NPT) due to operational failures.
- Faster and smoother drilling operations due to well-planned casing programs.
- Proactive identification and management of drilling and completion challenges.
- Proper casing design extends the life of the well, maximizing production and return on investment.
- Ensures adherence to the latest **API standards** and regulatory requirements.
- Builds internal expertise and a culture of excellence in well engineering.

### Target Audience

- Drilling Engineers & Senior Drilling Engineers
- Drilling Supervisors & Workover Engineers
- Petroleum Engineers & Completion Engineers
- Geologists & Reservoir Engineers
- Well Site Engineers & Toolpushers

- Subsurface Team Leads & Operations Managers
- Asset Integrity Engineers
- Consultants involved in well planning and design

## Course Outline

### Module 1: Fundamental Principles & Advanced Concepts

- Review of casing functions, types, and materials (API 5CT).
- **Advanced tubular mechanics**: yield strength, tensile strength, and burst/collapse pressure.
- Introduction to **triaxial stress analysis** (von Mises criteria) for combined loading.
- Selection of **proprietary connections** and premium tubulars.
- **Case Study**: Analysis of a casing failure due to combined loading in a deep-water well.

### Module 2: Casing String Design & Load Analysis

- Defining **service life load cases** (drilling, cementing, production, and workover).
- Detailed analysis of burst, collapse, tension, and compression loads.
- **Advanced buckling analysis** (sinusoidal and helical) and mitigation techniques.
- **Annular pressure buildup** (APB) and its effect on casing design.
- **Case Study**: Designing a multi-string casing program for an onshore HPHT well.

### Module 3: Special Conditions & Complex Wells

- Casing design for **HPHT** environments.
- Design considerations for **extended reach drilling** (ERD) and horizontal wells.
- **Cementing program** integration with casing design.
- Managing **casing wear** and corrosion in corrosive environments (H<sub>2</sub>S, CO<sub>2</sub>).
- **Case Study**: Casing program for a complex subsea well with significant dogleg severity.

### Module 4: Practical Application & Software

- Hands-on training with industry-standard **casing design software** (e.g., StressCheck, CasingSeat).
- Introduction to **Finite Element Analysis** (FEA) for complex scenarios.
- Input data requirements for accurate casing design calculations.
- **Sensitivity analysis** to optimize design for varying parameters.
- **Case Study**: Using software to optimize a casing design and compare it with traditional methods for a North Sea exploration well.

### Module 5: Well Integrity & Risk Management

- Understanding the role of casing design in ensuring **well integrity** throughout its lifecycle.
- Implementing a **risk-based approach** to selecting design factors.
- **Failure analysis** of common casing problems.
- Regulatory compliance and industry standards.
- **Case Study**: Forensic analysis of a well integrity failure and recommendations for future casing designs.

### Module 6: Cost Optimization & Economics

- Evaluating trade-offs between cost and performance in **OCTG selection**.
- Minimizing non-productive time (NPT) through robust design.
- Life-cycle cost analysis of various casing programs.

- Identifying and implementing **cost-saving opportunities** without compromising safety.
- **Case Study:** Economic evaluation of two different casing design scenarios for a shale gas well.

## Module 7: Advanced Concepts in Materials and Connections

- Metallurgical properties of steel and corrosion-resistant alloys (CRAs).
- Performance envelopes of premium and **API connections**.
- The impact of heat treatment and manufacturing processes on tubular performance.
- Advanced connection selection for specific wellbore challenges.
- **Case Study:** Selection of corrosion-resistant casing for a sour-gas well.

## Module 8: Future Trends & Innovation

- Application of **AI and machine learning** in predictive casing design.
- Real-time data integration for dynamic casing design.
- Emerging technologies in well construction and drilling.
- Casing design for **carbon capture, utilization, and storage (CCUS)** wells.
- **Case Study:** The future of smart casing design and its impact on drilling operations.

## Training Methodology

This course employs a dynamic, **blended learning methodology** to ensure maximum knowledge transfer and skill development. It combines:

1. Lectures & Presentations
2. Workshops & Group Exercises.
3. Real-World Case Studies & Discussions.
4. Hands-on Software Application.
5. Interactive Q&A & Peer-to-Peer Learning.

## Register as a group from 3 participants for a Discount

Send us an email: [info@fineskilltrainingcenter.org](mailto:info@fineskilltrainingcenter.org) or call +254769199797

## Certification

*Upon successful completion of this training, participants will be issued with a globally- recognized certificate.*

## Tailor-Made Course

*We also offer tailor-made courses based on your needs.*

## Key Notes

- a. The participant must be conversant with English.
- b. Upon completion of training the participant will be issued with an Authorized Training Certificate
- c. Course duration is flexible and the contents can be modified to fit any number of days.
- d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.
- e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

## Upcoming Scheduled Sessions

| Start Date  | End Date    | Location | Price   |
|-------------|-------------|----------|---------|
| 21 Sep 2026 | 25 Sep 2026 | Online   | \$1,000 |
| 21 Sep 2026 | 25 Sep 2026 | Physical | \$1,500 |
| 21 Sep 2026 | 25 Sep 2026 | Physical | \$0     |
| 21 Sep 2026 | 25 Sep 2026 | Physical | \$0     |
| 21 Sep 2026 | 25 Sep 2026 | Physical | \$0     |
| 21 Sep 2026 | 25 Sep 2026 | Physical | \$0     |
| 21 Sep 2026 | 25 Sep 2026 | Physical | \$0     |
| 21 Sep 2026 | 25 Sep 2026 | Physical | \$0     |

Ready to enroll or request a customized program? Book online or contact us:

Register Online Now

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