Texas City Wings

Volume 11, Issue 9 September 2009

Inside this issue:

"We all know that a lighter-weight airplane is easier for the motor to pull through the air.."

Build For Better Performance—Part 1

From the newsletter of the Tampa Bay Line Flyers Control Line Model Airplane Club

by Phil Bayly

Concept: We all know that a lighter-weight airplane is easier for the motor to pull through the air and will perform better, especially with a stunt ship—right? "Lighter" also means the airplane has a more favorable wing loading (weight vs. wing area) and stunt maneuvers are done more easily. The airspeed doesn't sag off during maneuvers, and this preserves the energy needed to continue the flight smoothly without stalling. We also know that we need to build in enough wood to give the strength needed to withstand the forces of flight, landings, and engine power, including vibration. So, here comes the weight penalty. Therefore, the real question is, how can we get the best of both worlds? Obviously a light weight and strong airplane is the ideal solution. But, reality says we probably need to find a compromise between the two.

With this accepted, the intent of this article is to outline some of the tricks of the trade that should help you lighten up your airplane without losing strength and achieve better performance. In fact, the first principle to understand is that a lighter airplane has less inertia. Therefore, less force is available to drive an airplane to its destruction as easily as a heavier one under similar conditions, e.g. crashes, air loads, etc. The guiding theme then says that what is really needed is just the right amount and kind of wood in the right places, and no more. This will give the optimum between the airplanes weight and its required strength. That's it! Now, let's examine some of the important details of construction principles, techniques, and wood selection that let us do this—the key to it all.

Bending Moments and Force Distribution: From physics we find that something breaks when enough force is applied to distort it beyond its elastic limits. When this happens, one side gives in compression and/or the other gives in tension. When less force is applied, we only get minor bending or distortion with a return to original form as the force is reduced. We should visualize this principle of breakage each time we select the wood (type, size, and density) for every part of the airplane, joint locations, and reinforcements. Try to imagine what forces each part will actually experience and choose the wood type, density, and size accordingly without any excess anywhere. You should use as little (light) as possible, but as much as necessary in every location throughout the airplane. This assessment includes the wood's size, density, grain, location, etc. in conjunction with the stress expected. Most important, realize that extra weight is simply unnecessary cargo that actually increases the inertia and force that is extended to the weaker places that break under

(Continued on page 5)

Texas City Radio Club Meeting Minutes September-

These are the minutes for the Texas City Radio Control Club meeting for September 26, 2009. The meeting at the TCRCC flying field was called to order at 8:00am by President Michael Grassmuck. A quorum was met with 18 members in attendance.

Visitors: none

Secretary's Report - David Gatling: A motion was made, seconded, and carried to accept the August meeting minutes as written in the August 2009 Newsletter.

Treasurer's Report – Ray Saenz: no report

President's Report – Michael Grassmuck: Mike is establishing a committee to look into erecting a covered area for the big birds north of the present covered area. The committee will be James Grassmuck, chairman, Harvey Cappel, Randy Steed, and Walter Clemishaw.

Mike reminded all of the Fun Fly on October 10th for club members and family. Randy Steed has volunteered to cook hot dogs and hamburgers.

Mike reminded the membership that the officer nominations will be held during the October 29th member's meeting at the Nessler Center in Texas City.

Vice President's Report – Randy Brown: Randy stated that the Christmas party has been set for Space Center Houston on Tuesday night, December 8th, 18:30 – 22:00. The menu will be chicken and beef fajitas and fixings. There will be drawings for: 1. A round trip flight in Randy's plane from Hobby to Galveston, limo pickup to dinner in Galveston. 2. A LA Racer with motor. 3. A Raptor F-22 RTF with radio, 4. 8- $25.00 gift certificates for the ladies.

Event's Section Report – The club 40 and quickie races started after the meeting.

Old Business Harvey Cappel reported that the Texas City mayor has stated to him that the field club house is a done deal with the club paying 70% and the city 30%. Harvey stated that the building could be completed as early as 8 months depending on when the City is ready to start. The club members, under the leadership of James Grassmuck, will install the building wiring. Harvey has a contractor for the building construction. The concession stand siding needs to be completed with trim and painting. Mike is suggesting some time in October.

