Melges 24 White Paper on the Systemic Forestay Issues related to the 7x19 Jib Halyard

Created by the International Melges 24 Class Association Technical Committee

Updated August 7, 2025

Background:
Earlier in 2024, the Technical Committee started receiving complaints documenting the premature failure of the current supply of 7x19 stainless steel wire rope halyards. While it is well-known that the 7x19 halyards used in this application require routine inspection and replacement on a regular basis, it seems that the current supply of 7x19 is not as robust as past supplies. More troubling, however, is the current 7x19 supply seems to be failing with the inner core of the wire often breaking first and this is not visible without unraveling the wire. This means that routine visual inspection looking for bird caging and broken individual strands will not necessarily reveal the issue putting even the most diligent teams at increased risk.
After consultation with Zenda, they reported that they were aware of the problem and have already tested a number of different suppliers to try and resolve the quality expectations of the fleet. Sadly, all to no avail. This seems to suggest that the supply of 7x19 wire rope is being dominated by a single manufacturer controlling the market through distribution.

While we are concerned about the quality of wire supply, rig loading seems to be playing a significant part in the reported failures. A lot of teams are going well beyond the 25-Turn limit suggested by the manufacturer and most rig tuning guides.

To give perspective on this issue, it was reported that a lot of the top teams competing at the 2024 World Championships in San Francisco were replacing their 7x19 halyards after a single day's sailing, such was their lack of trust in the quality of the wire.

While the class has been lucky that no one has been seriously hurt as a result of a failed forestay, this is now clearly identified as a safety issue in addition to yet another unwelcome increase in the cost of participation. As it is the Technical Committee's responsibility to investigate and possibly find ways to address concerns like this, it was decided to propose a rule change for 2024 to ban the use of the original 7x19 halyard design going forward in favor of the newer fixed forestay design that was approved for class use in 2008. As predicted, this proposal created some spirited commentary from those in attendance at the annual Technical Committee meeting held that year. As a result of those discussions, it was suggested that the proposal was being tendered without the vast majority of the membership even being aware of the issue and as a result the Technical Committee withdrew the proposal in favor of creating a white paper including the latest findings.

Current Class Approved Forestay Systems:
The issue with the 7x19 halyards is not new to the class. 7x19 does not respond well to rotational or twisting loads caused by furling the jib which eventually causes the wire to bird cage and break. This has been a concern for a long time and in 2008 the class approved an alternative design utilizing a 1x19 "fixed" forestay in hopes the fleet would convert to a safer

and less costly to maintain system. The fixed forestay system replaces the original system with a conventional forestay which is attached to the mast using a Gibb T Terminal type fitting with a female backing plate installed in the mast above the factory halyard sheeve. The stay is fitted with a sliding furling swivel which is hoisted with a Dyneema halyard using the original halyard sheeve. The stay terminates at the mast with the same furling swivel used in the original system. As 1x19 handles torque much better than 7x19, bird caging is completely eliminated. While many in the fleet did test the new system shortly after it was approved, it was eventually discovered that the original system was easier to use, especially in the higher wind ranges and in variable conditions. The flexibility the original system offered generally equated to it being faster and as a result, many simply switched back.

Understanding the wire:
Wire ropes are designated by the number of bundles and wires in each bundle that the wire rope contains. The 7x19 variant includes 7 bundles with 19 wires in each, giving the rope 133 wires. The 7x7 is another well-known flexible wire rope alternative that contains 49 wires. When you do the math, a 7x19 cable has over 2.5 times the number of wires used in a 7x7 wire rope. And this is why the 7x19 is able to bend more easily than 7x7 which makes it ideal for applications such as our halyard where it has to bend over the diameter of the halyard sheeve. While galvanized 7x19 wire rope is actually stronger than stainless steel and has been tested by the class to reasonable effect, there are significant corrosion issues, especially in salt water, which makes its use less than ideal. This is the primary reason it is not approved for use by the class.

The original halyard design ingeniously utilizes the inherent stretch properties of the 7x19 wire to auto rake the mast aft as the shroud tension is increased. To understand this, consider that the 7x19 halyard will stretch approximately 13mm more than an equal length of 1x19 when loaded to only 25% of its breaking strength. Obviously to increase the rake you simply tighten the shrouds and the 7x19 stretches allowing the mast to rake aft. It is a great design, except for the torque created by furling the jib and the fact that it is being loaded very close to, if not exceeding, safe working load limits.

