

# Reducing Rod Breakage

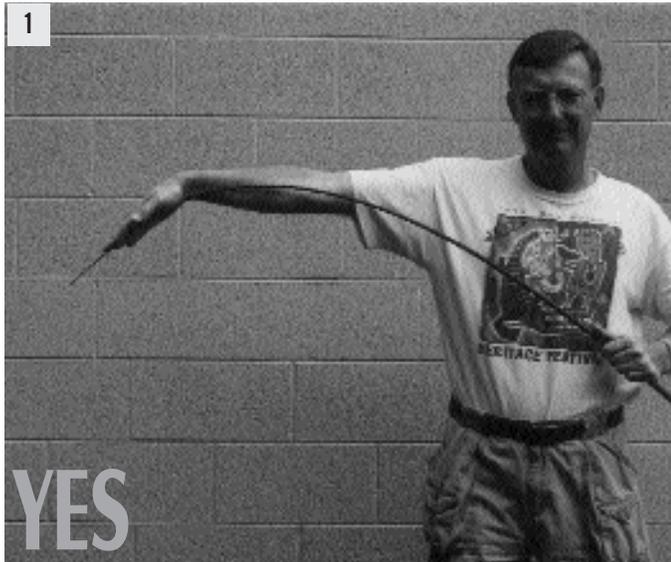
You can't totally eliminate broken rods, but you can educate your customers on proper fish fighting and rod handling techniques. In the process, you stand a very good chance of reducing the number of rod failures that can be attributed to poor rod use.

*by Tom Kirkman*

**M**ost custom rod builders dread the prospect of facing a customer who has just broken his expensive custom rod. About the best thing that can happen in such an instance, is that the customer will tell the builder that it was an accident, he broke it and is prepared to pay full price for another one. The worst that can happen, and which is the rule more than the exception, is that the fisherman has no idea how it broke, it must have been defective, and he'll expect a new one in a couple weeks at no charge.

Rod builders, much more than the average fisherman, understand the things that cause rods to break. We know that roughly 98% of all rod failures are due to some sort of accident or abuse on the part of fishermen, not actual defects in parts or assembly. Over the years I've often wondered if at least some of these failures couldn't be prevented if only fishermen understood the various actions that break rods and how to prevent them from occurring. While fishing with other anglers, I've often witnessed something which I knew was putting a rod in danger and when I pointed it out to the fisherman, he'd usually reply with something like, "Gosh, I didn't know that would hurt a rod."

Designing and building a rod is only part of the custom rod builder's job. Wise builders spend a few minutes with each customer, going over the proper care of their new rod and how to avoid the things that can easily result in breakage. Most anglers who have spent top dollar on a quality rod are more than willing to take good care of it, provided they are given some guidelines for doing so. With that in mind, let's cover some typical angling situations that can break rods and which are easily prevented by proper technique.



### What Can Be Prevented

Accidents do happen. Tackle boxes get dropped on rods, car doors shut on them, weighted flies smash into them, kids step on them. There are a host of accidental causes behind many rod breakages and there's not much we can do to prevent them. Things happen, rods get broken. This will never change. But such accidental abuse may only account for a small portion of rod breakage. I have no numbers to back this up, but I feel fairly confident that at least half of all rod breakages are caused not by accidental impact or abuse, but by simple angler ignorance. I've seen too many fishermen use rods in a ways that were almost guaranteed to cause breakage. Poking lures off stumps with the rod tip, high sticking and high reaching, overlining, etc., are all causes of rod failure and yet they can all be prevented through customer education. Accidents are things we can't really control, but the latter, simple angler abuse, can be controlled with just a little insight. And this is one area that we can control somewhat, through customer education.

*\*No rods were harmed during the production of this article. Only low-modulus glass rods were used during the photographing of dangerous rod abuse.*

### Shop Failures

Fishermen like to flex rods before buying. They shake, bend, wiggle and false cast any rod before they decide whether to purchase it or not. And many employ some strange and damaging techniques in so doing. Not so many years ago I had a fisherman tell me that he liked to "test" rods in the local discount stores in order to find out which ones were good and which ones were bad. He said he just picked up a rod off the rack, bent the tip around

until it reached the butt, and if it didn't break, he'd buy it. If it did break, and according to him lots of them did while undergoing his quality check, he just set it back in the rack as best he could and moved on to the next rod. According to him, the ones that broke had something wrong with them. The ones that held up were good rods and were the ones you wanted to choose from.

I once had a customer buy a rod from me and promptly break it right there in the shop! He was hand flexing it to show another fisherman "the action" and had pinched a spot about 12 inches back from the tip between his thumb and forefinger and tweaked it over. It snapped like a twig. According to him, it must have been defective, after all, he had never even made the first cast with it let alone fought a fish with it.

The trouble is, many fishermen don't even begin to realize there is a proper way to test or hand flex a rod. Done correctly, the rod or blank is in no danger. Done incorrectly, failure is a great possibility. Flexing a blank over its entire length does not put a rod in danger of breakage. Holding your palm against a rod tip and applying moderate pressure is not going to break a rod (1). Neither will pressing a rod tip into the ceiling or against the floor at a moderate angle.

Unfortunately, few fishermen flex rods with this much care or understanding. One of the most foolish things anyone can do to rod is to grasp it between thumb and forefinger and give it a sharp bend (2). I've seen dozens of rods and blanks snapped off by guys doing just this. Grasping the rod in this manner puts undue pressure and a very sharp bend into a very short area. Graphite in particular, does not like this. Unfortunately, most guys who break rods in this manner this never quite understand just what happened. The rod must have been defective, they reason. Actually, they broke the rod in just the same way as they'd



snap off the end of a dry twig. Make sure your customers don't do this to your in-house stock and make sure they understand that there is both a safe and an unsafe way to hand flex a blank.

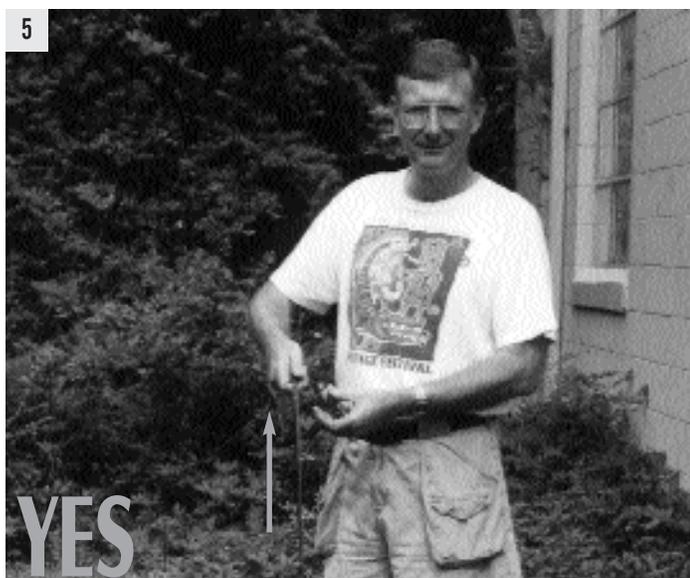
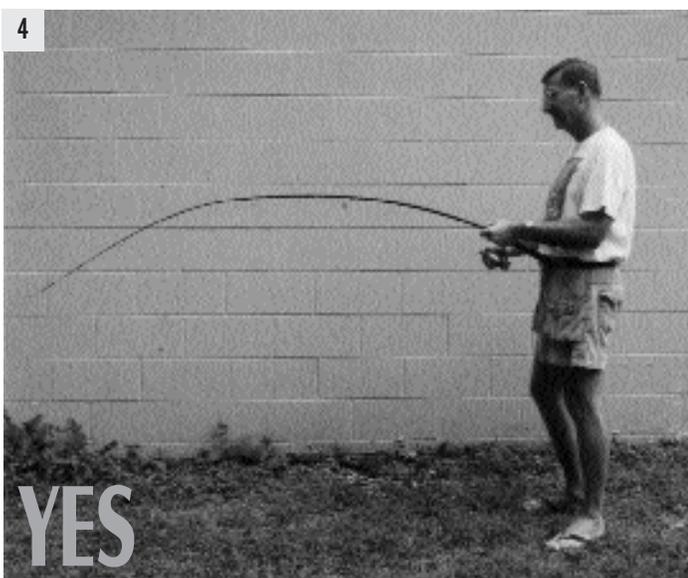
### Fighting Pressure

