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

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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 desig

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?ééS, CO?éé).
- **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 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:

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