



# Smaller, stiffer, clutter-free

They didn't win the latest Volvo Ocean Race but the two Telefónica entries boasted an apparently radically simple but ultimately very successful new approach to VO70 rig design, as Scott Ferguson explains...

The highest level of grand prix racing in recent years has been taking place in the TP52 and the AC classes. In particular, there has been extensive research in these classes to improve the overall aerodynamic package. Improvements made in analysis techniques, along with better use of materials, have opened the door to lower drag masts. With this combined knowledge on the table we were able to apply many of the same principles to the second-generation Volvo Open 70 rig designs.

Back in 2001 I designed the very first TP52 rig for Nelson-Marek, complete with cathedral rigging and 345Gpa carbon for the tube. It took a while for the class to gain momentum but when it did I was asked in

2004 to design the rigs for three new Farr TP52 sisterships, which would be led by the very successful *Esmeralda*.

The first big step in defining a more modern rigging geometry was to eliminate the upper cathedral rigging and put this weight back into the upper mast tube. Also on the agenda was to raise the capshroud placement significantly, up above the headstay, to make up for the lost support. This higher capshroud placement is now found on all TP52 rigs.

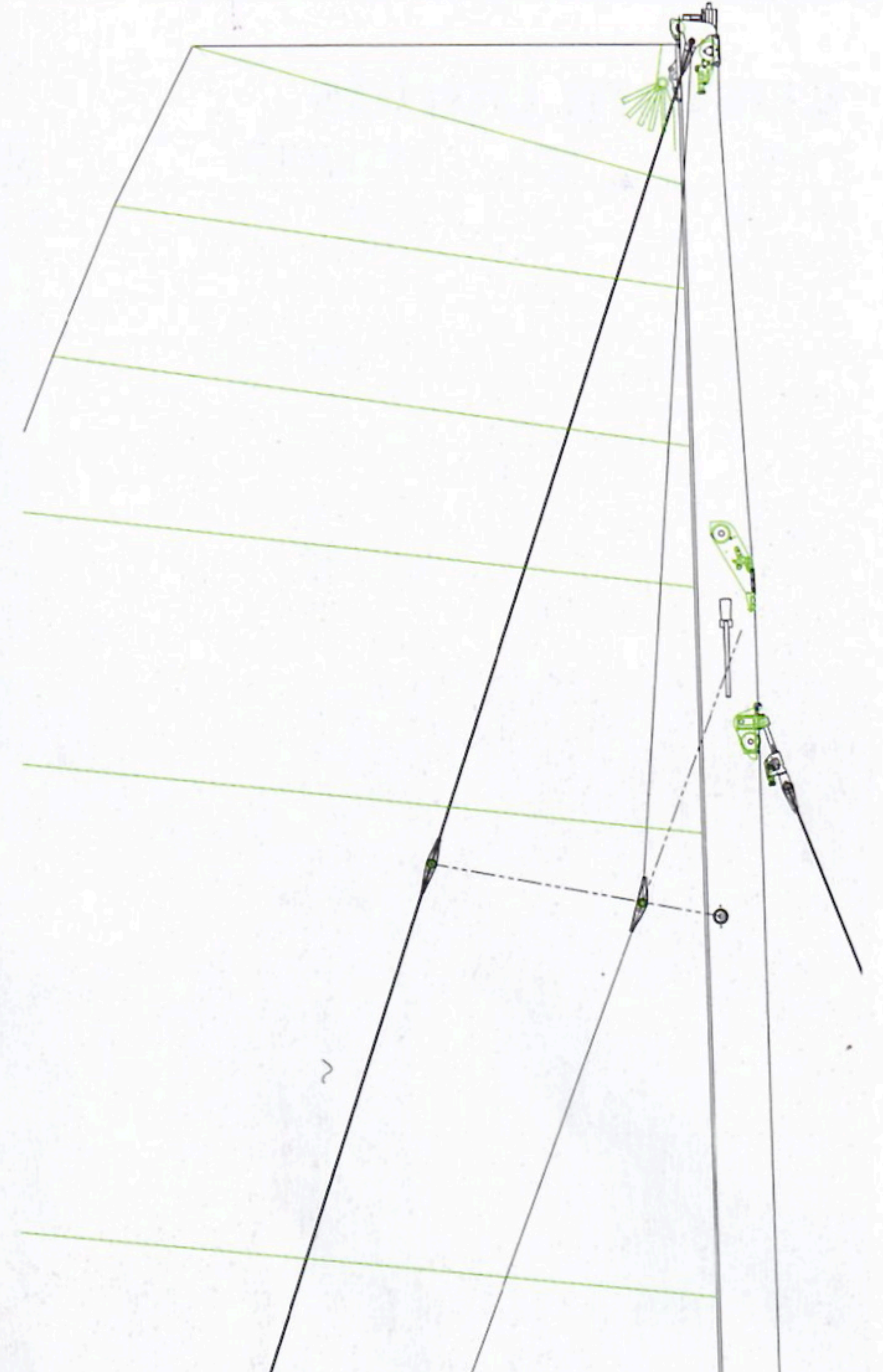
As the class gained popularity and the competition increased, there was more of a push for something even better. In 2005 I worked closely with Botín and Carkeek to design a smaller section for *Pisco Sour*,

