OVERVIEW

GEORGE WESTINGHOUSE

- THE MAN
- THE INVENTOR
- THE ENTREPRENEUR/BUSINESSMAN

WESTINGHOUSE - THE FIRST 100+ YEARS
GEORGE WESTINGHOUSE

THE MAN

BORN: OCT. 6, 1846 – CENTRAL BRIDGE, NY

DIED: MAR. 12, 1914 – ARLINGTON NATIONAL CEMETARY

ANCESTORS: GERMANY
FARMERS/MECHANICS

YOUTH: WORKED IN FATHER’S MACHINE SHOP
CIVIL WAR – AGES 16 TO 19
EDUCATION – 1–1/2 YEARS TOTAL

FIRST PATENT: AGE 19
ROTARY STEAM ENGINE

FIRST ENTERPRISE: AGE 22
WESTINGHOUSE AIR BRAKE COMPANY

APPEARANCE: PHYSICALLY STRONG
COMMANDING
DISTINGUISHED
GEORGE WESTINGHOUSE

THE MAN

CHARACTER: DILIGENT
              DISCIPLINED
              ENERGETIC
              HARD DRIVER
              SINCERE

HIGH INTEGRITY
INSPIRATIONAL
ENTHUSIASTIC
EAGER
SENSITIVE

EMPLOYEE RELATIONS:

AIR BRAKE CO.
DINNER
TURKEY
PENSION
COVERED WALKWAY
LUNCHROOM

EMPLOYEE CLUBS

WEALTH: A TOOL TO CARRY OUT IDEAS

SIMPLE MAN: TEMPERATE
            HARD WORKING

HONESTY: "WE ARE HERE TO SERVE OUR
          CUSTOMERS NOT TO SWINDLE THEM.
          THAT'S THE ONLY WAY TO BUILD A
          SOUND BUSINESS"
GEORGE WESTINGHOUSE

THE INVENTOR

PATENTS: ONE EVERY 6 WEEKS FOR 48 YEARS (OVER 350)
VERSATILE NOT FOR SALE - MADE IN OWN SHOP

TECHNOLOGIES:

AIR BRAKE: STRAIGHT AIR
AUTOMATIC QUICK ACTION ELECTROPNEUMATIC
ACCESSORIES FRICITION DRAFT GEAR
HYDRAULIC DRAFT GEAR

ELECTRICAL: DISTRIBUTION
TRANSFORMERS GENERATORS AND MOTORS
METERS ARC LAMPS ELECTRIC RAILWAYS AND LOCOMOTIVES
STEAM ENGINES STEAM TURBINtES
NATURAL GAS AND FUEL GAS RAILWAY SIGNALLING AND INTERLOCKS

LAST PATENT: NOV. 5, 1918 FOR AUTOMATIC
TRAIN CONTROL
GEORGE WESTINGHOUSE

THE ENTREPRENEUR/BUSINESSMAN

FIRST ENTERPRISE: WESTINGHOUSE AIR BRAKE COMPANY – 1869

TOTAL OF 104 COMPANIES:

- TO MAKE EQUIPMENT CREATED BY PATENT IDEAS OR SPINOFFS
- WORLD WIDE
- MANY EVENTUAL MERGERS

WESTINGHOUSE ELECTRIC COMPANY:

- CHARTER JAN. 8, 1886
- $1,000,000 ASSETS
- 27 PATENTS
- 1890 BUILT 250 HP DC CURRENT GENERATOR BELT DRIVEN FOR RAILROAD APPLICATION
- 1894 DIRECT COUPLED WITH STEAM ENGINE – 1500KW
- 1898 ROTARY CONVERTER APPLICATION BIRTH OF AC POWER PRODUCTION (CONTROVERSY WITH EDISON) 300–400 KW UNITS 3600 RPM 480 VOLT HZ WESTINGHOUSE AIR BRAKE COMPANY
- ASSETS TRANSFERRED TO WESTINGHOUSE ELECTRIC & MANUFACTURING CO. – 1889

WESTINGHOUSE MACHINE COMPANY:

- CHARTERED IN 1881
- STEAM ENGINE EMPHASIS
- 1895 LICENSE FROM SIR CHARLES PARSONS FOR STEAM TURBINE TECHNOLOGY
- HARTFORD ELECTRIC LIGHT CO. – 1900 1500 KW 1200 RPM T–G
- SINGLE "DOUBLE FLOW" DESIGN
GEORGE WESTINGHOUSE

THE ENTREPRENEUR/BUSINESSMAN

BUSINESS DETOUR:

