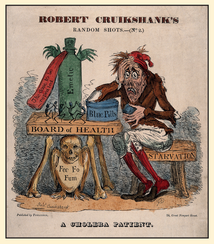
Industrial Revolution & Exploitation of Labour

The era of pandemics, economic barbarism, and wide-spread child labour in Europe and North America

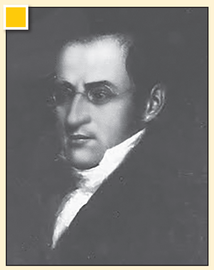
LEGEND
- Safety scientist/activist
- Safety problem
- Safety legislation

1800-1910

In Great Britain the textile industry gave its dominant economic position gained early in the 19th century to iron and steel as they brought the dawn of heavy industries, rail, and mechanisation. Poor and malnourished masses in densely populated areas around the factories suffer from cholera pandemics ravaging Europe. Among whom are great number of child labourers exploited due to their energy, low food requirements, and inability to protest. Charles Turner Thackrah depicts the state of public health in the city of leeds through his findings (1832), that only 10% of the population are in good health and the mortality rates are 150% higher than the rural areas.



A gruesome cartoon of a cholera patient experimenting with remedies by Isaac Robert Cruikshank (1789-1856). Wellcome Library Collection



Charles Turner Thackrah English surgeon (1795-1833). Copyright the Thoresby Society, The Leeds Historical Society

Navvies (Navigational Engineers) working on the railway connecting Stockholm to Uppsala, Sweden. Photo: Wikimedia Commons

Oliver Twist asks for more; from Charles Dickens' Oliver Twist. Image: Wikimedia Commons

Young woman in a loom shop, blanket factory, Witney, Oxfordshire, UK, 1898.

In response to widespread child labour the Factory Act (Health and Morals of Apprentices Act) of 1802 is passed to limit child labour and establish humane working conditions in textile mills. The law is extended to other industries and the British Factory Inspectorate is established to monitor its implementation in 1833.

It is during this time that Calder publishes the first reference about factory accidents and guidelines on safe construction and operation of factories and machinery. Calder's publication (1899) promotes the so-called safety technique, in which everything that rotates and is at height is protected by rails, fences, and grids.

The United States of America has already passed legislation limiting child labourers' working hours by 1910, but little attention is paid to occupational safety. The first international comparisons show the steel industry to have three to four times the mortality rate of same sector in Germany. Hoffmann estimates 30,000-35,000 deaths, 350,000 severely wounded, and 2,000,000 injuries annually; numbers exceeding the Civil War. In a culture that deems accidents as part of the work, US steel initiates the Safety First Movement in 1906, implicating worker behavior as the primary cause of industrial accidents. The States do not prescribe compensation similar to Western Europeans. The Pittsburgh Survey, the first sociological survey (1906-1907) in the US reveals fatality compensations not enough for burial costs while the poorest classes suffer 350% higher fatality rates than the well-off working class.

Crystal Eastman *(Massachusetts, 1881, Pennsylvania, 1928) was an American lawyer, socialist, suffragist, and a civil liberty activist. Eastman was the first one to stress the necessity of safety from the perspective of financial consequences for the families as she highlighted the petty compensation by the steel company. She viewed accidents result of working conditions, i.e., long working hours, high production, high temperature and noise with young and inexperienced workers. Eastman's death calendar highlighted the state of (un)safety in US steel factories averaging 1-2 fatalities a day. Moreover, her approach to documenting accidents by linking the fatal industrial accidents to different machinery initiates the scenario-based approach to accident analysis and prevention.*

Photo: Library of Congress, LC-USZ62-56052

Frederick Ludwig Hoffman *(Varel, Germany, 1865, San Diego, USA, 1946) was the seventh president of the American Statistical Association. Between 1895 and 1900 he was involved with investigations on health conditions of industry workers focusing on miners. He presented the statistics on workplace injuries to the Bureau of Labour in 1909.*

The road to happiness, 1913, a Safety First Campaign Poster, US Steel.

American child labourers in glass-work. Indiana, 1908. Photo: Lewis W. Hine

"The Puddler" Statue by Constantine Meunier, 1884. Showing compensation paid per injured body part in 1907 according to Pittsburgh Survey.

In the Netherlands, despite the late and limited introduction of steam in the latter half of the 19th century, the consequences of industrialization were not different from the neighbouring countries. Three inquiries between 1870 and 1880 report 16-17 average working hours, insufficient pay, and wretched working conditions. Coronel cites the two consequences of mechanisation as exploitation of women and children and introduction of new hazards to accident-prone workshops crowded with machinery.

Samuel Senior Coronel *(Amsterdam, 1827, Leeuwarden, 1892) was a social doctor and the first in the Netherlands to engage in scientific occupational hygiene. His study of the working classes led him to view their health as a socio-medical issue.*

Fredrik Willem Westerouen van Meeteren *(Amsterdam, 1851-1904) was an engineer and a liberal who advocated the institution of Dutch Society to Prevent Accidents in Factories and Workshops active 1890-1901. He authored the first Dutch reference book on occupational safety and health on legislation and accident statistics in 1890-1891. Similar to Calder, Westerouen van Meeteren advocated safety by technique highlighting the source of occupational accidents as unprotected rotary machinery and components in addition to elevated platforms without railing.*

Louis Heijermans *(Rotterdam, 1873, Amsterdam, 1938) was a doctor who established technical hygiene as an engineering discipline by teaching a course in Delft Technical High School. He identified the causes of accidents as indifference and carelessness, long working hours, and repetitive monotonous tasks.*

Although not enforced the first Factory Act of 1872 limited labour to ages above 12. The report of the 8th parliamentary inquiry into the state of factories and workplaces in the Netherlands led to initiatives including installation of Factory Inspectorate (1890), Labour Act 1889 forbidding women and child labour, Safety Act (1895), on machine guarding, and the 1901 Accident Act, regulating financial. Other initiatives including the 1890 national exhibition to promote safety and health in factories and workplaces followed by the safety museum in 1893, a world first.