

# M.A.R.C.S. SPARKS

Monthly Newsletter of the Madison Area Radio Control Society  
Madison, WI AMA Charter # 665

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## Minutes of MARCS General Membership Meeting, July 3, 2003

By *Birr Fontaine*

The meeting was called to order by President Wayne Lanphear at 7:10 p.m. with 38 in attendance.

**New Members:** David Drake is a new member tonight. Dave has some stick time on his Sig Kadet Mark I and will be contacting Dan Dudovick for an instructor.

**June Minutes:** The minutes of the June meeting as printed in the July issue of SPARKS were accepted as published.

**Old Business:** *Big Bird Rally* - The Screamin Eagles Big Bird Rally on June 14 was very well attended by pilots and public and was a great success. Some of the larger aircraft included a 170 inch Lancaster and a 40% Edge 540. One of the factors that contributed to the success of the event was the large number of people that helped. Special thanks go out to the many Screamin Eagles and MARCS members and their extended families that helped make the event run smoothly.

*Pesticides and Herbicides Hearing* - Several members of the Board attended the City's public hearing last Thursday that was considering possible changes in the regulations for the use of pesticides and herbicides on City parkland. President Lanphear spoke on behalf of the Club and noted that effective control of the dandelions is essential for small RC aircraft to use the field. He argued that any changes to present spraying policy should allow an exception for dandelions at the field to be sprayed with the minimum amount of herbicide necessary for good control.

*Electric Fly In* - July 5, Kettle Field. Dave Rush indicated the arrangements are complete. Mike Kimmerly will organize the food (brats and burgers). There will be a nice selection of raffle prizes. Last year there were 20 pilots and several more are expected this year.

*Boy Scout Fun Fly* - July 12, Kettle Field. Jerry Buss reported that Harley Nelson will head up the assembly of the AMA Darts and Bill Kinney will manage the noon lunch. Jerry will prepare the food ahead of time at home.

### *Come Fly With Us*

MARCS meetings are held on the first Thursday of every month at 7:00 P.M. in Room 201B of the Madison Labor Temple, 1602 S. Park St. in Madison. Visitors are always welcome. We think we have a great hobby and we invite you to come and see and consider joining us.

#### **Officers:**

Pres: Wayne Lanphear, [bgbird@charter.net](mailto:bgbird@charter.net)  
Vice Pres: Don Weigt, [weigt@mailbag.com](mailto:weigt@mailbag.com)  
Secty: Burr Fontaine, 233-9063  
Treas: Ed McDonald, [edgarmcdonald@msn.com](mailto:edgarmcdonald@msn.com)

#### **Membership information:**

Ed McDonald  
Phone 249-0734

#### **Flight Instruction Coordinator:**

Dan Dudovick  
Phone 273-4339

#### **Mail address for official business, other than for publication in SPARKS:**

PO Box 8864  
Madison, WI 53708

**MARCS Web Site:** [www.marcswi.org](http://www.marcswi.org)

**Web Master:** William Velez  
[william@velez.org](mailto:william@velez.org)

The MARCS web site contains links to War Birds and Electric Flyers Special Interest Group web sites

**Editor:** Jerry Buss  
1809 Browning Rd  
Madison, WI 53704

e mail: [jbuss@itis.com](mailto:jbuss@itis.com) Phone: 244-8534

Contribution of articles is encouraged. Deadline for submittal is the 20th of the month.

*Float Fly & Picnic* - July 20, Riley-Deppe Park, Marshall. Activities with RC planes and RC boats will start about 9:00 a.m. Please bring a dish to pass for the picnic lunch at noon.

*Scale Rally* - August 17, Kettle Field. Mike Kimmerly responded to Don Weigt's request for someone to organize the food staff. According to Don, all other major areas for the rally are covered.

**New Business:** *Car on I-90 Hit by Model Plane?*

There was a report that a car on I-90 was hit by a model plane last Thursday, but the report was false. What was reported was by a State Trooper who stopped to investigate a motorist that was looking at a model aircraft on the edge of the road. The motorist was asked to move on immediately which he did. Apparently, this was the end of the report i.e., no indication of any aircraft hitting the car and no identification of the motorist. President Lanphear did not feel the plane came our field, but he was concerned that someone may have been operating an RC transmitter within 2-miles of the field.

*Cut Grass East of the Field and "No Trespassing sign* - The tall grass on land east of the field was cut by someone last Tuesday evening. Apparently this is county land. Some members remember that it had been cut in other years as well.