which would go on to become the 2005 MedCup champion. Eventually we took a step up to higher-modulus 450Gpa carbon, which allowed us to move to the class minimum in section size as well as minimise the rigging for what would become the 2008 MedCup winner *Quantum Racing*. This formula has now become the standard low-windage package for all the top TP52 teams.

Following the philosophy of the TP52 designs, clean and simple is what I had in mind when I took on the rig design for the two Telefónica entries in the latest Volvo Ocean Race. This project was truly a team effort, with the intelligent input from the Telefónica team, who had their own specific ideas along with the talented team of designers at Farr Yacht Design and the impeccable builders at Hall Spars.

We decided very early on to move in a new direction in refining the Volvo Open 70 rig, and the outcome was something of a head-turner when the first rigs showed up at the Telefónica base in Alicante. I think that some of the other teams were soon scratching their heads and questioning our whole approach; the Telefónica sections are significantly smaller than their counterparts', but they also feature fewer checkstays, no jumpers and no backstay...

I had taken a clear concept and pulled together much of the experience from a variety of projects that I had done over the years, starting with the jumperless rig that I designed for the 2007 Luna Rossa AC



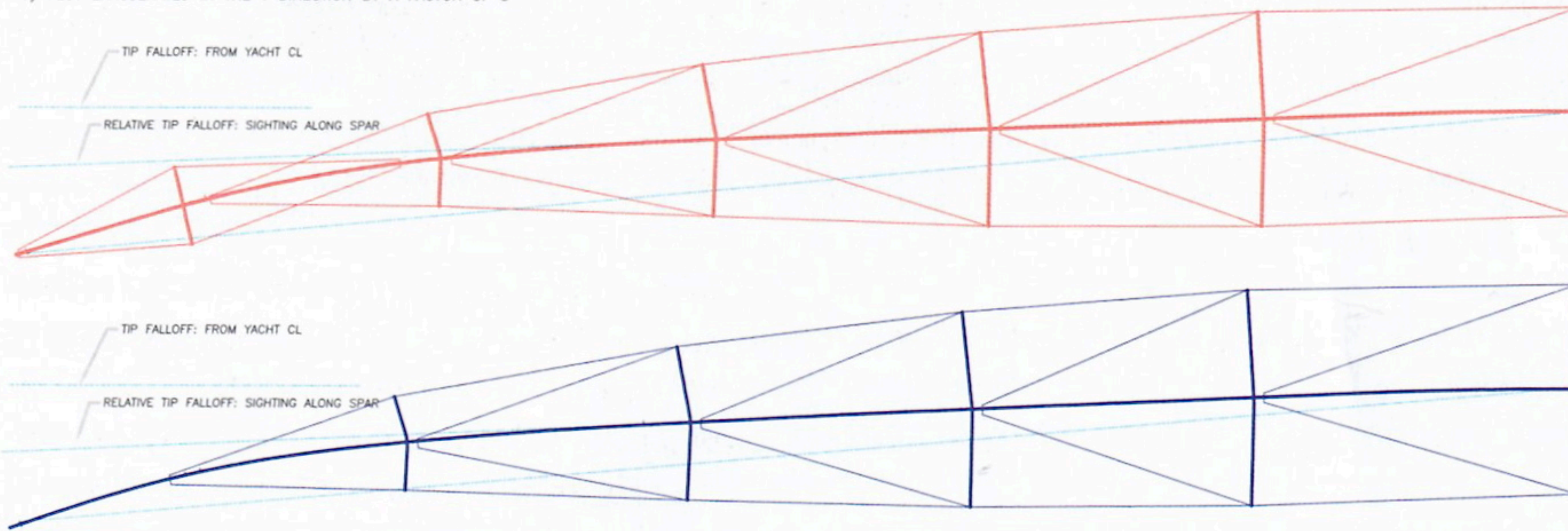
#### 4 Spreader Baseline vs Bare Topmast High Cap