- WESTINGHOUSE WAS HIS OWN BANKER
- 1907 "GREAT PANIC" LOANS CALLED IN NO BANKS FOR BACK-UP
- RECEIVERSHIP STATUS FOR 3 COMPANIES WESTINGHOUSE ELECTRIC COMPANY WESTINGHOUSE MACHINE COMPANY SECURITY INVESTMENT
- RECOVERY PLAN IN 14 MONTHS ELECTRIC COMPANY RECOVERED NEW BOARD - 1/2 SEATS CREDITORS WESTINGHOUSE POWERS LIMITED 1911 RESIGNATION

FINAL MERGER:

- 1917 WESTINGHOUSE MACHINE COMPANY OFFICIALLY MERGED WITH WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY

GEORGE WESTINGHOUSE LEGACY:

- ADVANCED STATE-OF-THE-ART IN TRANSPORTATION THROUGH INVENTION AND DEVELOPMENT OF THE AIR BRAKE
- ADVANCED MANUFACTURING POWER BY DEVELOPMENT OF AC IN DISTRIBUTION AND APPLYING POWER WITH ELECTRICITY.
WESTINGHOUSE ASSOCIATED COMPANIES
CHRONOLOGICALLY ARRANGED

1870  1880  1890  1900

CIE. INT. PR. LE CHAUFFAGE DES CHEMIES DE PLUMET SYSTEME HENITZ, LTD.
WESTINGHOUSE METAL FILAMENT LAMP CO.
SOCIÉTÉ ÉLECTRIQUE WESTINGHOUSE DE RUSSIE
UNITED PUMP & POWER COMPANY
NATIONAL BRAKE & ELECTRIC CO.
WESTINGHOUSE COOPER HENITZ CO., LTD.
WESTINGHOUSE METALLFADEN GLühlAMPFABRIK GESELLSCHAFT
MILWAUKEE LOCOMOTIVE MANUFACTURING CO.
SOCIÉTÀ ITALIANA WESTINGHOUSE
WESTINGHOUSE BRAKE CO. LTD. (AUSTRALASIA)
MAKEMICK-HOLLAND & WESTINGHOUSE POWER SIGNAL CO., LTD.
WESTINGHOUSE LAMP CO.
BERGMANN ELECTRIC WERKE, A. G.
SOCIÉTÉ ANONYME PR. L'EXPLOITATION DES PROCÉDÉS WESTINGHOUSE LEBLANC
SOCIÉTÉ HONGROISE D'AUTO SYSTEME WESTINGHOUSE
TRAFFORD REAL ESTATE CO.
WESTINGHOUSE FRICTION DRAFT GEAR CO.
PITTSBURGH HIGH VOLTAGE INSULATOR CO.
WESTINGHOUSE AIR SPRING CO.
COMPAGNIE DES LAMPS À FILAMENTS MÉTALLIQUES
COMP. POUR LES APPLICATIONS DES RAYONS ULTRA-VIOLET (FRANCE)
SOC. INT. POUR LES APPLICATIONS DES RAYONS ULTRA-VIOLET (BELGIUM)
COPEMAN ELECTRIC STOVE CO.
WESTINGHOUSE PACIFIC COAST BRAKE CO.
ELECTRIC PROPERTIES CORPORATION
WESTINGHOUSE NORSK ELEKTRISK AKTIENSELSKAP
WESTINGHOUSE GEAR & DYNAMOMETER CO.
LOCOMOTIVE STOKER CO.
CANADIAN CONCRETE PRODUCTS CO., LTD.
NATIONAL STEEL FOUNDRIES
KRANTZ MANUFACTURING CO., INC.
FOUNTAIN ELECTRICAL FLOOR BOX CORP.
PAGÉ-STORM DROP FORGE CO.
NEW ENGLAND WESTINGHOUSE CO.
WESTINGHOUSE ELECTRIC EXPORT CO.
J. STEVENS ARMS CO.
MERIDEN FIRE ARMS CO.
TURTLE CREEK A, ALLEGHENY VALLEY R. R. CO.
WESTINGHOUSE ELECTRIC PRODUCTS CO.
SOUTH PHILADELPHIA CO.
WESTINGHOUSE ELECTRIC INTERNATIONAL COMPANY
INTERBOROUGH IMPROVEMENT CO.
FRANKLIN ELECTRIC MANUFACTURING CO.
EAST PITTSBURGH & WILMERDING COAL CO.
WESTINGHOUSE AIR BRAKE HOME BUILDING CO.
GEORGE CULLER CO.
NATIONAL UTILITIES CORPORATION
WESTINGHOUSE UNION BATTERY CO.
INTERNATIONAL RADIO TELEGRAPH COMPANY, THE
MANSFIELD VITREOUS ENAMELING COMPANY, THE
WESTINGHOUSE BRAKE & SAFETY SIGNAL CO., LTD.