New Business Harvey Cappel stated that the covered area roof has several rust spots that need wire brushing and sprayed with antirust paint. Looking for volunteers.

Show and Tell none

Meeting was adjourned at 8:30 am.

Next members meeting will be October 29th, 7:30pm at the Nessler Center.

Texas City RC Club 40 Race—July 11, 2009

By Mike Walther

The Texas City RC Club had their first open Club 40 Races and it was exciting and fun. We had 12 entries. This was not to bad for the first race of this kind in the Houston area. After four rounds of racing, the pilot points and fast times were as follows:

Mike Walther	12	1:37
Don Roccaforte	10	1:33
Fast time for the day!		
Eric Desardi	10	1:50
Mark Weiss	9	1:45
James Grassmuck	8	1:46
Richard Rehwald	7	2:04
Harvey Cappel	6	1:54
Sieve Leslie	6	1:54
David Gressens	5	1:40
Mike Grassmuck	5	1:58
Ray Saenz	2	1:50
Phil Vance	2	2:16

The races were 3 plane heats with 4 heats per round. After this, we had the elimination rounds in which I really get excited about. If a person does badly during the regular point rounds, then they have a chance to make it up on the end main elimination rounds. The elimination rounds goes like this. The races are based on where a person placed in the points. If you have the lowest points, you are on the bottom tier, or first ones to race in the elimination rounds. If you have the highest points, you are up on the last race on the elimination round. A person can race his way up from the lowest to the highest and place above all as long as they win all their elimination rounds. After the elimination rounds, the overall places ended up as below:

Don Roccaforte	1st
David Gressens	2nd
Mike Walther	3rd
Eric Desardi	4th
Mark Weiss	5th
James Grassmuck	6th
Richard Rehwald	7th
Harvey Cappel	8th
Sieve Leslie	9th
Phil Vance	10th
Mike Grassmuck	11th
Ray Saenz	12th

The final elimination rounds with the top two pilots and the guy who stepped his way up all the way from near the bottom (Gressens) was pretty exciting to say the least. I was in the lead, until I got greedy and cut out. Both Roccaforte and Gressens were coming up on me and I lost my cool. Then it was up to them. Gressens ended with a cut a Roccaforte came in first. Both of the pilots entered their first official race this day and this is very commendable for this.

There were many other exciting close call and exciting races throughout the contest and some mid air collisions to go along with it. A great time was had by all.

Thanks to Butch and all the other club members that judged the race.

Thanks to all who participated in the races.

I am hopeful that we have more.

"Texas City Wings" is published by the Texas City RC Club. Opinions expressed are those of the authors and not necessarily those of the Club or Officers.

NEXT CLUB MEETING:

NESSLER CENTER

7:30PM

October 29th

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Dickinson, Texas 77539

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Visit us on the web
www.tcrcc.org

AMA Charter #1075

(Continued from page 5)

The fuselage: A proper combination of woods, good design, and craftsmanship is essential here. The engine must be mounted on hardwood beams with a plywood firewall and gear mount. The sides must be hard and strong balsa reinforced internally to solidly support the power, vibration, and G loads of the motor while the sides continue to support the tail section's air loads. The top and bottom blocks are the final elements that require good wood selection for lightness and strength, whereas a removable cowling contributes no structural strength and can be ultra light. In flight, leverage stresses are amplified at the wing's leading and trailing edges and are enormous for stunt airplanes with long moments. Ultimately, cracking occurring at these high stress points is normal, even through the top and bottom blocks.

Don't discontinue internal beefing there unless you expect a short life airplane. Strange as it seems, thin plywood will provide the required beef-up strength at less weight than more volume of balsa, since it does not tear or compress easily, e.g. 1/64 inch. All of the same rules apply. Internally trim away all of the wood that does not contribute to the strength of the airplane while filling (non load bearing) holes such as cowlings with light wood. The tail portion of the fuselage may progressively get lighter (thinner) as your proceed rearward from the stabilizer's leading edge, but leave enough to support the tail wheel stresses. They are high stress during a hard landing, so a ply mount is best here.