A No Trespassing sign has been posted at the bridge on the northeast corner of the field. President Lanphear will try to get additional clarification from the landowner.

*Combat Flying* - In the June issue of SPARKS, Dave Lorentzen wrote an article on combat flying and invited other playful souls to sharpen their combat skills with him. Dave said tonight the response has been underwhelming. He brought tapes of recent combat events with him tonight and will display them on his laptop computer after the meeting with the hope of attracting some interest.

**Raffle :** Our thanks to Charlie Schultz for donating the wing racks as one of the prizes tonight. **Winners:** **Dave Rush** - Firebird electric model; **Bob Hinrichs** - Flight Pack; **Miel Vermeulen** - Hat; **Wendell Hottmann** - Plane hangers; **Mike Kelly** - Wing Rack.

**Show & Tell:** Show & Tell pictures are on the Club's website, [www.marcswi.org](http://www.marcswi.org).

*Don Weigt* brought a GWS P-51 with a geared 380 motor. Don said the highlights are it is simple, looks nice, and, with the recommended control throws, it loops and rolls nicely.

Lois Weber's hobby is quilling (the art of paper filigree) and she displayed two nicely framed examples, a SPAD 13 and a Fokker triplane.

The meeting adjourned at approximately 8:45 p.m.

## Philosophy 101

Always drink upstream from the herd.

Will Rogers

## Electric Fun Fly Report

*By Dave Rush*

The day started quite scary as I woke up to a 4:30 a.m. thunderstorm. Fortunately, it moved through by about 6:30 a.m..

The day was quite successful with very little carnage, although I think Pete Aarsvold's sky diver has more lives than all the cats in Dane county. Numerous times he arrived at mother earth without the benefit of his parachute having opened.

We more than doubled our numbers this year with 41 registered pilots (20 last year). Pilots came from Green Bay, Waupaca, Fond du Lac, Wisconsin Rapids, Sparta, Chicago, Port Washington, Salem, Waukesha, Brookfield, Muscoda, Blue Mounds, Janesville, Milton, Topeka, Kansas and the Greater Madison Area. There was a wide variety of planes, a number of 10-12' powered gliders, a 6' wing span all foam P-51, a converted Four Star 40 and a converted Ultra Stick 60 to name a few. Wendell Hottmann's beautiful Morane Saulnier flying was a highlight of the day for me. Oddly enough there was a large number of pink planes present as well.

I tried something different for the pilots registration/raffle. Pilots could pay \$5.00 to fly only or \$15 to fly and receive a pilot's raffle ticket. Twenty four of the 41 pilots opted to get in the raffle and because of the generosity of our sponsors, everyone went home with a prize.

A HUGE thank you to our pilot's raffle sponsors - **Batteries America, Dockter's Hobby World, Flitterwings, Hobby Horse, RC Performance and Hobby, and Schultz Sport n' Hobby.**

A thank you to all the people that helped out with the event. - **Pete Aarsvold, Greg Baer and his nephew Tom, Greg and Dan Sutter, Wendell Hottmann, Lois Weber, Bill Kinney and Wayne Lanphear.** Sorry if I missed anyone. Thanks to **Joe Imelkowski** for providing us with generators to make preparing and serving food much easier for **my wife, Jodie, and son, Matt.**

A BIG thanks to **Burr Fontaine** and **Dan Dudovick** who spent the day in the transmitter impound.

A Special thank you to **Mike Kimmerley** who spent hours and hours mowing on the 4th of July to make

## MARCS 2003 Calendar of Events

Event	Date	Location
1.5 Meter Hand Launch	August 16	Long Island Sod Farm
Kindschi Scale Rally	August 17	Kettle Field
Fall Thermal Soar	September 6	Long Island Sod Farm
Warbirds Over Dane	September 20	Kettle Field

the field look fabulous. Our visiting guests were very impressed by our field.

My wife guesstimated over 100 spectators. I think there were well over 100 planes but I never got far trying to count.

I look forward to next years Electric Fly!

### Boy Scout Fun Fly Report

*By Jerry Buss*

On July 12 we had between fifteen and twenty Boy Scouts (they kept moving and were hard to count) in from Sun Prairie for a morning of ground school, flying RC and building and flying Sig-AMA Darts. The boys seemed to have a great time. Bill Rewey gave them a quite a show by aborting his first two attempts to land his home-built Pietenpol on the field because the willows at the southeast corner were a good deal higher than he remembered and his approaches were too fast. On his third try he got it down with lots of room to spare, although I think he may have scared the heck out of the driver of a garbage truck that he met head on on his approach. After lunch he got off easily and the boys and their parents enjoyed the treat.

