**NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ CLASS: \_\_\_\_\_\_\_**

**KIRBY AEROSPACE -- Wright Brothers Project**

***Inventing a Flying Machine – Research Notes***

**Inventing a Flying Machine –**

 **Between 1899 and 1905 –**

 **The genius of Wilbur and Orville –**

**1899: Getting Acquainted with Aeronautics –**

**After collecting reference material from the Smithsonian and other sources –**

 **During the 1800’s –**

 **A letter to the Smithsonian –**

 **Aeronautical approaches –**

 **The Wrights’ course –**

 **Forefathers of flight –**

 **Sir George Cayley, 1773-1857 –**

 **Otto Lilienthal, 1848-1896 –**

 **Lilienthal gliders –**

 **An abrupt and tragic end –**

 **Fundamental Flight Problems –**

 **1.**

 **2.**

 **3.**

 **Stability and control: The influence of the bicycle –**

 **The breakthrough concept –**

 **The significance of Wing-Warping –**

 **Testing Wing-Warping –**

 **1899 Wright Kite –**

 **Visual thinking –**

 **Flight testing the kite –**

**1900 Glider Trials at Kitty Hawk –**

**Designing the 1900 Wright glider –**

 **Lift and the center of pressure –**

 **Elevator –**

 **Canard configuration –**

 **Wing profile –**

**Aerodynamics: Aircraft size –**

**Calculating lift and drag –**

 **Lift = kV2SC1**

 **Drag = kV2SCd**

 **Anatomy of the Wright glider –**

 **Wingspan –**

 **Wing Area –**

 **Length –**

 **Height –**

 **Weight –**

 **The framework –**

 **The fabric –**

 **Kitty Hawk: Testing grounds –**

 **The site –**

 **An arduous journey –**

 **Vacations nonetheless –**

 **Test flying the glider –**

 **Kiting the glider –**

 **Flying the glider –**

 **Rare Photos –**

 **Back to the drawing board –**

**1901 The Biggest Glider Yet –**

**Poor lift performance of their 1900 glider… –**

 **The 1901 Wright Glider –**

 **Second and most problematic, in a series of 3 gliders –**

 **Similar in structure to the 1900 craft –**

|  |  |
| --- | --- |
| **AIRCRAFT** | **WING AREA** |
| **1901 Wright glider** |  |
| **1900 Wright glider** |  |
| **Lilienthal monoplane glider** |  |
| **1896 Chanute-Herring glider** |  |

 **A discouraging flight –**

 **Flight testing the 1901 glider –**

 **Problems with control arise –**

 **Problems with lift persist –**

 **Results of the 1901 glider trials –**

 **An invitation from Octave Chaunte –**

 **Some aeronautical experiments –**

 **Wilburs’s speech –**

 **Doubts about data –**

 **Wilbur and Orville felt it was time to perform their own aerodynamic research –**

 **The bicycle apparatus –**

 **How it worked –**

 **Calculations and results –**

 **The Wright Wind Tunnel –**

 **Scraps of wallpaper from the wind tunnel –**

 **The Wrights large wind tunnel –**

 **Wright wind tunnel balancres –**

 **Many, many wings –**

 **Model wings used in the tunnel –**

 **SIZE –**

 **CURVATURE –**

 **PROFILE –**

 **SHAPE -**

 **Correcting Smeaton –**

 **Recording the wind tunnel data –**

 **Correcting Smeaton’s Coefficient –**

 **SIZE –**

 **CURVATURE –**

 **PROFILE –**

 **SHAPE -**

**1902 Close to a True Airplane –**

 **Better than its’ predecessors –**

 **Perfecting the control system –**

 **Kiting the 1902 glider –**

 **Well digging –**

 **Changes to the rudder –**

 **The 1902 Glider –**

 **The first fully controllable aircraft –**

 **Wingspan –**

 **Wing Area –**

 **Length –**

 **Height –**

 **Weight –**

 **1902 Wright glider: The most advanced glider –**

 **World record holders –**

 **A picture of success –**

**1903 The First Successful Airplane –**

 **On December 17, 1903 –**

 **Designing the flyer –**

 **Allowing 200 pounds for the propulsion system… –**

 **Construction and fabric –**

**Wingspan –**

 **Wing Area –**

 **Length –**

 **Height –**

 **Weight –**

 **Wing rib construction –**

 **Double layer fabric covering –**

 **Wing struts –**

 **Propulsion System –**

 **Engine –**

 **The aluminum crankcase: A first –**

 **How the Wright engine worked –**

 **Propellers & Transmission –**

 **Making the propellers –**

 **Chain –and-Sprocket transmission system –**

 **Flight Controls –**

 **A small complement of instruments recorded flight data –**

 **The instruments were arranged so all could be turned off –**

 **Return to Kitty Hawk –**

 **The grand junction railroad –**

 **Triumph! –**

 **Tossed a coin –**

 **The flyer was airborne for only 3 ½ seconds, but –**

 **With damage repaired –**

 **Back in the air –**

 **Patenting –**

 **Wright patent –**

**1904 The First Circular Flight –**

 **On January 5, 1904 –**

 **The 1903 Flyer had only performed short, straight-line flights –**

 **Huffman Prairie –**

 **Increasing stability –**

 **The first circular flight –**

**1905 The First Practical Airplane –**

 **Fall of 1905 –**

 **They would not fly again for 2 ½ years –**