PART 2 will be printed next month

(Continued from page 1)

stress.

The wing: So, where and how can we save this extra weight? Logically, you must attack the heaviest parts first to make the most difference with less effect elsewhere. So, let's start with the wing since it is normally the heaviest part of the airplane. In practice, diminishing the weight towards the wing tips with proper limits will make it stronger. Why stronger? Because the weight toward the tips is the major leveraging force that finally causes the wing to break at the usual spot, the intersection of the fuselage or edge of the wing capping, whichever is weaker. On nose impacts, especially with profiles, you typically find the wing's trailing edge tears loose at the body as the leading edge compresses, or the wing buckles up or down from the vertical force during flight maneuvers or when bellied in to the ground. With this understood, you can and should taper spars, trailing edges, leading edges, and capping to effectively reduce the overall weight progressively towards the wing tips without sacrificing the wing's strength. Other parts of the wing, including the tips, should be made of very light weight density wood. But think a minute. The outboard wing tip is usually weighted for flight stability. Therefore, heavier and stronger wood is always better than lead for tip weight, except for the need for a small amount of adjustable flight trim. Since the outboard wing needs to be heavier, it accordingly needs a little more strength throughout the outboard wing (higher density in the main spar is probably enough, so select the heavier one for the outboard).

Joints are the next consideration. Always be careful how joints are designed and where they are placed. Butt joints are the worst for strength! Diagonally cut, well matched, and glued joints are the best, especially with the reinforcement since the stress is distributed over a large area. Matching a diagonal joint is an easy fit if you overlap the two pieces of wood and cut the diagonal with a razor saw without letting them move.

Overlapping spars vs. diagonal matching and reinforcement is a great technique for strength and weight reduction since reinforcement is unnecessary, but difficult to achieve except with Free Flight wings. Since all joints become stiff and strong when reinforced, the wing spar's bending and breakage usually begins at its edge or thereafter. If not, you should reexamine your methods of jointing, including the type glue you use. Clamping joints while the glue dries is always best and can double its otherwise holding strength. Clothes pins work well too.

The wing's spars' distribution of force, beyond the stiff center area, should be diminishing toward the tip to optimize its overall strength. This means you don't want the forces to be able to over-concentrate at one spot causing the compression-tension relationship and breakage to happen as discussed earlier. You also want to trade off to have more wood (density and size) toward the fuselage at the tip. Smoothly distributed (non-visible) bending absorbs the force by spreading the load throughout instead of applying most of it at one place. Therefore, tapered spars, reinforcements, gussets, and anything else that helps the forces to be distributed smoothly throughout the spar is what we are looking for as we progressively have more wood approaching the fuselage where it is needed to help counteract the increasing leverage (breaking) force. This happens because most of the forces will now be concentrated there (as balsa spar enters a rigid reinforcement) when leveraged from the tip or from the wing during its high levels of flight loading (such as 90° or 120° turns).

Additionally, wood in the center of a spar or a wing does less for its strength (and stiffness) than the same amount at the surface. Therefore, for the maximum strength for its weight, intelligently laminated spars and V- or U-shaped and tapered reinforcements add the (least) wood at the right points where there is little compression and tension and the most wood near the surface where the stress is greater. You may recognize this as an "I-beam" concept for the spar with its veneer capping on a wing. Light weight sheet balsa on the surface adds much greater strength (and prevents distortion) than the same wood will do near the center of the wing. Its curvature to the airfoil also improves its rigidity. The ideal structure for weight vs. strength is tubular for stress to be applied from any direction; whereas, an I-beam wins for vertical stresses alone. Again, because this puts most of the mass of the material at the point of compression and tension where breakage begins or is countered for flight stresses. Additionally, you are always tasked to consider where some wood's weight would be better removed for use somewhere else or not at all.

Finally, you should inspect all spars and stringers for minor nicks. Forces can concentrate here too and cause easy breakage under stress. You are much better served to sand out all of the nicks to help the distortion under stress to be uniform instead of concentrated at a flawed point. Don't leave it "rough cut" or as is. Strange enough, sanding the spars is more for strength than saving weight, unless you significantly change the dimension of the wood.

(Continued on page 4)