



Choosing the Best Paper for Paper Airplanes

Paper is the most critical part of the paper aircraft. Yup, it's all about the paper. This may sound so obvious that it becomes ridiculous. However, there are several properties that can vary between different types and brands of paper. Understanding these properties and how they change the airplanes aerodynamics is essential to designing and building good paper airplanes.

Important paper properties include: strength, stiffness, stretch, weight, and texture. All of these properties have an effect on the actual folding of the paper, but, when it comes to flying paper planes the three most important are: stiffness, weight, and texture. You can refer to the PDF file for more detail on why these properties are so different for different brands of paper. What we are going to concentrate on here is what our best choices are for success in both building and flying paper airplanes.

Over the years I have noticed that if I find a paper that make good airplanes it does not seem to stay on the market for very long. Part of this is that paper sales have been based on supplying a product that is used for so many different things. I personally think that the aerodynamic quality of the stock should take precedence. However, not everyone agrees. With the demand for heavy, bright colored printer paper over the last several years, I thought that the problem was no longer going to be an issue. The only problem is that cost of making good paper airplane stock is more expensive than just making bright colored paper. The main characteristic that suffers in today's market is stiffness (not from too little but from too much).

It requires more processing time to reduce stiffness and produce a softer paper. This increases cost and in order to provide the most competitive price most stores are selling lower quality paper. My favorite airplane paper was "eXtreme colors" from Ampad and sold at Wal-Mart. Unfortunately, this paper has been replaced by "Embassy Colored Paper" from Ampad. This paper is much too stiff for paper airplane folding. For those of you who don't read the advanced text PDF file, the problem that occurs with stiff paper is that the wings won't curve due to the difference in air pressure on the top and bottom of the wing. This causes a decrease in lift and an increase in drag, thereby, shortening airplane flight time. Worse, one wing can bend while the other does not and the lift and drag become unbalanced leading to instability. I have not checked Kmart or Target yet to see if they have changed their paper types. As a note, the paper they have sold before ("Hots" from Georgia-Pacific, and "Brights" from Riverside) were better than "Embassy Colored Paper". "Hots" is fairly good and "Brights" is OK but a lighter paper.

Weight is the next important property for airplane flight. Unlike full size aircraft, we are trying to get as much weight as possible built into our paper airplane. The reason for this is to give us the most



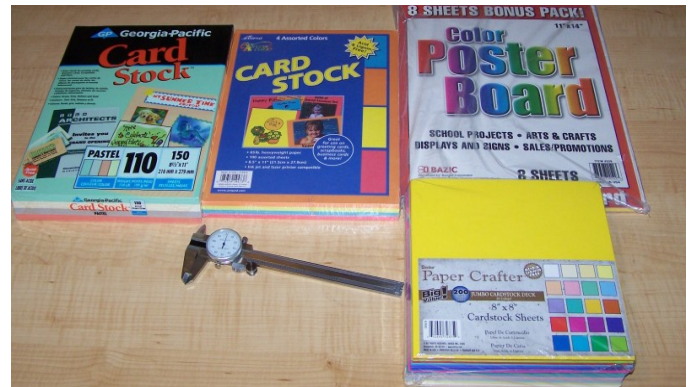
momentum to overcome drag. Most paper gliders have wings that produce more than enough lift to compensate for the heavier weight as long as we maintain a good speed. At the same time, the paper must remain foldable. This usually leaves us to compromise at a paper that is 24 lb weight. You can search out the details of why paper is labeled under the weight values you see on the package but I am going to just present a table at the bottom of this page that show the weight values and equivalent thicknesses. For folded design we are going to be using bond paper. For those gliders that do not have too thick of a bend 28 lb paper can be used for an even better weight.



Things get a little more confusing when it comes to paper or poster board to make glue up style gliders. These airplanes are a lot of fun but the weight can throw in some variables. First, most poster board or heavy craft paper for scrap booking does not even give a weight (most poster board is about 140lb index stock). When weights are given you might see 65lb or 110lb card stock. These two papers are very similar in thickness and weight. The difference is that the 65lb

stock is cover stock and the 110lb is index stock, both of which are sold as card stock. Both varieties along with poster board will work for glued airplanes. The lighter stock may show a little instability if not well trimmed. On many of the craft type paper it may be too thin unless you first glue two pieces together. This would make for a nice paper airplane if two colors are used together. The biggest thing to remember is that the difference between the papers is the thickness and you may have to measure it.

The last major characteristic to affect aerodynamics is texture. Many of the nice looking (for us with older taste, imitation parchment is nice!) papers available have a texture that can cause a bit of extra drag. This also seems to be the case with paper that I like the feel during folding. For best flight conditions on paper airplanes the paper surface should be smooth but not have a "sticky" coating. The Embassy "Fine Paper" series including the parchment look do make pretty good airplanes. The Riverside "Parchment" paper is also OK. You can see what the packages look like in the photo below.



So, at last, I have come to the point of giving my final opinion on the best paper. With the disappearance of "eXtreme colors" the best choice I have found is drum roll please..... 24lb Ink Jet Paper like the type shown above from Georgia-Pacific. Yes, it is **plain** paper, but is also **plane** paper!!! For those who need color you have two choices: Use computer graphics to add some art to your favorite designs or keep looking for that perfect paper.



Chart compiled by: Micro Format,Ink -- Check out their site for other good data.

	-- Bond Ledger	- Offset Text	- Cover -	-- Tag --	- Index -	- Points -	- *Caliper (inches)	-- millimeters --	- Metric (grams/sq meter)
Equivalent	16	40	22	37	33	3.2	.0032	0.081	60.2 gsm
Weight	18	45	24	41	37	3.6	.0036	0.092	67.72 gsm
	20	50	28	46	42	3.8	.0038	0.097	75.2 gsm
	24	60	33	56	50	4.8	.0048	0.12	90.3 gsm
	28	70	39	64	58	5.8	.0058	0.147	105.35 gsm
	29	73	40	62	60	6	.0060	0.152	109.11 gsm
	31	81	45	73	66	6.1	.0061	0.155	116.63 gsm
	35	90	48	80	74	6.2	.0062	0.157	131.68 gsm
	36	90	50	82	75	6.8	.0068	0.173	135.45 gsm
	39	100	54	90	81	7.2	.0072	0.183	146.73 gsm
	40	100	56	93	83	7.3	.0073	0.185	150.5 gsm
	43	110	60	100	90	7.4	.0074	0.188	161.78 gsm
	44	110	61	102	92	7.6	.0076	0.193	165.55 gsm
	47	120	65	108	97	8	.0078	0.198	176.83 gsm
53	135	74	122	110	9	.0085	0.216	199.41 gsm	
54	137	75	125	113	9	.009	0.229	203.17 gsm	
58	146	80	134	120	9.5	.0092	0.234	218.22 gsm	
65	165	90	150	135	10	.0095	0.241	244.56 gsm	
67	170	93	156	140	10.5	.010	0.25	252.08 gsm	
72	183	100	166	150	11	.011	0.289	270.9 gsm	
76	192	105	175	158	13	.013	0.33	285.95 gsm	
82	208	114	189	170	14	.014	0.356	308.52 gsm	

87	220	120	200	180	15	.015	0.38	312 gsm
105	267	146	244	220	18	.0175	0.445	385.06 gsm

The darker colored boxes above represent the "most common paper weights" for that category.

Normal paper manufacturing tolerance within a paper production run is + or - 5% to 7% caliper

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