Civil Engineering in the Power Generation and Power Transmission Industry

Center for Educational Excellence – Teacher Enrichment Program

Prepared for CEE
By Phillip Harter, P.E., M.S.C.E.
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Agenda for today

- Personal Introduction
- OneWay™ moment
- Company overview
- Power Industry Primer
- Civil Engineering in Brief
  - Failure Video
- Samples from my experience
  - 3D Model Presentation
- Discussion - Skills to nurture in students
- Q&A
Introductions

Phillip Harter
Principal Structural Engineer,
WorleyParsons

B.S.C.E from Penn State University
M.S.C.E from Villanova University
Professional Engineer in PA
## OneWay™ Framework elements

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Our Proud History in the Power Business

WorleyParsons Overview

Gilbert’s Timeline
http://www2.readingeagle.com/article.aspx?id=54151
https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.html
WorleyParsons' global reach

116 offices
42 countries
26,280 employees
Projected fuel mix of U.S. consumption changes over time

Clean Power Plan accelerates shift from coal to natural gas and renewables
Figure MT-28. Net electricity generation by fuel in the Reference case, 2000–2040 (billion kilowatthours)

Energy consumption by sector (Reference case)
quadrillion British thermal units

Energy consumption by fuel (Reference case)
quadrillion British thermal units

Typical Combustion Turbine

- Inlet Scroll
- Compressors Section
- Turbine Section
- Exhaust
Steam Turbines

- **Steam Turbine (ST)**
  - Custom designed & tailored to each project
  - Generates up to 1300 MW
Power Transmission

When electricity leaves a power plant (1), its voltage is increased at a "step-up" substation (2). Next, the energy travels along a transmission line to the area where the power is needed (3). Once there, the voltage is decreased or "stepped-down," at another substation (4), and a distribution power line (5) carries the electricity until it reaches a home or business (6).
Power Transmission
Civil Engineering

Civil engineering is a professional engineering discipline that deals with the design, construction, and maintenance of the physical and naturally built environment, including works such as roads, bridges, canals, dams, airports, sewerage systems, pipelines, and railways. Civil engineering is traditionally broken into a number of sub-disciplines. It is considered the second-oldest engineering discipline after military engineering, and it is defined to distinguish non-military engineering from military engineering. Civil engineering takes place in the public sector from municipal through to national governments, and in the private sector from individual homeowners through to international companies.

Courtesy – Wikipedia
Civil Engineering

What it aspires to be:

![ASCE Logo]

**Code of Ethics**

**Fundamental Principles**

Engineers uphold and advance the integrity, honor and dignity of the engineering profession by:

1. using their knowledge and skill for the enhancement of human welfare and the environment;
2. being honest and impartial and serving with fidelity the public, their employers and clients;
3. striving to increase the competence and prestige of the engineering profession; and
4. supporting the professional and technical societies of their disciplines.

[https://www.asce.org/code-of-ethics/](https://www.asce.org/code-of-ethics/)
Civil Engineering

Why is it important?

Failures of infrastructure affects the entire population, and can lead to lost lives, property, and livelihood.

Errors can and do happen: FIU Bridge Collapse

Example of Power Plant Design – Combined Cycle Station in Middle East

Walkthrough a 3D Model of a Power Station
Closing Discussion:

What skills does it take to be an Engineer in a global economy?
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