



## FPST 1213 Fire and Safety Hazard Recognition

### History of Safety

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## Objectives



- Know how the Industrial Revolution necessitated the Safety Movement in the US
- Understand the philosophical changes due to key events and the advancement of knowledge
- Understand key historical laws
- Understand current and future issues

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## What is Safety?



- NSC
  - An ever-changing condition in which one attempts to minimize the risk of injury, illness, or property damage from the hazards to which one may be exposed
- Webster's
  - the condition of being safe from undergoing or causing hurt, injury, or loss
- What is safe?
  - free from harm or risk
- How do we know when we are "safe"?
  - Safety is a feeling

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## The Industrial Revolution



- Inventions that ushered in the Industrial Revolution:
  - The Spinning Jenny in 1764
    - credited with moving the textile industry from homes to factories
  - <https://www.youtube.com/watch?v=zYoSvaPjcuc>
  - The power loom in 1784
    - improve the speed and quality of weaving
  - The cotton gin in 1793
    - easily separates cotton fibers from their seeds
    - One person with cotton gin = 50 people by hand

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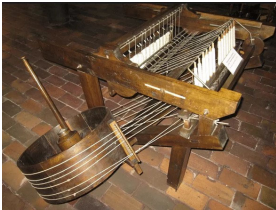
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## The Spinning Jenny in 1764



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## The power loom in 1784



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## Cotton Gin – 1793



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## The Industrial Revolution



- Innovations in processes and organization of production included:
  - Replacing animal power with mechanical energy (e.g. steam)
  - Replacing humans with machines
  - New methods for transforming raw materials into finished goods
  - The development of factories
- These changes created hazards that were never before encountered

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## Industrial Revolution



- 1712: The Newcomen steam engine
- 1733: John Kay invents the flying shuttle
- 1764: James Hargreaves invents the spinning jenny
- 1769: Richard Arkwright patents the water frame
  - James Watt patents a series of improvements on the Newcomen engine making it more efficient.
- 1779: Samuel Crompton perfects the spinning mule
  - used to spin (process prepared long bundles of cotton (roving) into workable yarn or thread) cotton and other fibers
- 1785: Edmund Cartwright patents a power loom
- 1793: Eli Whitney patents the cotton gin
- 1807: Robert Fulton begins **steamboat** service on the Hudson River
- 1830: George Stephenson begins rail service between Liverpool and London

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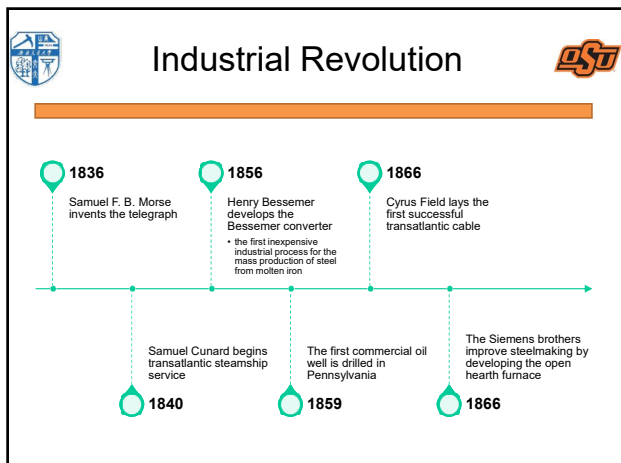
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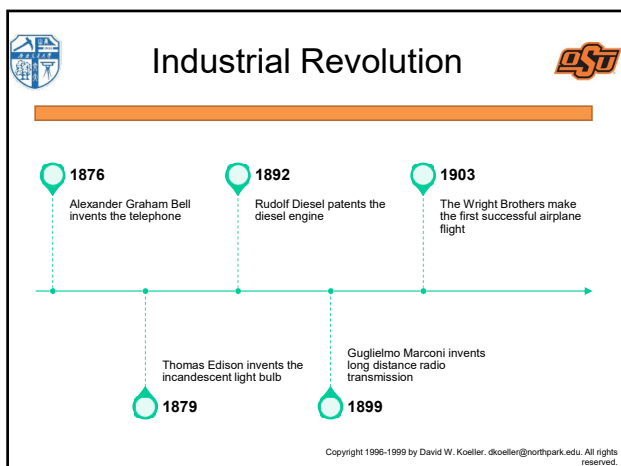
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**History of U.S. Safety Movement**