The way most fishermen attempt to apply more pressure to a fish, or a snag, is by pulling back harder and farther on the rod. Of course, once you put more than about a 90 degree bend in a rod, no more pressure is actually brought to bear against the quarry. The rod is simply put in jeopardy (3). Your customers need to understand that there is a limit to the degree of flex a rod can withstand as well as a degree of flex that once exceeded, fails to put any more pressure on the fish or obstruction.

Ideally, the angler should utilize the most powerful section of the rod, which lies in the mid to butt areas. To do this, he should keep a taut line and apply power from a fairly low angle, say about 0 to 45 degrees from the water (4). Once the rod butt starts to move past 45 degrees, there is no longer any sense in continuing upwards with it. Instead, the angler drops the rod, recovering line with the reel, and begins another "pump," keeping the pressure on the fish by having the rod flexed deep into the mid and butt area. Simply pulling back farther and farther on the rod will not get the powerful mid and butt sections of the rod involved in the fight. You'll simply end up with what is depicted here in photo #3, which puts very little pressure on the fish. The power of any rod is in the mid and butt sections. Get your customer to use that power by starting each rod pump low and pulling on the fish with the lower mid and butt of the rod.

Here's another good way to apply maximum pressure to a fish - drop the rod so that it is pointed at the fish or obstruction. On a tight line, move the butt of the rod to the side, recovering line as quickly as it is gained. What you're attempting to do here is take the rod out of the equation entirely and employ what amounts to a tug of war against the fish or obstruction. The situation you create here is not at all unlike what you'd have if the rod didn't even exist - a situation where you're simply pulling against whatever is on the other end with the line alone. When using this method on a fish, however, you need to understand that without the rod there to cushion any sudden surges, you're likely to break light line or tippets unless your reel drag is properly set and functioning. Remember, this method takes the rod out of the equation to a large degree and your line is definitely the weak link in the chain.

If you're attempting to free a hopelessly snagged lure, or to break the line on such, you can simply put the rod directly in line with the obstruction and pull back on the line without moving the rod at all (5). On a baitcast-



ing reel, lock the spool with your thumb. On a spinning reel lock the spool by dropping your forefinger onto it or cupping it with one hand. On a fly reel, cup the reel and spool so nothing turns. Now pull straight back with the entire rod/reel assembly while keeping the rod straight. Do exercise care, however, as lures or sinkers that are freed this way can exit the water like a bullet!

The number of rods broken each year by fishermen attempting to free snagged lures would likely boggle the mind. This is one very important technique your customers need to know about. And while you're at it, remind them that lures and baits are generally less expensive than rods. If something is going to be lost or damaged, better a lure than a rod.

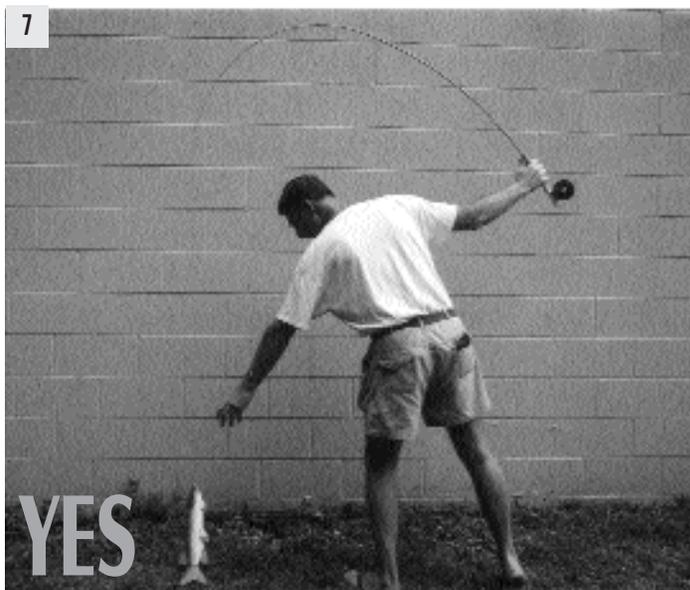
### Landing Mistakes

One customer of mine was continually breaking his rods near the tip. Every rod I made for him came back broken about 4 to 12 inches back from the tip after only a few outings. One day after returning another broken rod to me in the shop, I asked him to go through the motion of landing a fish. His actions made the cause of his rod failures all too obvious.

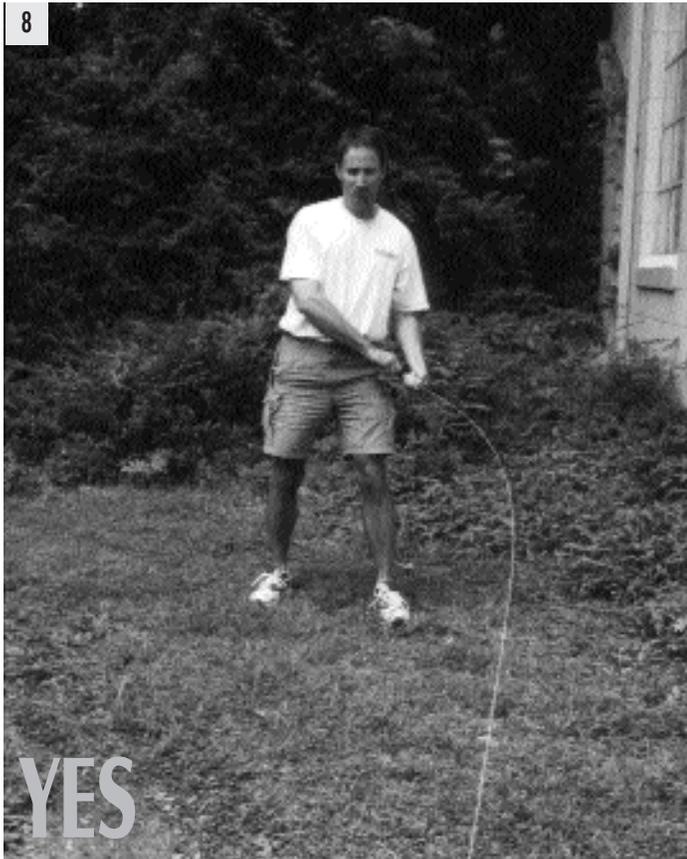
Bringing a fish in too close and then pointing the rod skyward when you attempt to land him, almost always results in the tip of the rod folding over into a 180 degree bend. Few rods will take this kind of abuse. Fly fishermen are particularly bad about doing this as their long rods make it impossible (or so they think) for them to get the darn fish close enough for them to land it. So they wind the fish up close and point the rod skyward, never looking up to see the horrendous bend they're putting in the rod. The bottom of the rod is pointing straight up, and the tip is pointing straight down (6). Failure is imminent.

