

## Downsizing Intelligently:

### Choosing the Best Canopy Size

By Scott Miller



"What size canopy should I buy?"

Anyone who makes more than a handful of jumps will eventually ask this question. Almost every skydiver transitions to a different size canopy at least once, if not several times. When you ask this question, it's important to find the right answer. And if someone asks you the same question, it's important to give good advice.

Today most of us are flying much smaller canopies than skydivers were ten years ago, and the idea that "smaller is better" has become very popular. Unfortunately, many people choose a smaller canopy for the wrong reasons, and end up regretting their decision. Learning a few facts about canopy sizing, and understanding some common myths, can help you avoid this mistake.

It's difficult to discuss canopy sizing without using the terms "wing loading" and "exit weight." Exit weight is your body weight, plus the weight of your clothing, rig, both canopies, and anything else you are wearing when you exit the plane. This is the amount of weight your canopy will have to support. A typical jumper's exit weight will be about 20 to 25 pounds more than his or her body weight.

In this article, the weight given for a jumper is his or her exit weight.

Wing loading is equal to your exit weight in pounds divided by your canopy's surface area in square feet. For example, if Joe weighs 180 pounds and flies a 180 square foot canopy, his wing loading would be 180 pounds divided by 180 square feet, or 1 pound per square foot. If Joe downsized to a 120 square foot canopy, his wing loading would be 1.5 pounds per square foot ( $180 / 120 = 1.5$ ).

Higher wing loading increases the speed of a canopy. Joe will have a faster forward speed and higher rate of descent under the 120 than he did on his 180. In fact, the smaller canopy will not be capable of flying as slowly as the 180. The 120 may penetrate better into strong winds, but may not glide as far in light winds or when running with the wind.

The smaller canopy will also turn more quickly, and lose more altitude in a turn. Joe will need to plan ahead, and will have less time to react if something goes wrong. The smaller canopy might

level off or "swoop" farther on landing, but timing the flare will be more difficult, and crashing more painful. If Joe knows how to flare well, he may have more fun landing the smaller canopy. But if his landings have never been great, or he has trouble adjusting to the new canopy, his landings will almost certainly be worse.

Some of these effects are caused by the size of the canopy itself, not just by the wing loading. Suppose Marco weighs 190 pounds, and flies a 190 square foot canopy. The canopy is easy to handle, and he lands well even in light winds. Let's say his girlfriend, Sue, has 20 jumps and is ready to buy her own gear. Sue weighs 135 pounds, so Marco tells her she should buy a 135. Since they would both be loading their canopies at 1 pound per square foot, a 135 should be just as easy for Sue to fly as Marco's 190 is for him.

Unfortunately, this isn't going to be true. As canopy designer John LeBlanc explains in his seminar on wing loading, different size canopies will not fly the same when flown at the same wing loading, even if they are the exact same type of canopy. One reason is that both canopies will be flying through the same air. Sue may be 30% lighter than Marco, and her canopy 30% smaller, but the air molecules she flies through will not be 30% smaller or closer together.

Also, a smaller canopy usually has shorter lines, which will make it react more quickly than a larger canopy flown at the same wing loading. Sue would find a 135 more responsive, but also less forgiving, than the 190 is for Marco.

Some of these effects may increase or decrease if you change from one design to another. For example, zero-porosity canopies will normally glide farther and flare better than ones made of low-porosity "F-111" type material. You might find a zero-p canopy has a lower rate of descent, and is easier to land, than a slightly larger F-111 canopy. If the zero-p canopy is more than 20 square feet smaller, though, this may no longer be true.

In order to help customers choose the right canopy, manufacturers publish wing loading recommendations for the canopies they build. Unfortunately, these recommendations are often misunderstood, and end up being used incorrectly.

The most common recommendation given is maximum exit weight. Suppose the maximum exit weight for a certain canopy is 144 pounds. If a person flying this canopy weighs 144 pounds *or less*, the canopy will perform as the designers intended. If someone heavier jumps the canopy it will be faster, but may not glide as far in all situations, or land as well.

Too many people ignore the word "maximum" when looking at maximum exit weight, and believe this is simply the recommended weight. Some will even say you are "under-loading" your canopy if you weigh less than the maximum weight. Technically, a canopy can only be under-loaded if the manufacturer specifies a *minimum* exit weight. If a canopy has a maximum weight of 190 pounds, but no specific minimum weight, there is no reason why a 130-pound

person could not jump it. In fact, a novice jumper, or one who is simply conservative, may want to be well below the maximum exit weight for his or her canopy.

Another source of confusion is the fact that two very different canopies may have similar weight recommendations. Let's say there's a canopy named the "Floatie" and another called the "Zippo." The maximum exit weight for a Floatie 150 is 165 pounds, for a wing load of 1.1. A Zippo 97 has the same maximum weight of 165 pounds, for a wing load of 1.7. If a 165-pound jumper has been flying a Floatie 150, and wants to buy a Zippo, should he downsize to a 97? Probably not.