- Last half of the 1800's:
  - 1,750,178 working children between the ages of 10-15
  - 12-14 hours a day
- No safety and health guidelines

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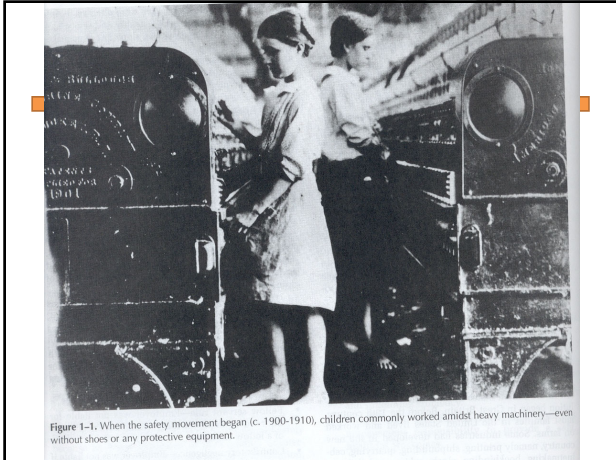


Figure 1-1. When the safety movement began (c. 1900-1910), children commonly worked amidst heavy machinery—even without shoes or any protective equipment.

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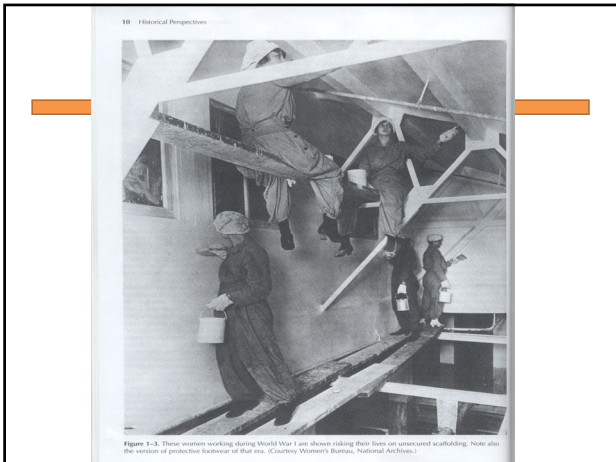


Figure 1-2. These women working during World War I are shown riding their bare unsecured scaffolding. Note also the variety of protective footwear of that era. (Courtesy Women's Bureau, National Archives.)

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### Philosophy of the day before safety laws...



- Accidents are part of the job...part of doing business
- Accidents are cheap
  - Triangle Shirtwaist
    - - \$75 per victim to each family (\$1990 in 2018)
- Laws didn't hold employers accountable

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## Philosophy of the day before safety laws...



- Came from English Common Law –
- Fellow servant rule
  - The employer was not liable for injury to an employee that resulted from the negligence of a fellow employee
- Contributory negligence
  - The employer was not liable if the employee was injured because of his or her own negligence
- Assumption of risk
  - The employer was not liable because the employee took the job with full knowledge of the risks and hazards involved

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## Changes in Philosophy



- Allegheny County, PA – 1907
  - "Pittsburg Survey"
  - First attempt to pin point the serious nature of occupational accidents and deaths
  - The "Death Calendar"
    - 2 work-related deaths per day
- 1908 President Teddy Roosevelt's contribution
  - "The number of wage-earner accidents is appalling"
  - First WC law
    - Only covered federal employees
- Wainwright Law of 1910
  - New York – first bill for workers' compensation
  - Originally declared unconstitutional on March 25, 1911
  - The Triangle Shirtwaist factory fire convinced people the laws were needed

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## DEATH CALENDAR IN INDUSTRY FOR ALLEGHENY COUNTY



Each red cross stands for a man killed at work, or for one who died as a direct result of an injury received in the course of his work.