Instruct your customer on the finer points of landing fish. Improper landing techniques are the undoing of many a rod. Always leave a length of line beyond the rod tip that is equal to, or greater than, your rod's overall length. That's right, with a 6 foot rod you want at least 6 feet of line past the rod tip when attempting to land a fish. With a 9 footer, keep at least 9 feet of line, if not a few feet more, past the rod tip. When landing a fish, turn your hand over and outward so that the rod tip is not flexed past 90 degrees (7). The fish will fall gently to hand, net or gaff without your rod being put in danger.

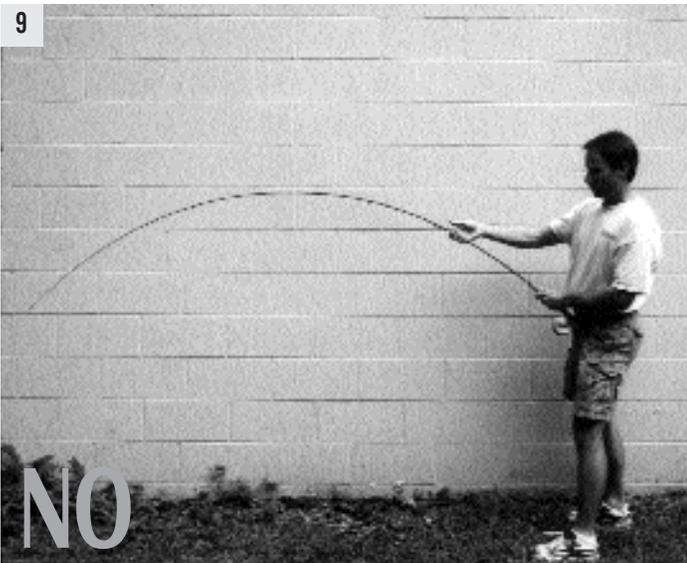
While I'm sure most of you already know this, your customers need to understand that using the rod to lift and swing any decent sized fish over the gunwale and into the boat is not good landing technique. I know the bass pros do it and get away with it a lot of the time. But if you're not fishing big money tournaments where you can afford to bust rods, you're better off using a much safer landing technique. Explain this to your customers.



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### The Reel Is Not A Winch

Fishing reels are not winches. They're not made for direct retrieve against any sort of heavy load. Their purpose is to pay out line under pressure and to recover it when there is no pressure. I'm sure all of us have been in a boat with an angler who hooks a nice fish and then starts winding and cranking away. The rod tip bends over and past 90 degrees and the angler just winches away on the reel, keeping the rod up high and with a tight bend in it. This is often referred to as "high sticking," again pretty much what was depicted in photo #3. With spinning equipment, you'll often hear the spool clicking or whining as the angler simply slips the drag, rotating the spool around the spindle shaft, severely twisting the line but never actually gaining any!

I don't want to delve into the intricacies of reel drags and proper settings, other than to point out that a reel is not meant for winching in a fish. The rod moves the fish towards us and the reel simply takes up the slack line as the rod is dropped back down and readied for another pump. All the while, the rod is never brought back so far as to put more than a 90 degree bend in it. Depending on the line and reel drag setting, the rod can be flexed deeply into its power zone and efficient power is then brought to bear against the fish, hopefully moving him the direction you wish him to go. When rod flex begins to move past 90 degrees, it's time to lower it back towards the fish all the while using the reel to recover the gained line. Your customer should understand that this is not only the most effective way to fight a fish, but it does not pose any harm to his equipment.

One aside that I need to mention is that the tendency for most anglers is to move the fish by sweeping the rod upwards. Yet quite often, the easiest way to move the fish is to apply pressure from the side (8). For whatever reason, fish tend to resist the urge to be pulled upwards, but do not resist nearly as much to being pulled to the side. Try it some time and see for yourself.

### High Reaching

A rod is a lever. To the fisherman it's a third order lever and to the fish, its a second order lever. In both cases he (the fish) has the advantage over you in terms of power. If he's big enough and strong enough, the tendency when you tire or need to move the fish, is to reach up on the rod, shortening the lever and trying to reduce the fish's lever advantage (9). It's effective for sure, but its also tough on rods. All rods feature a progressive action and as the load on the rod increases, the rod flexes further and further down towards the butt into the beefiest and strongest part of the structure (at least if you keep recovering line and resist the temptation to simply aim the rod to the heavens and winch away).. If you've got

maximum pressure on a fish and you suddenly reach up and beyond that very strong part of the rod, isolating the much weaker mid or tip section with that same pressure, you're going to break it. Customers need to understand that they can still beat a fish quickly without endangering their rod.

The purpose of the fighting butt on fly rods, or longer handles on most casting and spinning rods, is so you can get the rod butt up under your forearm thereby taking pressure off your wrist and putting it on the whole of your arm and shoulder.

The tight-line sideways movement outlined earlier in this article is sometimes also a good practice in these situations. Take the rod out of the equation entirely. Remove the lever advantage the fish has on you and whip him in a tug of war. It's more effective and you won't break a rod doing it.

### The Really Dumb Mistakes

I can't count the number of rods I've seen in the act of being broken and the entire time the event is taking place the fisherman is totally oblivious to what's going on. I've watched fly fishermen attempt to pull the line/leader connection through the guides only to have it catch or snag on a guide and stop. The fisherman keeps pulling on the fly end of the leader, effectively folding the tip of the rod over into a sharp arc. This is very similar to what I spoke of earlier when talking about landing a fish. Most line/leader connections can easily be shaken through the guides with a few short, false casting type motions, or by lowering the rod and wagging it from side to side. Make sure your fly fishing customers know how to do this.

Then you've got the surf fisherman who travels up and down the beach in his 4WD vehicle, rods stuck into his bumper mounted rod holders, hood and sinkers secured in one of the guide frames or rings. As bad as this is on the guides, it's pure torture on the rod blank. Those surf sinkers or metal lures tick, tap and slap the rod surface as the vehicle motors down the road or cruises the dunes. The fishermen stops and climbs out and loads up his next cast only to have the rod snap. Another defective rod, or so he thinks. If the sinker or lure has to beat and bang on anything, make it the handle, not the rod blank surface.

Watch fishermen as they attempt to get a too long rod into a car, truck or boat with a too small opening. They think that if they only double the rod up for just a second, they'll be okay. Often they're not. A few "words to the wise" with regard to these type errors can spare many a rod from breakage. Customers need to understand the ramifications that any sharp or sudden impact to the rod surface can have down the road. Rods that are subject to such abuse may not break at the time of the impact, but rather fail a little later leaving the fisherman to believe he did nothing to cause the break.

### Fish Fighting Tips

- Never flex a rod by hand by pinching the rod between thumb and forefinger.
- When flexing a rod by hand, flex the blank over its full length, never just over a short area.
- Never put more than a 90 degree flex into a fishing rod either while fighting or landing a fish.
- A rod's power is concentrated in the lower mid and butt sections. Apply pressure against a fish by pulling with the lower mid and butt areas of the rod, keeping your lifting and pumping action from between just under 0 degrees and up to about 45 or 50 degrees (8 to 11 o'clock).
- When attempting to free your lure or fly from a snag or obstruction, point the rod directly at the obstruction and hold the reel spool so it cannot slip. Pull straight back against the snag and do not put any flex into the rod. Exercise care, as a freed lure or sinker can come at you like a bullet.
- Pay attention to the line you use on any rod. The line should always be the weak link in the chain, not the rod. Using a higher line test than recommended and applying maximum pressure with it can easily break a rod.
- Transport and store rods with a reasonable amount of care. Quality graphite rods are terribly strong but do not hold up well to bumps, bangs, scrapes and other types of impact or abrasion.