We had plenty of people to instruct, coach, help with the Dart building and food service. The weather was outstanding, the food came out almost even with demand and the day could hardly have been better. Thanks to all who turned out. At least two parents expressed interest in getting into RC. Look for pictures in a future issue of *Model Aviation* in Bill Oberdieck's District VII VP's column, assuming he can find room for them.

Following are the guys who helped, to the extent that I was able to get their names, at least: **Ed Buechner, Harley Nelson, Mike Kimmerly, Dan Dudovick, Bill Kinney, Bill Rewey, Wayne Lanphear, Fred Schrank, Scott Schwandt, Dick Riddle, Ozzie Johnson and Bob Stowell.**

Thanks a big heap, guys. If I missed anyone, sorry.

### August's Big Event - Kindschi Scale Rally

*By Don Weigt*

You all are invited to the 2003 Ken Kindschi Scale Rally, Sunday, August 17. Setup will begin about 7 A.M., registration at 8:30, pilot's briefing at 9 sharp, flying immediately after.

We expect the usual great turnout of at least 30 pilots and 50 or more scale planes, from small to huge, cute to magnificent, of all types. Even if you don't have anything to wear, er, fly, you should come to see and marvel at what can be accomplished!

Jerry's Gourmet Lunch will be featuring Johnsonville brats this year along with an assortment of other delectibles, yum, yum! *(Editor's Note: Remember the A&W Drive-Ins with cute car hops serving root beer and barbecues on a tray that they hung on your car window? Well, we're having A&W recipe barbecues. There will be root beer too, but all the cute car hops are somebody's grandma now.)*

The raffle promises to be different and interesting, and raffle meister Dave Rush promises it will be quicker!

As always, if you can help for a few hours, it will make the day easier for everyone, especially if it is warm.

So, come on down, or come on out, and enjoy one of our club's fun events, one that should inspire you to more and better building next winter. You'll be glad you did. Don't you dare miss it!

Want to help but not sure how? Call Don Weigt at 608-238-9402.

Thank you for your support!

### Scale Rally Raffle

*By Dave Rush*

There will be one raffle held at 12:30 p.m.. You must be present to win.

For the public, tickets will be \$1.00 each or 6 for \$5.00.

Pilots will have the choice when registering to pay \$5.00 to just fly or \$10.00 to be in the raffle. If a pilot pays \$10.00 they will receive five raffle tickets **and** then get an additional ticket every time they fly. Prizes will be

set up similar to the Screamin' Eagles Raffle. That is, you can put your raffle ticket in the bucket by the prize you hope to win.

I hope to end up with at least 8 really nice prizes. Six of the prizes that I already have acquired are a shelf stereo system, a DVD player, a 10x10 Quickshade, a remote control jeep, a GWS P-51, and a Top Flight Focke Wulf 190 D9 1/7th scale kit as of the July 20.

I hope you will enjoy this new format. Keep flying to increase your chances!!

This raffle is a combination of what worked really well at the Screamin' Eagles Rally and the Electric Fun Fly.

## **The Bent Bird**

### **More About Wings**

*By Don Weigt*

The previous article discussed how a wing acts as a beam to transfer the lift made along its length to the center where the fuselage applies most of the load. In normal flight, the top member or edge of the spar is in compression, and the lower member or edge is in tension. A web or other material between the top and bottom holds the spacing and braces them so they can't slip past one another. This is a critical part of how the spars work. The grain in the web should be vertical, or 2 layers at 45 degrees to either side of vertical, not spanwise! This is because of the direction of the stresses in the web, which are between the top and bottom of the wing, not spanwise. Without the web, the spar and wing would be nearly as heavy, yet much weaker and more flexible.

Other beams were mentioned as examples, showing by their shapes that the stresses are mainly at the top and bottom, with a thinner web connecting the top and bottom members together, setting their spacing and preventing one slipping along relative to the other.

Thicker wings actually have lower compression and tension forces to support the same load at their centers. An example estimated the stresses in a model wing like my 82 inch Hangar 9 PT-19. The example used the depth of the spar to calculate the leverage and tension and compression forces in the wing.

Actually, the critical dimension is a bit smaller than the spar depth: it's the distance between the centers of the top and bottom spar pieces. The average forces are applied at the center of the top and bottom pieces (spanwise strips). Parts of the pieces are closer together than average and contribute less strength, other parts are farther apart than average and provide more but all contribute to the average.