It's important to understand that there is no standard formula for determining a main canopy's weight limit. These numbers are based on the designers' ideas of how their canopies should fly, and who will be flying them. In this example, the Zippo is probably intended for jumpers who like very fast, responsive canopies, and have the skill and experience to fly them. A Zippo 97 may be capable of landing with a wing loading of 1.7, but this will certainly be more difficult than landing a Floatie 150 loaded at 1.1.

Also, different manufacturers have different ideas about wing loading in general. One company may believe canopies need to be loaded heavily to perform correctly, while another may feel that high wing loading isn't necessary.

We've already seen that a 97 will have very different flight characteristics from 150. This is still true even if the weight recommendations for the two canopies are the same. Even if our 165-pound friend flies his 150 very well, this will not prepare him for the demands of a 97.

So the question remains: what size canopy should I buy? In the end, only one person can give you the final answer. That person is you.

First, you need to ask yourself why you want a smaller canopy. If you simply want a canopy that is faster than the one you currently fly, that might be a good reason to downsize. Other reasons are not as good.

If you have problems landing, and believe a smaller canopy will help, you may want to read the first half of this article again. If you're happy with your current canopy, but "everyone else" says you need a smaller one, that also isn't a good reason. Everyone else doesn't have to land your canopy, and a choice that is right for others may not be right for you.

You might choose a smaller canopy just to get better penetration in strong winds. This may not be a bad choice, as long as you remember that a smaller canopy will be more difficult to land in light winds. Also, a smaller canopy may give you better penetration, but it will not give you the skill and experience needed to land safely in windy conditions.

Some jumpers dream of a smaller canopy the way motorcycle racers dream of more horsepower. Most of us have seen other jumpers swoop through the landing area on smaller canopies, going farther and faster than we do. It's easy to think, "That could be me, if only I had one of those canopies."

It's also easy to forget that most of the best canopy pilots have hundreds, if not thousands, of jumps on larger, more docile canopies. Rickster Powell is a good example. Many people have seen Rickster's extreme landings in the film *Antigravity* by Patrick Passe. He also appears in Passe's newest film, *Crosswind*.

"I'm glad I made a lot of jumps on larger canopies," says Powell. "You're just making it hard for yourself if you downsize to a really small canopy, and then try to learn how to swoop,"

Powell, a camera flyer who weighs about 180 pounds in gear, started swooping over 15 years ago on a Spitfire 180. After several hundred jumps on this canopy, he downsized to a PD 170. Then, as zero-p canopies became available, Powell continued downsizing one size at a time as his skills improved.

Joey Jones, who won first place in both the Daytona 5000 and Caribbean Challenge swoop competitions last year, followed a similar path. Jones learned high-performance landings on a Falcon 175, which he used for 800 jumps. Like Powell, Jones made over 1000 jumps on some of his canopies before downsizing. "If you aren't really wringing out your canopy, getting the best performance you can from it, there's no reason to downsize," says Jones.

Before you decide you are "bored" with your current canopy, be honest about how much you can still learn with it. Has anything happened recently under canopy that surprised you? Can you consistently land on your feet, even in light winds? What are the accuracy requirements for the license that you currently hold? Did you earn that license with a larger canopy than the one you are jumping now?

If you decide you are ready for a smaller canopy, try it before you buy it. You probably wouldn't buy a car you had never driven, or a house you had never seen, so why buy a canopy you have never jumped?

Although some drop zones have demo or rental gear with a variety of canopies, many do not. Some manufacturers have demo programs, though, and can send you a canopy to use for a short period of time. Anyone selling a used main should be willing to let you jump it a few times if you are seriously interested.

When trying smaller canopies, it's better to downsize only one size at a time, making several jumps on each new size before trying a smaller one. If a canopy feels good, and you're happy with the performance, then ask yourself if you want or need to go any smaller.

If you try a smaller canopy and have a hard time landing softly, can't land anywhere near your target, or just don't feel comfortable under that canopy, it's almost definitely too small for you right now. Staying with a larger canopy that's easier to handle will be less risky, and will help you build better skills in the long run.

If there is absolutely no way to try different mains before you buy one, then be conservative. Chose a size that is at least close to one you have jumped. You may end up with a slightly larger canopy than you want, but this is better than being injured under a canopy that is too small. Also, don't buy a container before you decide on a canopy size. Doing so might severely limit your choices.

Skydiving is a high risk sport. Each of us must decide for ourselves what risks we are willing to take, and which ones we wish to avoid. Choosing the right size canopy is an important part of that decision. Finding good information, and balancing it with your own good judgement, can help you make the right choice.

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