### Conclusion

There are some things in fishing that you simply cannot control and that are going to break rods. But it only makes sense to at least try to offer some input on those things that either you or your customer can control. Most custom rod customers would prefer that their expensive new rod didn't break, and they are only too happy to try and prevent breakage by practicing safe and effective techniques. But they can't do that unless they know how. Here's one more chance for you, the custom rod builder, to impart some knowledge and extra value into each custom rod sale. And you just might be sparing yourself a future headache in the process! 📌

*This article isn't intended to be a full treatise on fish fighting techniques, so forgive me if I've skimmed over any of the more important aspects that such a treatise would require. The purpose here has to been to offer you some basic instructional information which you can relay to your customers. The Volume 3 #1 issue of RodMaker contains much more technical details on rod breakage causes.*

# Rod Failure

Well over 95% of all rod failures are due to misuse or abuse. As a custom rod builder, can you spot the difference between a rod broken due to abuse, and one broken due to an actual defect?

by Tom Kirkman

Over 200 rod blanks were destroyed during the making of this article. All had been in perfect 1st quality form and were simply ruined by twisting, crushing, high-sticking, overloading and any and all manner of physical torture and abuse you can think of. It sounds bad and it is. But it's what you must do if you really want to learn how to identify the various types of rod failure.

The good news is that only about 2% of rod failures are due to manufacturing defects. The remainder, which constitute the vast majority of rod breakages, are due to misuse and abuse. A quality rod blank is remarkably strong but seemingly little things like sudden impacts, "high-sticking" and other assorted bumps and lumps can quickly reduce an otherwise sound fishing rod into a failure just waiting to happen. And it doesn't take much - even a very powerful rod blank, misused or perhaps damaged from a small surface fracture, can suddenly pop under a very marginal load. When this happens, the fisherman almost immediately cries "defective" and may insist on a free replacement. He won't remember that earlier in the day he slapped the rod against the SUV lift gate, or that his buddy fell on a stack of rods while getting into the boat, or that his weighted fly came back and struck the rod as he freed it from a snag. All those things pass quickly from memory with a quick feel of the rod and a "Gee, I hope that didn't hurt anything."

Any damage done from these seemingly small incidents will silently lurk until the rod undergoes its next test - which can be against a large fish, or even a small one. It may reveal itself on the very next cast, or much later. In any case, most rod damage that doesn't reveal itself through an immediate failure will be forgotten by the angler, leading him or her to honestly believe that any breakage must have been due to a defect of some sort.

For the custom rod builder who has invested a great deal of time and care into the crafting of a high quality fishing rod, being confronted by a disappointed or even angry customer who feels he has been sold a defective fishing rod can be a real headache. Fortunately, most rod breakages leave behind telltale clues that allow a rod builder to quickly ascertain the actual cause of the failure and enable him to engage the customer from the high ground of knowledge.

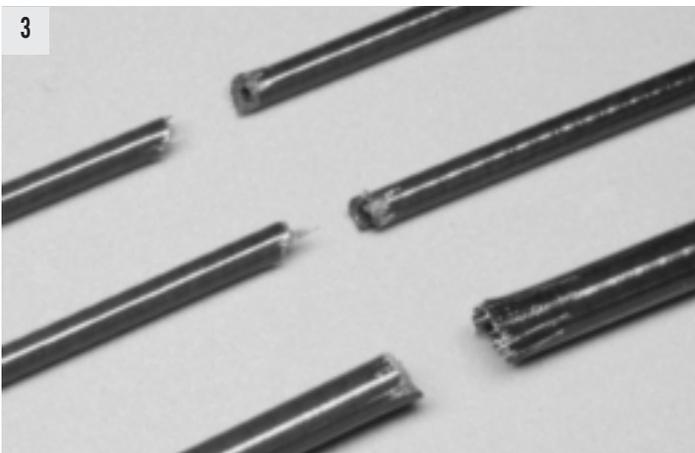
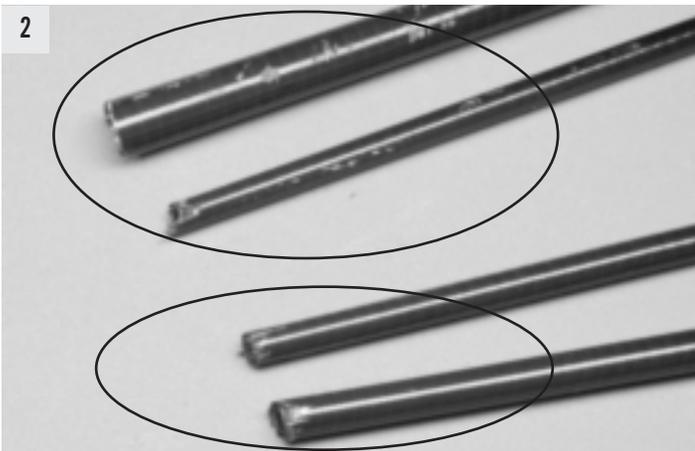
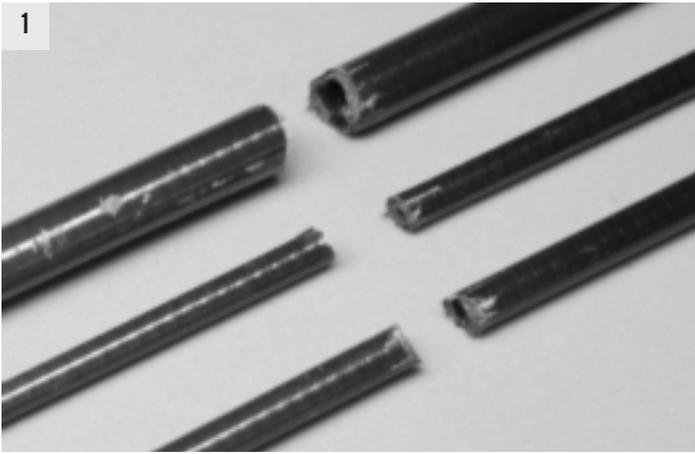
## Notes

How a rod breaks and the evidence a break leaves behind can vary greatly depending upon the material the blank is made from along with the particular design concept employed. A rod blank made from a woven glass cloth, for instance, will not necessarily fail in the same manner nor leave the same telltale

signs of why the breakage occurred as a graphite blank made with a linear power fiber arrangement. For the purpose of this article we'll be discussing breakage on graphite rod blanks made with the common linear power fiber arrangement accompanied with a thin scrim material for hoop reinforcement.

Although blanks from many manufacturers and with various finishes and coatings were tested (broken) the blanks chosen for our photographic images were non-sanded and clear coat finished. When inspecting blanks which have been painted opaque, matte finished or left in their natural un-coated state, a more careful examination of the surface may be required in order to spot the more subtle aspects of the failure that are normally left in the surface of the rod blank.