So, if a wing spar is 2.5 inches high overall, with

1/2 inch thick top and bottom spar pieces, then the average spacing of the stresses is 2.0 inches, not 2.5, and the stresses are 5/4 as much: 25% greater. This shows it is helpful to have the top and bottom spar members be thin and wide to maximize their spacing.

The perfect design would have infinitely thin top and bottom members right at the surface of the wing skins. We can't get there, but, we can come close. Wings where thin skins are also the top and bottom spar members are about the best we can do. This is a good description of the sheeted foam core wing, the fiber glassed sheeted wing of either foam core or built up construction, and the wing with carbon fiber tow reinforcing strips along its top and bottom surfaces.

In these wings, the skins carrying the stresses are very close to the surfaces, so the spacing of the top and bottom spar members is almost equal to the wing's thickness, at least near the deepest part of the airfoil. While some of the skin is on thinner parts of the wing and provides less strength, this type of wing may be strongest for its weight because no other skin is needed; it's both spar and sheeting, needing only a finish.

This sort of wing has other advantages; the skins are strong and tough, they resist puncturing, tearing, and denting. They also are very smooth, so they can be more efficient airfoils than open framework wings with ribs covered by film or fabric. If you buy foam cores, or have a core cutter, this sort of wing is also very easy to make. It's much simpler to cut a core and skin it than to cut all those ribs and assemble them accurately with spars, webbing, and leading and trailing edges, perhaps adding sheeting and cap strips, and then covering.

One disadvantage is these wings aren't the lightest. Framed up wings can be lighter than foam core wings, though usually less strong. The lightest models always have had built up frameworks and very light covering. Also, if you need a flexible wing, for example to have real working wing warping for roll control, then you don't want to make it with a sheeted wing, especially with a foam core, or with fiberglass or carbon fiber added!

Built up wings where the skins serve as the spars will still need webbing to maintain the spacing between the upper and lower skins to help brace them spanwise. But any separate top and bottom spar members will be rather small; just large enough to transfer most of the loads between the web and the wing skins.

If there is no web, then those forces that would pass through the web will pass through the skins from the center to the leading and trailing edges, where they cross through to the other surface. This puts a lot of shear

(splitting) stress across the wood grain: it's not a good way. Adding a web increases the wing's strength far more than its weight.

Foam core wings usually don't have separate webs or much other added structure, but the entire core serves as the ribs and web, holding the skins in position so the wing doesn't change thickness or deform, and also preventing top and bottom skins from sliding spanwise across each other.

Styrofoam isn't the strongest material for its weight, but used cleverly like this it can be part of a wing that's very strong for its weight. That's what matters: not just how strong a wing is, or how light, but how light it can be while still strong enough.

OK. Now we understand how the wing carries the stresses to support the plane's fuselage or other concentrated loads with lift generated all along its length. What can we do to reduce those stresses, or the weight?

Moving more of the wings area inward reduces the length of the arm through which the average stress (lift) is applied. A nice tapered wing does that. It also makes the center deeper, so the spar is deeper and stronger. It helps aerodynamically, too, because the tips are quite inefficient, and taper reduces the area at the tips. Hmm. Sounds just like all the best planes from WWII through the fleet of passenger jets serving the world today, doesn't it? Maybe those designers knew something!

But, these wings are harder to build. They also are prone to tip stall, unless the tip airfoil is chosen to retard its stall, or the wing is twisted (has washout) so the tip is at a lower angle of attack. It isn't always worth all that trouble for a model wing, which may not be pushing any design limits, but it's a free bonus when making a scale model of any full size plane with a tapered wing.

A good goal is to make the wing strong only where it needs to be. Even with a straight wing, the stress falls off rapidly as we go away from the center. One third of the way to the tip, the remaining wing is only  $2/3$  the area and  $2/3$  the lever arm that exist at the center. So, the stress in the spar is less than half what it is at the wing's center ( $2/3 * 2/3 = 4/9 = 45\%$ ).

In a built up wing, we can make the spar half as thick from there to the tip, and it will still be strong enough for any flight loads that won't buckle the wing at its center.

An easy way to taper the spar is to make it from two equal sized pieces of wood side by side. For example, if the spar is  $1/4$  square, use 2 pieces  $1/8 \times 1/4$ . Or, if you're cutting your own pieces, use 2 pieces  $3/16$  square, increasing the distance between the upper and lower spar members a bit. In either case, the web sheets can be

sandwiched between the two spar strips, so one is glued to the front of the web, and the other to the back.

