Interpretation 038
of
AC75 Class Rule Version 1.7 issued 4th November 2019

Rules References:

15.4 At any cross-section, the only permitted movement of a **foil flap** relative to a **foil wing** is a rotation about an axis that remains approximately stationary with respect to the **foil wing** at that cross-section. This axis must be designed to be stationary, but is permitted to have some movement resulting from:

(a) play in a mechanical bearing; or

(b) a flexure or soft hinge, such as a thin flexible material joining the **foil flap** to the **foil wing**.

21.4 Power that does work on a **control surface** to adjust its shape, position or orientation can only be supplied by:

(a) **external forces** acting on that **control surface** where, for this Rule only, the combination of the **mast**, **mainsail** and any hoisted **headsails** shall be considered together as a single **control surface**;

(b) the crew, via **force input devices**, only as expressly permitted in Rule 21.2;

(c) the **ECC** as permitted by Rules 24.2 (d), 24.2 (e) and 24.2 (f);

(d) the **FCS** as permitted by Rule 27;

(e) no more than 50 J of elastic energy stored within springs or lines (or collections thereof).

21.5 Power supplied by the crew to do work on a **control surface** must be used directly without being stored, except where permitted by Rule 21.4 (e) and by Rule 22.13 within **HCCs**.

35.15 **Control function**

A permitted degree-of-freedom of motion, or deformation, of a **control surface**. All **control functions** of a **control surface** must be distinct from each other, with no significant overlap in their functionality, and that functionality must relate to a clear **control surface** motion or deformation. Examples include **rudder** rake rotation, **rudder** yaw rotation, and permitted sail controls such as **headsail** sheet, sheeting position, cunningham, and **mainsail** sheet, traveller, head twist, etc.

Context:

Rule 15.4 (b) authorises explicitly the use of a soft hinge for the **foil flap**.

Rule 35.15 authorises explicitly the usage of Cunningham systems as sail controls for **headsails** and **mainsails**.

The supply of power to do work on a **control surface** is only allowed if it falls in one of the exceptions listed in rule 21.4. This bans the usage of stored energy to do work on a **control surface** if this stored energy does not come from the elasticity of springs or lines (or collections thereof). If the stored energy stems from the elasticity of springs or lines (or collections thereof), the amount is limited to 50 J.

When the Cunningham on a sail is pulled to flatten the sail, energy is used to stretch the sail cloth and to bend the mast. If the Cunningham is eased to make the sail fuller this elastic energy, stored in the sail cloth and in the mast is used to bring the sail back to its original shape.

If a soft hinge is used for a foil flap, energy is stored during the forced movement of a flap and is released when the flap moves back to its original (equilibrium) position.

In both cases elastic energy is stored in the **control surface** and is used to adjust the shape of that same **control surface**. For the purpose of this interpretation it is assumed that in both cases more than 50 J of energy are stored.

Questions:

1. If elastic energy is stored in a **control surface** and that elastic energy is used as a power source to adjust the shape of that same **control surface** does this fall under the limitations in rules 21.4 and 21.5?
2. If the answer to question 1 is "YES" a contradiction is seen between 21.4 and 21.5 on one side and 15.4 (b) and 35.15 on the other side. It is assumed that in this case 15.4 (b) and 35.15 supersede 21.4 and 21.5. Is this correct?

Interpretation:

The uncontrolled storage of elastic potential energy created as a consequence of rule compliant work on a rule compliant **control function,** and the subsequent release of that same energy as a consequence of returning the **control surface** towards the energy state before this energy was stored, provided that energy is not recovered by any other means and does not infringe Rule 21.4(e) or Rule 22.13, does not infringe the Rule; it is permitted.

Answers:

1. No.
2. Not applicable.

END.