## Impact Failure

Rod blanks are incredibly strong provided their surface has not been compromised in some way. A perfectly sound rod blank that can dead lift 20 to 30 pounds can just as easily fail under a 1/2 pound load if the surface fibers of the blank have been fractured or bruised. Such damage or fractures are usually the result of some type of impact against the rod. The fisherman that slaps his rod on the boat's gunwale, or the guy who rips loose a snagged lure or weighted fly and has it zip out of the water and impact his blank, is very likely going to experience a failure either immediately or at some point down the road. How soon it happens is relative to how damaging the initial impact was and when the rod next experiences a test or load that suddenly reveals that earlier damage.

Failures due to impact are generally easy to spot - they're usually clean breaks with little to no lengthwise splitting of the blank in the area around the break (1). Imagine scoring a piece of glass and then giving it a sharp rap - it'll usually break cleanly along the scored line. This is very similar to how a rod blank that has suffered a surface fracture due to impact will fail.

There are other telltale signs to be on the lookout for whenever you suspect that an impact of some sort may be the cause of a failure. Check the area just fore and aft of the break and see if any visible marks from impact or abuse are apparent (2-top). Such marks in the immediate area of the break are additional evidence that the rod surface was fractured due to vibrating against a rigid surface or being continually rapped by a hard object. A single sharp impact can also cause a failure and in those cases where one sharp lick did all the damage, no additional marks may be present (2-bottom). But the break itself will be the same - clean and fairly straight with very little other disturbance of the blank's fibers.

## "Hi-Sticking"

Astute rod builders are aware of the dangers of pointing the rod butt to the sky while there is a fish on the other end. Graphite rods do not like being bent beyond a 90 degree angle to any applied load and the guy who uses his rod to lift a fish into the boat or pulls the rod around double while attempting to free a snag can easily put the upper half of a rod into a full 180 degree bend.

A high-stick situation doesn't guarantee a failure, but any time you flex a graphite rod to such an extreme a failure isn't at all unlikely. Although they seem fairly clean and straight (3), a closer look will reveal that the edges of the break are slightly irregular and distressed fibers are apparent (4). In fact, high-stick failures very closely mimic an overload failure except that they almost always take place in the upper 1/2 of the rod.

Marks or blemishes on the rod's surface in the area of the break are more indicative of some sort of impact and do

not necessarily point to a high-stick failure. But one thing is for certain, any sort of damage in the top half of the rod, such as due to impact or fracture, will quickly and almost certainly rear its head if the rod is high-sticked.

### Crush Failures

Rods are easily damaged by any type of crushing force. Stepping on a rod, sitting something on a rod or falling against a rod can easily fracture the structure. It may break immediately or the break may happen later when the rod is put under load. Astute fishermen and rod builders can usually spot damage from a crush prior to the actual failure - if they're looking for it. There will be telltale lengthwise splits along the rod in the area of the crush. If these are subtle enough, they may go unnoticed until the rod is put under load at which time a failure is almost certainly going to result.

A crush failure is fairly easy to spot. The rod may or may not be totally severed but in nearly all cases there will be long, lengthwise splits bordering a very irregular break (5). Close inspection may also reveal damage to the rod's surface stemming from the initial crushing force.

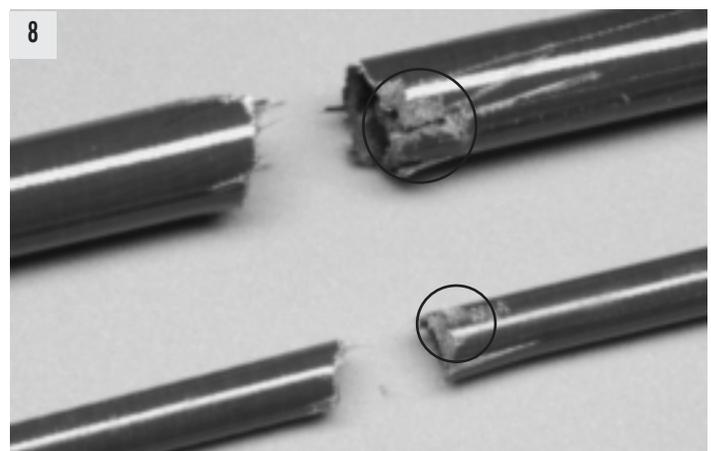
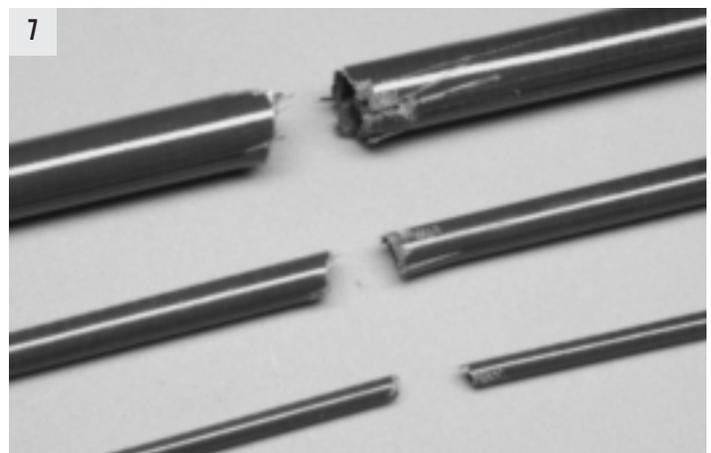
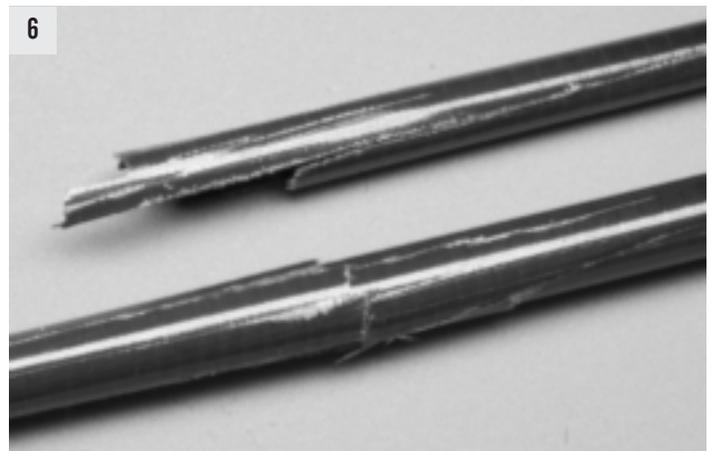
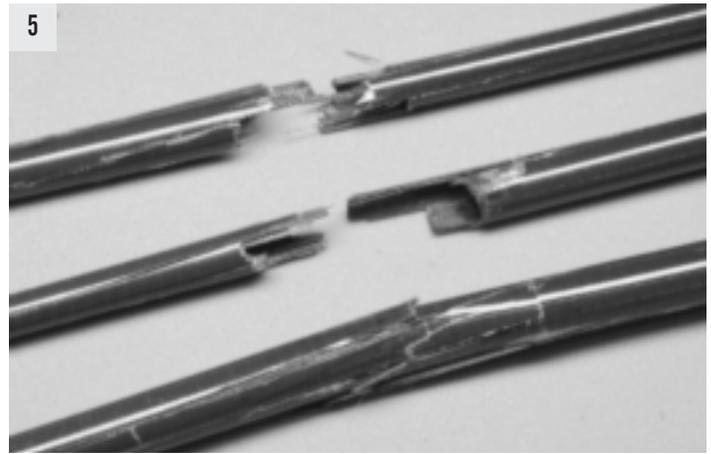
When you encounter a break that exhibits lengthwise splits and which isn't entirely severed, you're likely looking at a crush failure. The reason this type of damage doesn't always result in a complete severing of the rod is due to the fact that severe crush failures will result in collapse at the first hint of any load. In such cases there is very little force being applied and almost no sudden shock. Therefore the rod folds over, but remains intact (6-bottom).