GEOMETRIES:  
1) BASELINE 4 SPREADER JUMPER RIG  
2) BARE TOPMAST HIGH CAPSHROUD

LOAD CASE: CODE 0 (T=3)

NOTES:  
1) CODE 0 (FEA RUN T3)  
2) 9.0 TON CODE STAY LOAD  
3) PLOT EXAGGERATED IN THE Y DIRECTION BY A FACTOR OF 5

Scott Ferguson LLC	VOR2008 SL	FEA SIDE BEND COMPARE
DWG # 141-104-04	SHEET: 3 OF 3	SCALE: 1:1
FILE NAME:	ALTERATION: 4	DATE: 30-MAY-2007
		DRAWN BY: SHF
		CONTROLLED BY: SHF



masts, and then combined that with the latest work carried out on the TP52 rigs. Soon a formula was put together: a smaller section that would nevertheless be stiffer up top, along with a simplified aft rigging set-up. All in an effort to significantly reduce the overall drag.

In 2004 I had actually proposed a similar design, using a bigger section for the first development mast for the ABN Volvo entry, but the concept was scratched as it was considered a bit too radical. The section was used but no one was ready for the idea of going jumperless. I then moved on to designing a more traditional rig for the second-place entry, *Pirates of the Caribbean*. When the new Volvo rule was issued for the 2008-9 event, the use of higher-modulus carbon was now allowed, which suddenly made my original concept much more attractive.

In general, the Volvo 70 topmasts are all quite short because of the rule-defined sail geometry. This short topmast, combined with the use of stiffer carbon and a higher placement of the capshrouds, leads to a well-supported rig. In addition, the wide aft sections of the second-generation Volvo 70s allow for the running backstays to be

placed further outboard than previously which in turn reduces the deflections.

Again the development of the Telefónica Volvo Open 70 rigs followed a philosophy of minimising everything. When I was contacted by Telefónica to do the rig design there was immediate and strong support from the skipper, Bouwe Bekking, and the sail designer, Juan Meseguer, to move ahead with this concept and produce a developmental rig. We had a small window of time to work in and quickly drew up a schedule that would allow for the design and production of this developmental rig (rig #1) and also – crucially – allow for the time to test it properly. Fortunately, rig #1 was an early success and therefore it quickly became the prototype for the next two rigs.

In production of rig #1, the section and rigging were both high on the priority list. I felt pretty strongly that the previous Volvo Open 70 rigs had just too much repetitive aft rigging – one just has to look at how many elements are slack when the boats are sailing. During the design process we ran the numbers and found that dropping a set of backstays is worth about nine hours around the world and dropping a set of checks is worth another

**Opposite/left:** the Telefónica rigs are easy to identify with their clean and clutter-free topmast spans. Assuming that all the best VO70 rigs are on minimum weight and CoG then the excellent upwind pace of the Spanish boats – especially in lighter air – appears to validate Ferguson's choices. The load resolution of his 'virtual runner' backstay deflection system is highlighted in Ferguson's own design detail (above)

four hours. These were pretty compelling numbers and the Farr and Telefónica teams took notice. Of course, this comes with some modest compromises under certain conditions, but Bouwe and the sailing team were willing to accept them.

Along with the changes covered above, there were numerous other innovations that made these rigs unique, including the lightweight, glued-on mast track system and the runner adjustment system which enables the runner and backstay to operate on one cable. This arrangement allows for just one piece of rigging to accomplish what traditionally took two pieces. In addition to the shared usage, this system also allows the sailors to better fine-tune the bend characteristics of the mast.

Over the years and with each project completed I am always looking back and thinking to myself, how can we make the next advancement, how can we improve? It's not always easy to move away from what is proven and into new territory. Tough choices need to be made, especially when designing for a boat that is racing around the world, but given the years of research and development, newer tools and past experience, in this instance this was a new direction that we were all confident in pursuing. Are there improvements to be made for the next time around? Absolutely.

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