Cut one top and one bottom spar strip so they end at the first ribs more than  $1/3$  of the way to the tips. Sand their ends to tapers that start at the previous ribs, and evenly reduce the pieces to chisel points at the ends. Glue the longest flat sides of these pieces to the web or to the side of the full length spar pieces. Tahda! You now have a spar that can withstand just as hard a loop or snaproll, but is  $1/3$  lighter than one that's the same size all the way to the wing tip! It's as strong, but lighter, and lighter flies better.

This concept could be carried farther, with 3 or 4 or even more spar pieces of varying lengths, but it's the second piece, the first one that is less than full span, that gives the biggest weight savings and it's seldom worth the work of going to more.

Models with foam cores can have lighter tip areas by cutting out portions of the cores, especially behind the thickest point of the wing. Sometimes the sheeting also is reduced from about  $1/3$  of the way out to the tips, with only cap strips at "rib" stations. Fiberglass skinned wings often have a light glass cloth layer over their entire span, and an overlapping thicker and stronger glass cloth layer along the center third or so of the wingspan. The idea is the same: the center is where the loads are highest, and the structure should be strongest.

The forces on wire or strut braced models are determined mostly by the angles of the bracing, rather than the thickness of the wings, but the principles are the same. The bracing on early airplanes made them much stronger than they could have been built any other way at the same weight

with the materials available at the time. The engines were heavy and relatively low power, speeds were low. Very light weight structures were needed to get decent performance, drag was less important at these low airspeeds.

Because the stresses are greatest near the center, the wings often had double bracing wires for the flight loads in the inner bays (out to the first set of struts not attached to the fuselage), and single bracing wires farther out, and in the "landing" wires, which braced against reversed loads (negative Gs.)

Few RC models are designed with bracing wires and struts, unless they're scale models of full scale planes which had them. Scale models usually have either scale "rigging", or no bracing wires at all.

So, there are few choices there about how we build our models, but, if you want the model to be very light, we probably should brace it like the original.

Otherwise, we'll need large spars to carry the loads in these usually thin wings.

Later, as planes became faster, streamlining and drag reduction became more important than the lowest possible weight. External bracing was eliminated or minimized. These planes, from the mid '30s and later, are more like our typical models.

For simplicity, most of our models don't have bracing wires or struts. Scale models may, if the full scale planes did. Otherwise, we'll just have to make our models' wings strong enough without external bracing. That's what we have usually done. I hope this article may help you understand some of the ways it can be done, and helps you make wise choices about how to build strong light wings.

## The Long, Long Road to Kitty Hawk - II

By Jerry Buss

This is the second in a series of articles that will run through December about early flight experimenters who preceded the Wrights.

**William Samuel Henson** was the fairly successful owner of a lace making business in Somerset, England who aspired to be an engineer. In 1840, under the influence of George Cayley's writings and illustrations, Henson designed and patented an "aerial steam carriage" which he called the *Ariel*. Drawings of it present it as a huge, birdlike looking contraption with its tail feather shaped aft end and a 180 foot span of rectangular wings of considerable chord.

My own impression of a picture of it is that, with its tail configuration and pylon and wire bracing of the wings, it would have been somewhat similar in appearance to Etrick's far smaller 1911 designed Taube, of which I have an RC model, except for the shape of the wings. It was to have a weight of about 3,000 pounds.

Henson retained the services of **John Stringfellow**, at the time an apprentice engineer in the design of lace making machinery and horse drawn carriages and who also had a keen interest in the design of steam engines. Stringfellow seems to have been immediately smitten with the *Ariel* notion and he enthusiastically set about designing a light engine for a preliminary model of it.

Some folks have said that looking casually at a picture of the *Ariel*, with a ship-like cabin slung under its big wings, brings to mind a cartoon version of a modern airliner. Funny they should say that, for Henson professed to be planning to create an international airline. Naturally, money would be needed and so he and Stringfellow

embarked on a Madison Avenue style campaign to raise capital. They created illustrations of the *Ariel* in flight over London and such exotic places as the pyramids of Egypt, the Taj Mahal of India, and Chinese pagodas. These illustrations appeared in newspapers, magazines, on handkerchiefs, trays, wall tapestries, and lace-frilled place mats.