THE DATE OF ORGANIZATION AND MEMBERS OF COMPANIES INDICATED AS FOLLOWS:

13
THE FIRST 100 YEARS

MAJOR PRODUCT INTRODUCTION

1900–1910

STEAM TURBINE–GENERATOR
INDUCTION MOTOR
INDUCTION RELAY
ENGINE GENERATOR
SPEED REDUCING GEAR
SWITCHBOARD PANEL
AUTOMATIC SYNCHRONIZER
LIGHTNING ARRESTER

SYNCHRONOUS CONVERTER
ROTARY AIR PUMP
TUNGSTEN LAMP
RADIAL FLOW CONDENSER
HOUSEHOLD FAN
VOLTAGE REGULATOR

1910–1922

MARINE TURBINE
ELECTRIC WELDING
ELECTRIC LOCOMOTIVE
FRACTIONAL HP MOTOR
STEAM AIR EJECTOR
TOASTER
SEWING MACHINE
TRACTOR TRANSMISSION
ELECTRIC DRILL

ELECTRIC OVEN
KDKA RADIO
HELICAL GEARS
HYDRAULIC GOVERNOR
SYNCHRONOUS CONDENSER
AIRPORT RUNWAY LIGHT
DIESEL ELECTRIC DRIVE
VACUUM CLEANER
DEEP SEA DIVING LAMP
METER
LOUDSPEAKER
SHORT WAVE RADIO
COLOR LAMPS
OIL WELL DRILL
GEARMOTOR
ELECTRIC STEEL
FLAT IRON
KOVAR MATERIAL
WAFLE IRON
INERTIA SHOCK ABSORBER
REFRIGERATOR SEAL
DIRIGIBLE PROPULSION
CAR PARKING MACHINE
TACHOMETER
AIR CONDITIONING
HYDRAULIC ELEVATOR
CUPALOY
AIR BREAKER
TRANSFORMERS
MT. PALOMER TELESCOPE
MOUNTING
SOCKET INSTRUMENTS
PERCOLATOR
RADIO RECEIVING TUBES
POWER SAW
SIDE ENTRY BLADING
ELEVATOR CONTROL
TROLLEY COACH
ANNEALING FURNACE
TURBINE CONTROL VALVE
ELECTRICAL JACK HAMMER
PHOTOCELLS
SILENT MOVIE CAMERA
STROBAGLOW
TRAFFIC LIGHT CONTROL
AUTO DOOR OPENER
MICARTA
POWER FUSE
MOVIE PROJECTOR
SPOT WELDING
LOOM MOTOR
HYDRAULIC GOVERNOR
AIRCRAFT CONTROL
X-RAY TUBE
SUPERVISORY CONTROL
PIPE SAW
WATER HEATER
It can't be done — but here it is
1940–1953

- GAS TURBINE
- LINEAR COUPLERS
- JET ENGINE
- DIRECT DRIVE EXCITER
- SUNLAMP
- GEARED DRIVE LOCOMOTIVE
- REFRACTALOY
- TORPEDOES
- PLANE LAUNCHER
- ANALOG COMPUTER
- HEATED WINDSHIELD
- RADIATION DETECTORS
- ELECTRIC STAIRWAY
- INSULFOAM
- SEARCH LIGHT
- SPECTATOR CONVEYOR
- FLUORESCENT LAMP
- LAVDROMAT
- SYNTHETIC RESIN
- URANIUM PHOTO FISSION
- RADIOGRAPHY
- DRY TYPE TRANSFORMER
- INSECTICIDE DISPENSER
- PRECIPITRON
- RADAR
- PRECISION CASTING
- FOSTERITE VARNISH
- LASHED TURBINE BLADES
- STRATOVISION
- PACKAGED STEAM TURB.−GEN.
- AUTOMATIC PILOT
- ELECTROPLATING
- SUNLAMP
- DISCALLOY
- THERMALASTIC
- BALL PARK LIGHTING
- MEAT TENDERIZER
- REFRIGERATOR
- DOUBLE BLEEDER STEAM TURBINE
- HIGHWAY LAMPS
- WINDOW AIR CONDITIONER
- XB−19 AC SYSTEM
1953–1960

- Nautilus Power Plant
- Nuclear Power Plant
- Space Reactor
- Superconductors
- Truck Refrigerator
- Electron Microscope
- People Mover
- Coral Ridge
- Robotics
- Air Traffic Control

- Missile Launcher
- Airborn Radar
- Moon Camera
- 7-Up Business
- Breeder Reactor
- Metro Systems
- Awacs
- Light Water Reactor
- Longines Watches
PARSONS SINGLE FLOW TURBINE

WESTINGHOUSE SINGLE DOUBLE FLOW TURBINE

Parsons single-flow and Westinghouse single-double-flow turbines. Comparative sizes; equal powers.

DRAWINGS TO SAME SCALE TURBINES EQUAL CAPACITY