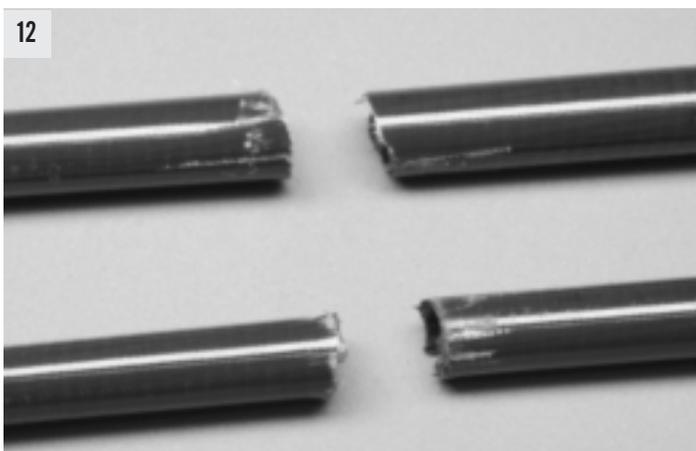
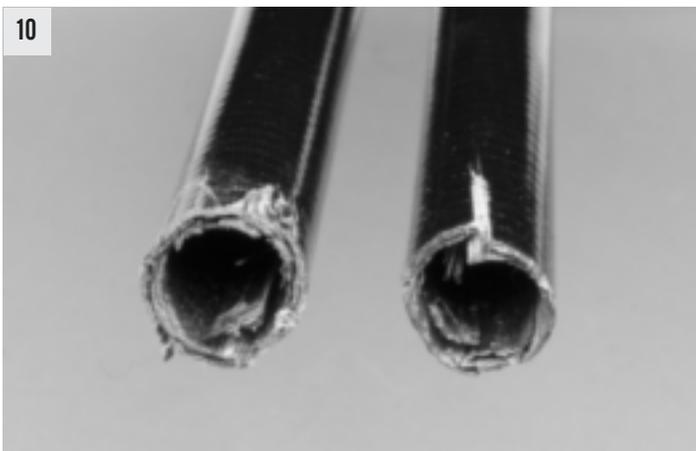
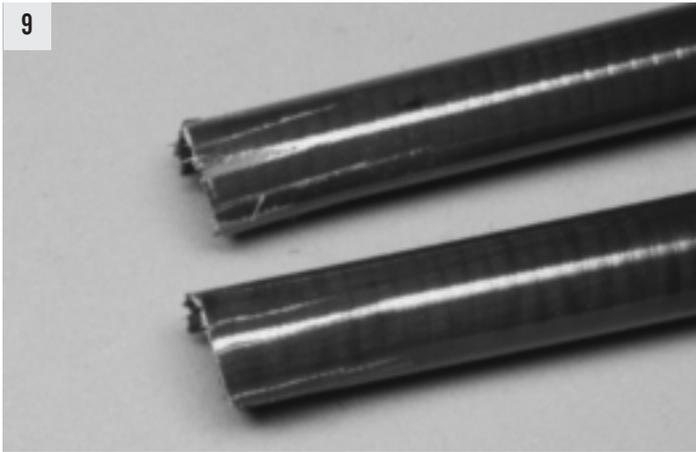
### Fracture

Almost any sort of impact or crushing force will result in a fracture of the rod's surface. But there is a particular type of fracture that stems from a "dig" or cut into the rod's surface. Such a fracture can result from something that has managed to cut or scrape into the rod, or perhaps a well meaning rod repairman has accidentally sliced into the rod while removing an old guide. The break that eventually results from these type fractures (7) will look much the same as those breaks caused by impact. However, close inspection of the break will usually reveal a deep or obvious "dig" or depression in the blank's surface (8).

### Overload Failures

Assuming a rod blank is in perfectly sound condition, and assuming the fisherman isn't "high-sticking" or otherwise abusing it, a rod can and will still fail at some point when the applied load exceeds that of the structure's design limits. In the case of graphite rod blanks, when the load limit is reached and exceeded, the fibers on the bottom of the rod, which are in compression, will blow inward. At that point,





you no longer have a tube and a catastrophic failure is the result. Load limit failures are easy to spot. This type of break will always take place in the bottom half of the rod, usually just forward of the handle or the fisherman's furthest point of effort (the rod hand). The break will be slightly irregular with jagged edges and short lengthwise splits and tears (9). Looking at the inside of an overload failure you'll note great distress in the walls of the blank both inside and out (10).

Another interesting facet of a load limit failure is that it's often accompanied by more than a single break (11). The initial break will take place just forward of the handle or point of effort, but the resulting shock of that break will almost simultaneously cause additional breakage further up and along the rod. The most common points where these additional breaks take place are several inches ahead of the first break and fairly near the tiptop. These subsequent breaks do not always take place, but when you do see them coupled with that jagged/irregular break just forward of the handle, you're almost certainly witnessing the result of a sound rod blank that was simply loaded beyond its design limits. The sudden shock from the overloading and breaking of the otherwise sound rod blank causes the additional breaks in many such cases.

### Shear Failures

Rod blanks are intended to be loaded over their entire lengths. Anything that a fisherman does to create a sudden stop or shear area along the blank can and often does result in a shear break at that point or just forward of it. Shear breaks are fairly easy to spot because they are relatively clean breaks (12). Although they may seem to resemble load limit failures, a closer inspection reveals that most shear breaks show very little distress of the fiber ends, particularly on the inside of the blank (13).

Always check the area just to the rear of any suspected Shear failure. If the rod has been repeatedly rested on a rail or gunwale, you may spot a blemish or worn spot in the rod's finish in the area just behind the break.

### Spiral Failures

We've all seen it - conventional casting rods with the guides on top, twisting under a heavy load. Although this might seem like murder to a fishing rod, blanks are designed and constructed to withstand a good deal of torsional stress. A simple 180 degree twist over the full length of a rod blank isn't likely to result in failure, but it can happen. And, the situation is exacerbated if there is other damage already existing somewhere along the rod.

Breaks due to twist or torsion are easy to spot. They closely resemble crush failures with long lengthwise splits on both sides of the break. But those lengthwise splits will be spiraled rather than straight (14).

