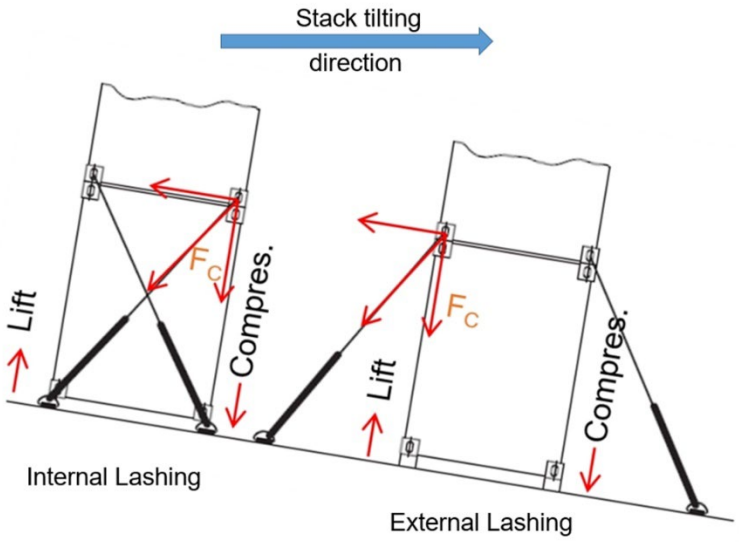
Why external lashings are giving better payload capacity than internal lashings?

It's not magic, it's pure engineering.

The MacGregor All Set design was the first external lashing system introduced ever. Today the external lashing system is industry standard for bigger container vessels equipped by higher lashing bridges. And not without reason.

Look at these benefits of external lashings:

External lashing system allows the container stacks to be loaded with a better weight distribution, with heavier containers higher up in the stacks and with higher container stacks, compared to an internal lashing system.



The engineering part of the story:

Internal lashing means that lashings are in front of the container end. External lashing means that lashings are outside the bounds of the container end. See the picture.

The idea of external lashing system is to reduce compression forces in the container stack.

The idea is brilliant, because compression forces are practically always limiting container loading in large container vessels!

Both lashings of one container stack, port side and starboard side, are never simultaneously in tension when the ship is rolling. Another side is in tension and another side is loose depending on which side the ship rolls. The tension side is marked with red arrows in the picture.

Unlike internal lashings, an external lashing system secures the lifting side of the container instead of the compressed side, reducing both of these unwanted forces, lift and especially compression.

The beef is that the compressive force component (F_C) of the lashing is not added to the compressive force of the container stack, which would increase the total compressive force!

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