The Aerial Transit Company was incorporated with the help of Henson's Member of Parliament and 300 shares of stock were offered at one hundred pounds sterling each with a promise of a return of three to one. They seem to have hoped to convince people that the aircraft was an already established fact, but apparently gullibility and avarice combined did not exist in sufficient quantity in enough people and so the money campaign failed miserably. Although the idea has all of the earmarks of a scam, Henson and Stringfellow truly believed in the *Ariel* as a real possibility and were completely serious. When all else failed, Henson appealed to George Cayley, but he declined to invest or even to endorse the idea until they built a working machine.

Short of money or not, Stringfellow built a twenty foot wingspan model in 1847, but the steam engine he designed and also built was simply not powerful enough to get it off the ground. Henson, who married about that time, became disillusioned about the whole thing, abandoned the project and emigrated to the United States, but Stringfellow stayed on and continued the quest. In 1848 he built another model with a 10 foot wing span and counter-rotating props. When he tried to fly it with an improved steam engine it made a short "hop," but didn't actually fly.

Despite his failures, Stringfellow remained enamored with flying and, with his son, Frederick, produced a number of steam driven models with little success in achieving actual flight until 1868. That year he and Frederick built a triplane design, which they exhibited at the Crystal Palace Exposition in London. In a test, he launched the model from a sloping guide wire and achieved the glorious result of having it fly free for 30 feet before crashing into a wall. The steam engine took first prize at the show and the flying machine itself is on display today at the Smithsonian Air and Space Museum. After John's death, Frederick carried on the attempt to further develop the triplane, but without any notable result.

The *Ariel* episode was largely forgotten, but it did have some positive effects. Its design and those of Stringfellow's early models prompted Cayley to rethink wing configuration. As a result, he came up with the multiple-wing concept that became a standard feature on

nearly all early successful aircraft. The *Ariel* itself was logically designed after Cayley's original notion of wings forward with aft stabilizing surfaces and it inspired many later glider builders. In spite of the scorn heaped upon Henson's and Stringfellow's outrageous publicity campaign, their many illustrations found their way all over the world. They placed the issue of the possibility of comfortable flight to faraway places squarely before humanity more than half a century before aerodynamics married to the internal combustion engine ever permitted man to propel himself any higher off the ground than he could jump.

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**Francis Wenham**, was an engineer. Like many other experimenters of his time, flight was a side interest, or hobby, to him. He was also interested in microscopy, photography, optics and engine design. Like Sir George Cayley, he also studied bird's wings. In 1859 he published a report on this subject stating that it is the camber of the wing which generates lift and, further, that the greatest amount of lift exists near the leading edge.

He later concluded that while the mechanical principles involved in bird flight must be utilized, "All imitations of natural wings must be repudiated.... In designing a flying-machine, any deviations from the design of natural bird wings are admissible, provided the theoretical conditions involved in flight are borne in mind." He might be paraphrased in non-Victorian language to have said, "They don't have to flap, just move 'em through the air." For years, wannabe flyers would still go astray, however, by trying to design ornithopters, machines which flapped their wings in emulation of bird flight. These doomed to failure experiments continued on for nearly a decade after Kitty Hawk and serve to prove that prejudices about how things might be done are hard to overcome.

In 1866 Wenham presented a second paper, this one discrediting the flapping idea, which he titled *Aerial Locomotion*, in London to the first meeting of the newly organized Aeronautical Society. It firmly established him as a significant figure in aeronautical research.

Wenham and **John Browning**, designer of the Browning machine gun and the 1911 Colt .45 caliber ACP, went on to design and build the world's first wind tunnel in 1871. With this, one of their achievements was establishing the relationship between pressure and velocity.

It was Wenham who concluded that a rudder, as on a ship, could not effectively turn a flying machine. He premised that, in order to turn, one wing must generate more lift than the other so that they would roll and utilize

their lift to turn the machine. He also demonstrated that, given two wings of equal area, one of greater length would produce more lift than one of greater chord. He published these conclusions in the Aeronautical Society's journal in 1894 under the title *Progress In Flying Machines*. It was widely read and strongly influenced the Wrights in developing wing warping to provide lateral control, as Wilbur wrote in a 1908 report.

Despite the fact that the conclusion on how to turn a flying machine by inducing one wing to generate more lift than the other was Wenham's, it was the Wrights who proceeded to patent the idea as their own and to initiate many lawsuits to protect it. His finding on the relationship between wing length and lift versus chord and lift effectively reaffirmed the conclusion he had reached long before in his 1859 paper that said most lift is generated along the leading edge.

## The AEROMART

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Dazzler .40 ARF

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