### Combination Failures

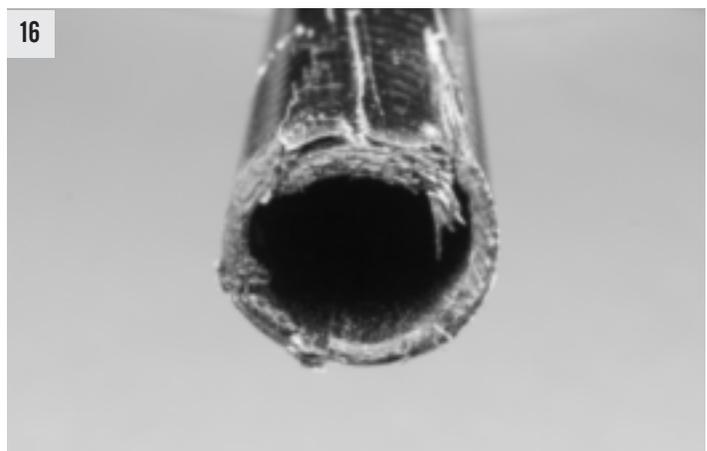
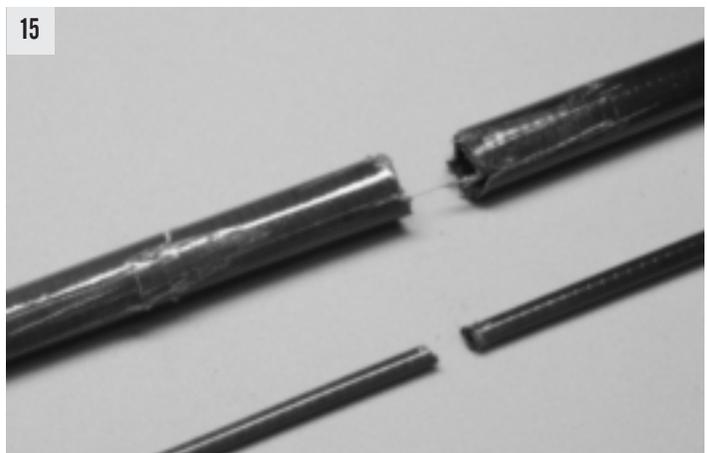
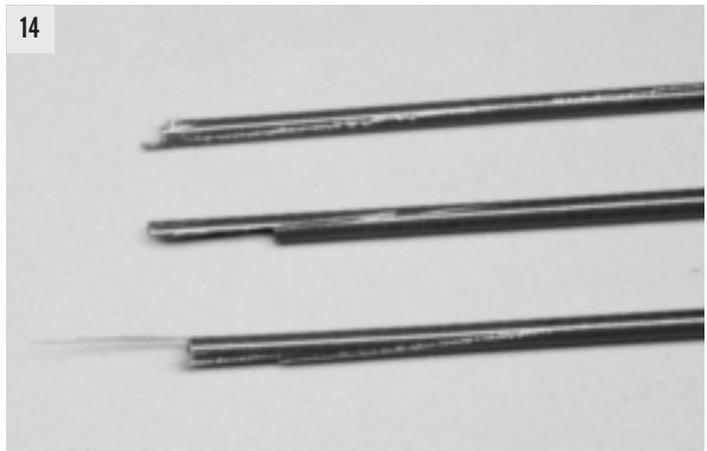
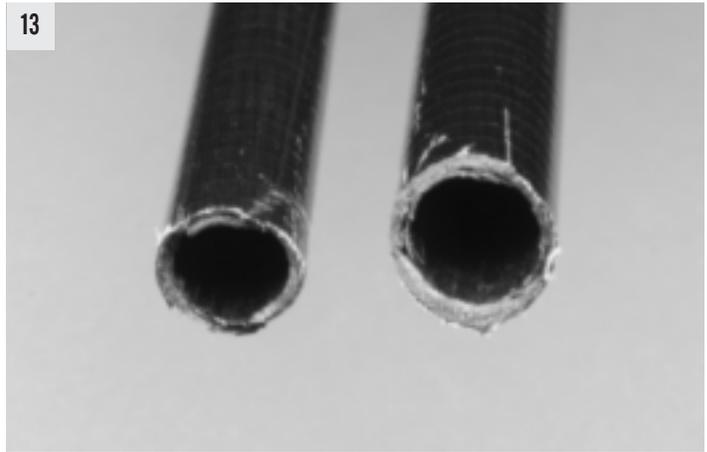
Sometimes it takes more than one incident of damage or abuse to cause complete failure. Many of the rods broken during the research for this article were “high-sticked” to a point that put the top half of the rod into a full 180+ degree flex. And yet, most held up to such abuse unless and until they were carrying a fairly hefty load in that position. Similarly, many rods with minor impact damage didn’t fail even with a fairly heavy load placed on them. This was particularly true when the damage was confined to the upper half of the rod. As the applied load increases, the flex in the rod moves beyond the tip and onto the more powerful mid and butt areas, allowing even lightly damaged areas in the upper half of the rod to remain intact. However, combine even light impact damage or a shallow fracture in the top half of the rod with a “high-stick” and you are guaranteed to have a quick and total failure on your hands. High-sticking a rod that has suffered even light damage anywhere in the upper half of the blank will result in failure at the point of that prior damage.

Another common combination failure is a simultaneous crush and shear action. Car doors, SUV lift gates, rod locker lids, etc., will easily crush a rod but will not exactly resemble standard crush damage/failure. When broken along a small diameter area, the break may appear like any other shear break - clean and straight across (15 bottom) When broken further towards the larger mid or butt areas, evidence of the crushing force will be present (15 top). Crush/Shear breaks in the lower half of a rod are often easy to spot by looking at the broken cross section head on. There will be some lengthwise splitting, the rod tends to break fairly clean at the point of the shear and will be left somewhat oval in profile (16). This is a common type of break and builders would do well to study these clues well. They do not mimic any other type of break and are almost never the result of an overload failure nor manufacturing defect.

### Breakage Due To Defects

Yes, defective rods do slip out pass the manufacturer’s quality control departments from time to time. This doesn’t happen nearly as often as most fishermen seem to think, but bad rods do indeed manage to get out to the dealers’ racks. A rod with a serious manufacturing defect or which has been constructed from defective material will tend to fail within the first few uses. Any time a customer has a rod fail for unknown reasons early on, a manufacturing or material defect can indeed be the culprit.

Most defects, fortunately, are quite obvious to the trained eye and very few defective blanks ever make it beyond a good quality control department. We spoke with some folks that have a pretty good idea what can go wrong during the manufacturing process and what they look for before allowing a blank to go out the door.



## Points to Remember

- Rods do not suddenly become defective after several seasons of use. True defects in materials or workmanship generally show themselves via a failure within the first few uses. A rod that has given good service over many fishing trips and then suddenly fails is almost always the result of some type of damage or abuse by the customer.
- Fishermen who swear that their rod broke while setting the hook on a 10 inch fish may actually be telling you the truth. However, the ultimate cause of such failure was prior damage that only revealed itself during subsequent use and which the fisherman had most likely forgotten about or not noticed at the time it occurred.
- Fishing rods are not unbreakable. A well made, sound fishing rod is designed to withstand a certain amount of load and flex. Take it beyond that design limit and it will break. Such failures generally occur in the lower half to lower 3rd of the rod and show great distress of the fibers both inside and outside of the blank.
- Always pay careful attention to the overall condition of any rod which is returned due to breakage. A rod that appears battered and beaten has likely suffered some type of damage to the rod blank itself. Whenever you see nicks, dings or deep scratches in the immediate area of the break, you should suspect that the failure was the result of impact or fracture.
- Get in the habit of regularly checking your rods for damage. While light nicks or scratches may not necessarily result in eventual failure, deeper fractures and crush splits will nearly always cause a rod to fail. Spot them early enough and you may be able to enact a repair that will save the rod before it is too late.
- The longer a fishing rod is in service the greater the chance it will suffer some type of damage which leads to either immediate or subsequent failure.

