

Milestones of flight



Wenham (UK)
1st Wind Tunnel built

Philips (UK)
2nd Wind Tunnel



Aeronautical Engineering

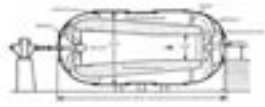
Science

Da Vinci - 'Wind Tunnel Principle'	1020	Tower jumpers
Bacon - Scientific Method	1480	
Galileo		
Descartes	1599	
Newton		
Robins' Whirling arm	1699	Drag on bodies a function of shape Importance of aspect ratio Transonic drag rise phenomena
Bernoulli - Bernoulli's law	1780	Montgolfier balloons
Smeaton - Smeaton's Coefficient	1797	1 st Parachute jump from balloon
Navier - Flow field relationships	1700	'Lift' Force relationship
Cayley	1785	
Stokes - Flow field relationships	1804	Aircraft concept - tail, fuselage, wings
Von Helmholtz - Vorticity	1819	
Reynolds - Friction drag	1842	
Penaud - Aircraft stability	1852	1 st Powered balloon flight
1 st Force measurement devices and force coefficients / Lillienthal	1866	Royal Aeronautical Society established
Book: 'Experiments in Aerodynamics'	1871	
Force measurement devices	1874	1 st Piloted hop - du Temple
Corrected Smeaton's coefficient	1876	
Definitive data - high aspect ratio wings / Langley	1880	
Lillienthal	1884	2 nd Piloted hop - Mozhaisky
Direct measurement of lift coefficient	1889	
Wright Brothers WT	1891	
Large WT - unique instrumentation, calibration, and application to aeronautical research / Zahm WT	1891-96	Successful Gliders
Wright brothers filed a patent request for a powered flying machine	1901	
1 st Russian experiments and facilities Riabouchinsky	1901	Wright Brothers 1 st Flight
1 st 'continuous circuit' design / Prandtl	1903	
Cody	1904	1 st Helicopter flight - Brequet-Richet No 1
Bleriot	1907	
	1908	1 st Powered flight in England
		1 st Monowing aircraft

Cont.



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	McCurdy Bleriot	1909	1 st Powered flight in Canada 1 st to cross the English Channel
	1 st Experimental facilities in Paris / Eiffel	1911	1 st South African flight, Weston-Farman biplane, Kimberley
	1 st Experimental facilities in Aachen, Germany / Junkers	1912	
		1912	Formation of the Union Defence Force, which included the South African Aviation Corps
	NACA Wind Tunnel No. 1 / Handley Page Introduction of the slat	1915	Establishment of National Advisory Committee for Aeronautics (NACA). 1 st scheduled passenger service London-Paris - de Havilland D.H.9.A and D.H.16
	1 st pressurised wind tunnel / NACA Variable Density Tunnel	1919	1 st Transatlantic Crossing-Vickers Vimy 1 st Flight from UK to South Africa - Pierre van Ryneveld Establishment of the South African Air Force Assembly of aircraft at 'Artillery and Aircraft Depot' (Thaba Tswane)
	1 st mass produced variable pitch propeller	1920	
	Study icing formation on wings & props / NACA refrigeration WT	1922	
	Introduction of twin tail aircraft Use of retractable landing gear	1926	1 st Successful Liquid-Propellant Rocket
	1 st European paved runway – Bromma airport, Stockholm	1926	
	1 st commercial autopilots for pitch, yaw and roll	1929	
	Introduction of ejection seats	1930	1 st Solo flight for a woman - Amy Johnson AA Depot starts building Westland Wapiti aircraft
	Research into rocket propelled models Introduction of tailless aircraft, delta wings, etc. US interest in aviation - aerodynamic courses initiated in ~40% of American schools	1936	
	CSIR founded	1939	
	Laminar aerofoil now commonly used, Autopilots now command heading, airspeed, altitude	1941	Gloster E28/39 - 1 st jet aircraft
	NACA Transonic WT	1943	
	Whitcomb - Established area rule – to reduce critical Mach number Introduction of aerodynamic 'fixes' – vortex generator; 'dog tooth', 'fences' 1 st boundary layer control devices Introduction of Numerically Controlled (NC) machining	1945	Atomic Bomb dropped on Hiroshima
		1946	1 st Unmanned Vehicle flights
		1947	X1 Penetrated the sound barrier
		1949	1 st Non-stop around the world flight by a B-5A aircraft.
		1950s	
		1950	1 st Variable incidence wing aircraft - Vought F-8 Crusader
		1953	1 st Building on new CSIR campus - 10ft wind tunnel
		1954	1 st Flight of Boeing 707 prototype
		1957	1 st Artificial Satellite - Sputnik
		1958	Operational deployment of Sidewinder Air-to-Air Missile(AIM-9C)
		1960	1 st X - 15 hypersonic research flight
		1963	
	Opening of Johannesburg airport	1965	Local assembly of Mirage II, Canberra, C-130, Impala MkI, Alouette III
	Founding of Armscor, Atlas Aviation Introduction of carbon and graphite (CFRP) composites	1969	1 st Flight of the Concorde 1 st Flight of Boeing 747, 1 st Moon landing
		1970	
	Commissioning of CSIR HSWT	1978	
	Commissioning of CSIR 7MWT, Commissioning of CSIR Ground Vibration Test Facility	1980s	Development of Alpha XH1, Rooivalk, V3C Air-to-Air Missile, Hanto Stand-off-weapon, OVID - all composite trainer
		1981	1 st Flight of Space Shuttle
		1986	1 st non-stop, non-refuelled flight around the world - Voyager
	Commissioning of CSIR MSWT	1989	
		2004	1 st Privately piloted craft to reach space
	Establish CSIR Vertical Turbine Test Rig	2005	Development of 5th generation Air-to-Air Missile



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