The pros and cons between the flexible (7x19) and the fixed forestays:

- All masts manufactured after 2009 were mandated to have the female backing plate (receiver) for the fixed forestay system installed when the mast was built. This means retrofitting the fixed forestay is simply a matter of adding the stay and setting up a 3:1 purchase system for the new jib halyard similar to that used for the main halyard. However, masts made before this have to have the female backing plate installed to utilize the system. This is an additional expense and obviously the backing plate must be installed properly.
- The fix stay system is fitted with an open barrel turnbuckle which is used to manually set the stay length and by extension the rake. While the 1x19 does stretch a little, it does not stretch enough to effectively rake the mast as the shrouds are tensioned up. This means the stay must be lengthened as the wind speed increases. Typical tuning guides suggest this is done in 4 steps of ½" each with each step requiring 6 full turns of the

open body turnbuckle. This must be done on the bow and requires 3 hands. One to hold the bottom of the turnbuckle or the furling drum, one to turn the barrel, and another to hold the upper swage on the stay. This can be improved by making a simple tool to prevent the furling drum from turning. Some use a batten with a notch cut in the end that indexes to the furler and is held in place by sitting on it. In addition to this, the jib must be lowered a few inches to allow access to the turnbuckle.

- The fixed stay system allows for the jib to be easily removed if fitted with a zipper luff. And as it is fitted with a halyard, luff tension can be easily adjusted in the cabin at the compression post using the purchase system. The jib tack is set using a strap, so the jib is set at a constant height which creates repeatability for the jib car settings.
- As the rake is set by the forestay length, which is adjustable, the stiffness of the boat has less impact on rake and rig tension. This effectively means that older or softer boats can be more competitive with less rig tension.
- The robustness of the fixed stay is quite impressive. Current users are reporting using the same stay for over 10 years. The bronze open body turnbuckle barrel does wear however, and replacement is required every few years depending on use and lubrication, not unlike the shrouds.
- With the backing plate installed above the original halyard sheeve, the forestay gains some leverage, and this does affect the backstay's ability to bend the mast. This results in a heavier or less effective backstay adjustment which could be offset by increasing the purchase, sadly that is not currently within class rules. This also affects how and where the mast bends and by extension would affect the luff curve design of the mainsail. I am not aware of any sailmakers making a mainsail specifically designed for a fixed headstay system.
- As older spars require modification, converting the class to the fixed stay will create a burden on the older boat owners. And converting will require an upfront purchase. This obviously would be easily amortized as the stay does not need replacing unlike its 7x19 counterpart. And it is important to note that the hoist-able sliding swivel is a proprietary design of Harken (and Zenda) which means this required fitting is currently available from only one source.
- The fixed stay system has the advantage of being more cost effective in the long run and being much safer.
- In recent years, the primary sailmakers supplying the class have shifted away from zipper luff jibs. This means there are few, if any, zipper luffed jibs available off the shelf. Those requiring zipper luff jibs often buy a standard jib and then have the zipper added. Unfortunately, few lofts are actually capable of properly installing the zipper while maintaining the correct jib luff curve. Buying a properly designed and made zipper luff jib requires planning and lead time.
- The fixed headstay system requires a separate and specific tuning guide. And proper use of that tuning guide is different than the tuning most are used to. So, there is an element of re-learning how to sail the boat fast. This often results in owners getting frustrated and abandoning the newer forestay design before they get up to speed with it.

Other possible alternatives:

The Technical Committee has been proactively looking at this (and other issues) with the boat for some time. This has led to some class approved experimentation as made possible by Section 9 of the Class Constitution.