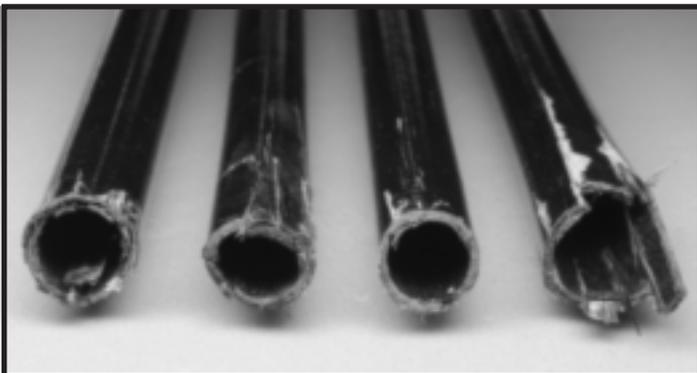
**Bad Tack** - The graphite prepeg pattern is tacked to the mandrel prior to being rolled around it. According to Jason Brunner, head blank engineer at St. Croix Rods, if this "tack" comes loose during the rolling process, the fibers will become misaligned and will create severe waviness or a corkscrew effect along the blank particularly in the upper half of the rod. In the lower half of the rod, a Bad Tack, or "Broke Loose" as Jason calls it, will manifest itself by a very out of round appearance.

**Loose Roll** - Graphite prepeg is rolled onto the mandrel between two plattens moving in opposite directions. This is done under pressure. In the event that the pattern is not rolled under sufficient pressure and remains somewhat loose on the mandrel, the subsequent tape wrap made on the blank will create obvious spiral indentations in the blank's surface. This is much more than the common residue left from the resin/tape after the blank has been cured. According to Jason Brunner, "This should be obvious to the builder as you can see and feel the spiral effect left by the tight tape wrap over the loosely rolled pattern." Jason also mentioned that these indentations may not occur over the entire length of the blank, but in short portions. Gary Loomis, who's been around the block a few times when it comes to rod blank design and manufacturing, added a similar comment "If the laminate is not well-compacted, it will be weaker, thus more breakage."

**Dents and Bumps** - Prior to the oven curing of the rolled and taped rod blank, it's important that the blank not receive pressure in small areas. "Dropping or leaning the blank against solid, rigid surfaces can cause the part to take on dents which can be seen after the part is cured," said Jason Brunner. He went on to add that imperfections in the resin application results in just the opposite - bumps which are visible when the blank is cured.

**Dry Spots** - Any areas where the resin has not been evenly or completely applied will result in an odd "skewed" appearance that shows some fibers out of alignment to the rest. Generally it gets caught in the tacking process as dry areas won't easily tack and stay put on the mandrel.

**Over Sanding** - When the cured blank comes out of the oven, the tape wrap is stripped away and the blank is generally sanded to a smooth surface. This is a critical process and the folks who do it are very skilled. Still, it sometimes happens that a blank will be oversanded resulting in a thin area that results in a weak point. Seeker Customer Service Representative Jim Upton says that this is one of the three main manufacturing defects that he's seen, "...bad tacks, dry spots and over sanding are the three most common defects." He also says that in the rare event that blanks with these defects do make it out the door, they're easy to spot when they fail. "Breaks due to oversanding will exhibit a



*Now that you've had access to the photographs depicting what the various types of specific breaks look like, let's have some fun! Study the 4 broken rods above and write down what you think caused each respective break. The answers are on page 34.*

much thinner wall on one side than the other.”

Gary Loomis concurs saying, “Sanding - over sanding - can cause breakage issues. You want to sand just enough to take the outer resin off, but not get into the material, especially in thinner wall areas.”

**Fiber Wash** - This is one of the things that can certainly cause a rod to fail and depending upon its severity, it may or may not be caught during the quality control process. If the fibers are misaligned from the intended alignment you’ll end up with weak spots in the rod blank. Fiber wash can result from bad material or poor manufacturing steps. In more severe cases, the defect is obvious to the eye, “Appearing in a snake like pattern on fairly short distances on a blank out of alignment with the remaining fibers,” said Jason Brunner. In less severe cases, blanks with fiber wash might just slip out of the manufacturer’s quality control department and make it to your dealer’s racks. Such blanks are very, very weak and generally fail right out of the box within the first use or so.

All the designers and makers we spoke with are in agreement that rod blanks which are truly defective either in materials or workmanship will fail within the first few times the rod is used, unless it’s simply not put to much of a test. But the rod that has served a fisherman well for a many trips, landing large fish and doing all that’s asked of it, doesn’t suddenly fail due to an inherent defect later on down the line.

Fortunately, most material and manufacturing defects are rather obvious and for this reason very few defective rod blanks ever make it beyond a premium blank manufacturer’s quality control department. This isn’t saying that a few don’t get out now and then, but it’s far more rare than most fishermen would think. Jim Upton remains convinced, “The vast majority of rod breakages remain due to customer misuse - setting drag pressures higher than the design rating of the blank (over-lining) and /or any action that has the same effect as “high-sticking” the rod.

The bottom line - most broken rods are the result of mishandling or abuse at some point after the blank has left the manufacturer’s facility. And now you know how to spot and identify that abuse. 🏹

## Blank Designer Comments

### Jason Brunner - St. Croix Rods

*True manufacturing defects will reveal themselves very early in a blank’s life. How early depends on how the blank is actually being used and how often.*

*A builder can do very simple visual inspections on a blank before building on it. I would first focus on the tip area as this is the section of a blank that is most vulnerable to defects. Inspect the tip visually looking for wrinkles and other obvious imperfections. Secondly, rub two fingers over the blank several times feeling for any imperfections. A good blank should feel smooth and straight. Also, bend the blank by hand in several locations using common sense not to exceed the blank’s ability. The blank should also be flexed from tip to butt... again not exceeding its ability. Finally, visually inspect the entire blank looking for the defects I mentioned in the article.*

*I would say that general mishandling of rods is the #1 cause of failure. Well designed carbon fiber blanks are very durable when used properly, but when mishandled they are prone to breakage. General mishandling can be anything from being stepped on, something dropped on it, cramming the tip into a rod locker, chattering against hard objects and the list goes on and on. Other factors that I also rate high on the list are high sticking, aggressive hook sets on objects other than fish and improper techniques for lifting fish into boats.*

*For sake of just stating it, I treat my \$300 rod the same way I treat my \$300 rifle. I clean it. I store it properly. I don’t drop it. I baby it!*

### Gary Loomis - North Fork Composites

*Most failures are usually a matter of abuse more than an issue of manufacturing defects. A weak area or defect should show up within days or a couple of weeks of the first use of the rod. Breakage after that time frame usually indicates an abuse of some type - whether the angler was aware of it or not. This can include hitting the rod against an edge, hitting a rod with a lure, etc. Sometimes the event that leads to breakage simply goes unnoticed while fishing, but the rod then fails sometime later.*

*There are a few things that rod builders can do to limit the amount of rod breakage they see. First, in the tip section, a builder can look for a broken tack-point that shows as twisted fiber. This is easier to do in uncoated blanks, of course. Then you want to look for blanks that are straight or which have an overall slight sweep, versus blanks that show a dogleg or strong twist along their length. Look for areas that might indicate over-sanding or just poor sanding quality. Again, this is easier to see in an uncoated blank. And the builder can flex test a blank and put it under a full fishing load to be sure that there are no immediate issues that might arise.*

*Finally there is one thing that is sometimes overlooked and ends up being very important - simply making sure that the end user and his or her angling situation is really right for the blank in-hand. If the end user wants or is expecting a certain performance level, they need to be sure that they truly get the right blank. This is where the custom rod builder’s expertise is so very important if the angler is to get what he wants and have it perform the way he expects it to. 🏹*