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## Workers' Compensation Laws

- Supreme Court – 1916
  - Declared WC constitutional
  - Declared constitutional in 1916 in New York Central Railroad Co. v. White
  - One man killed for each mile of track laid
  - Many states followed by implementing WC laws
    - Hold the employer responsible for a share in the economic loss suffered by an employee injured on the job
- Insurance Companies
  - Instrumental in the safety movement
  - Why?
    - Provided lower rates to safe companies
- Railroads and Steel
  - The first two large-scale industries to have organized safety programs

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## Safety Professionalism

- ASSP - <http://www.assp.org/>
  - Months after Triangle Shirtwaist
    - 1911 - United Association of Casualty Inspectors
    - 1914 - American Society of Safety Engineers
    - 2018 - American Society of Safety Professionals
  - Not a government organization
  - Networking
  - PDC's

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## Birth of the National Safety Council

- October 1913
- Primary purpose
  - Networking
    - Communication
    - Exchanging ideas
    - Sharing of solutions
  - First national survey revealed chaos in industrial safety

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## American National Standards Institute (ANSI)



- American National Standards Institute – 1928
  - <http://www.ansi.org/>
- Private - non-profit
  - 1,000 U.S. businesses, professional societies and trade associations, standards developers, government agencies, institutes and consumer and labor interests
- Oversee the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States
  - Not law

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## Changes in Philosophy



- Heritage of Cooperation
  - No secrets
- Priority
  - superiority in rank, position, or privilege
- Value
  - a principle intrinsically having desirable or esteemed characteristics or qualities
- Priorities change...values remain over time

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## Advancement of Knowledge



- Several important trends emerged in the safety field
- Analyzing loss potential of an organization or activity
  - Risk management
    - Predict where, when, how, severity
    - Prevent occurrence/recurrence
- Two other trends
  - More factual objective information – BLS
  - Safer product development – UL

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## Safety and the Law



- Early safety laws were workers' compensation
- Walsh-Healy Act - 1936
  - Firms contracting with government must provide safe and healthy conditions
- Williams-Steiger Occupational Safety and Health Act - 1970 (OSH Act)
  - OSHA born 1971

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## Evaluation of Accomplishments



- Between 1912 and 1999, death rate reduced 92%
- Incident Rate Trends
  - Lowest for smallest companies, <19 EE
  - Rise for medium sized, <250 EE
  - Decline for large, >250 EE
  - Lower for smaller companies...less exposure...but why higher for medium companies?
- Problem with the Data
  - Reporting used to be voluntary
  - All reporting is on the honor system
- Is there another explanation for the reduction in death rate instead of safety programs?
  - Growth in service industry
  - Reduction of high risk industry

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## International Standards



- Developed because of need for global standardization
- International Organization for Standardization (ISO)
  - 9000
    - Quality Management
  - 14000
    - Environmental Management
  - They tell the what but not the how
  - 45001
    - standard for management systems of occupational health and safety (OH&S), published in March 2018

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## Safety Professionals



- Specialized knowledge in physical and social sciences
  - Physical
    - Chemistry
    - Math
    - Statistics
    - Physics
    - Engineering
  - Social
    - Behavior
    - Motivation
    - Communication
    - Business theory
- Where do safety professionals spend the majority of their time?
- BCSP - <http://www.bcsp.org/>
  - Not a government organization
  - Peer certification process

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## Current Issues



- The internet
  - Increased public knowledge
    - Not just of events, but of laws, best practices, new innovations
    - e.g. Web MD
- Political Problems
  - Industry – Union – Government relations
  - No end in site

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## Future Issues



- You can't put a price on a life
  - Public knowledge will continue to increase
- Criminal prosecution of employers
  - Facilities cannot hide any more
- More diverse work force = cultural differences
  - PS1 example
- Safety expertise needed in developing countries
- Global market = global standardization

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