2:1 Composite Halyard – A couple of years ago we approved an application to experiment with a composite halyard. The system utilized a custom Harken upper halyard swivel that incorporated a fairlead to create a 2:1 purchase at the top of the forestay. The composite halyard exited the mast, passed through the fairlead and terminated up at the fixed fore stay receiver. A magic box purchase system was installed at the base of the compression post to control the rake. The jib used a simple hoist that ran through another fairlead on the bottom of the swivel and then fed down the luff inside the zipper and terminated at the tack not unlike the current Cunningham design. Initial testing showed promise, but the system was plagued by halyard wrap when furling which created chafing. There was also not a lot of repeatable control of the stay length which might have been in part because of the construction of the type of Dyneema that was tested. There is still the opportunity for more study with this setup including increasing the length of the 1x19 forestay so that there is less halyard to twist at the top and finding more durable synthetic halyard materials.

19x7 Wire Rope - Separate testing was conducted on an alternate Stainless Steel 5mm diameter wire rope using 19 bundles of 7 wires unlike the 7 bundles of 19 wires that we currently use. This type of cable is commonly used in crane hoists but up until recently was not available in SS in the smaller diameters. This cable is specifically designed to accommodate torsional loading and twisting which on paper suggested it would resolve the bird caging issue. However, surprisingly the initial findings proved that this wire suffered service failure even faster than 7x19 and as a result this once promising alternative was abandoned.

Composite Direct Replacement Halyards - Earlier this year, approval was granted to test a fully composite halyard. Testing was conducted by Bespoke Rigging and the Gamecock team using 5mm Maffioli Ultra Wire which is a pre-stretched SK99 Dyneema weave. After using the same Ultrawire halyard over 2 full regattas, while reports indicated impressive wear resistance, unfortunately, there were issues with maintaining a repeatable and consistent length especially after unloading the rig. It seems the halyard would stretch and then recoil which made rig tuning inconsistent and unreliable. The next possible step is to test 6mm diameter and see if the increased strength improves consistency.

Testing needs to continue but it is often difficult to find teams willing to commit to the time and skill required to get usable data. The class thanks Bespoke and the Gamecock team for their efforts.

Conclusions and comments:

Some have commented that perhaps the new mast made by Ceilidh with its different jib halyard sheeve may be contributing to increased fatigue of the halyard. But after studying regatta reports, it is clear that failures with the original Southern Spars are just as prevalent. While it is a fact that fewer failures are reported with the older boats, that may be attributed to the older

white masts (and the boat they are fitted to) are simply not stiff enough to get the wire rope into the danger zone in terms of safe working loads.
Many suggest that the old system is fine the way it is with areas of the world reporting no issues at all. Some claim their supply of 7x19 halyards is the same as it has always been. I would point out that this might be the result of existing supplies of better quality 7x19 still working through the distribution system. And in some areas of the world, fleets are typically sailing in less wind pressure which in turn makes it less likely the issues will be as prevalent as in a place like San Francisco. That however changes nothing as we do have boats sailing in venues that regularly approach the maximum allowable wind speed limit of 25 knots. We could always consider lowering that upper wind speed limit down to 20 knots which would resolve the issue… somehow, I doubt that idea will gain any traction.
While it is true that after a rash of failures, things seem to have calmed down a little. But again, I will point out that that is likely the result of teams being far more diligent with the lifespan expectations of the halyard.

Members may be wondering about the cost of the fixed forestay conversion kit, and we did reach out to Zenda to get a rough guestimate. While the original kit was supplied by Southern Spars, we think a complete 2025 kit for a pre-2009 mast will cost approximately $800 USD. It will also require approximately 3 hours of labor to install the female receiver which is epoxied and bolted mechanically in the face of the spar. Zipper luff jibs are not made on a regular basis by any of the major lofts and with many teams relying on used inventories, this is also a consideration if for nothing more the timing of an implemented change. Retrofitting a used jib to a zipper luff is possible but it is not the easiest job to get right. But it is also completely feasible to use a standard jib without the zipper with the fixed forestay. It is just not as easy to remove the sail.

In closing, I will add that the class has known about this issue for a very long time. Its impact on the fleet, ebbs and flows but clearly, it is an issue now more than ever. And I will point out that the class already has a solution approved for use. The Melges 24 is a strict One Design Class, yet it somehow allows for two completely different forestay systems. One is reliable, safe and cost effective. The other is prone to failure and apparently in need of replacement with increasing frequency. I keep wondering how this is even a question.

Mike Gozzard (CAN)
IMCA Technical Committee Chair