

Subject

Inspection of Lifiable Car Decks of Pure Car Carriers

# **ClassNK**

## ***Technical Information***

No. TEC-0484  
Date 11 October 2002

To whom it may concern

Two serious accidents on Lifiable Car Decks of Pure Car Carriers (PCC) have been reported since the beginning of this year as detailed below Accident 1. and Accident 2.

Since they are not concerned with the ships structure, liftable car decks have not usually been surveyed in detail unless specially requested. Only general surveys have been undertaken where damage caused by racking forces has been noted.

Please be advised that as these type of accidents had not previously been experienced up to now, the accidents have been investigated and suitable inspection and counter measures have been developed.

### Accident 1.

The supporting bracket part of a Lifiable Car Deck was broken and it's adjacent members were cracked.

### Accident 2.

The deck plate and transverse web were buckled around the middle of the transverse span, and consequently, the girder strength was much reduced and over all the Lifiable Car Deck became very deformed.

Regarding the broken supporting bracket part of the Lifiable Car Deck (Accident 1.), it was found by examination, that there had been a notch in the supporting bracket part of the Lifiable Car Deck and that the crack had extended from the notch, and consequently, the bracket part finally broke. A pillar part adjacent to the bracket part and a cross part between transverse and girder were also found to be cracked.

Regarding Accident 2., the sea condition when the accident occurred was estimated from the crew's evidence, and a calculation of hull motion was carried out on the basis of this sea condition. As a result of this calculation, it was estimated that about 1.5 G acceleration was exerted on the damaged liftable car deck. Also there was complicated undulation resulting from a typhoon at that time and it is possible that a large inertial force might have loaded the deck in such heavy wave conditions.

(To be continued)

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A simulation analysis was carried out examining the process until the deck deformed greatly, and it was found that large deformation occurred around the middle of deck transverse with long spans. (See Figure 1.) It is possible that the buckled deck and buckled transverse web resulted in a sudden reduction in the strength of main members. (See Figure 2.)

Also, it was found that the buckling strength for transverse web was reduced further if the tack welding between the web of transverse and deck plate was cracked or detached. (See Figure 3.) An instruction for surveyors has been prepared (see attachment) to help prevent the above mentioned type of accidents and in order to identify related damage prior to it becoming a major accident.

Ship's owners and operators are urged to pay special attention to the inspection of liftable Car Decks.

For any questions about the above, please contact:

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Attachment:

1. Attention to Surveys for Liftable Car Decks of PCCs during Special Survey or Intermediate Survey (in Dry docking)

Attachment 1. to  
ClassNK Technical Information No. TEC-0484

Attention to Surveys for Lifiable Car Decks of PCCs during Special Survey or Intermediate Survey (in Dry docking)

Surveys for Lifiable Car Decks of PCCs during Special Survey or Intermediate Survey (in Dry docking) should be carried out with particular attention to the following in order to prevent significant buckling or deforming of the deck.

1. Supporting bracket parts and their adjacent members (of Lifiable decks)
  - (1) A Lifiable deck is an efficient strengthened structure itself, which is composed of deck plate, transverse, girders and longitudinals etc., however, it is supported by 4 or 6 supporting bracket parts, and the bracket part and its adjacent members are subject to very severe conditions.  
Therefore, close-up inspection of the supporting bracket parts and their adjacent members should be carried out in order to confirm whether or not there are any cracks or scratches.
  - (2) Close-up inspection of the cross area between deck girders and deck transverse near the supporting brackets, and high stress areas should be carried out in order to confirm whether or not there are any cracks.
2. Welded parts between the deck plate and web of transverse.  
Be sure to examine whether there is anything wrong with the welded parts between the Deck plate and web of transverse  
Be sure to examine whether there is any corrosion, cracking, or breaking (See Photo 1.) etc. in tack welds in particular.
3. Deformation of Web of transverse in Lifiable Car Decks  
Examine whether there is any abnormal deformation in webs of transverse, or anything abnormal in the cross parts between webs of transverse and longitudinal girders.
4. Deformation of Lifiable Car Deck plate  
Significantly deformed deck plates might be found in some older ships. Carefully examine whether there are any abnormalities (cracks, detachments etc.) in welded parts between the deck plate and strength members (Transverse, Girder, Longitudinal, Stiffener etc.) when deformation as described in the following (1) or (2) is found;
  - (1) Local convex (∩) deformation of deck plates (See Photo 2.)
  - (2) Wide extent wavy deformation.  
In this case, measurement of the deformation should be carried out in order to grasp the exact condition ;  
Measurements should be carried out of a large deformation which is selected from the middle span of transverse members and the number to measure should be decided depending on the deformed condition. (See Figure 4.)

If the deformation is the same as the approximate thickness of the deck plate at the position of the above transverse, or the deformation is the same as approximately twice the thickness of the deck plate at about the centre of a small panel (Panel surrounded by both transverse and longitudinal members), suitable reinforcement as a counter measure should be considered or a second close up survey should be carried out.

5. Bend of over all Lifiable Car Deck

Examine whether the over all Lifiable Car Deck is greatly bent.

As a result of the examinations, some abnormal deformation, bends, cracks, detachments etc. are found and if it is decided that they need to be repaired/reinforced, please inform the Survey Department immediately of the detail and discuss this matter with this department.

For your reference, some sample counter measures are offered as follows;

(Sample Counter measures)

- In cases where there are notches or cracks in members for supporting the Lifiable Car Deck or the deck plate, stiffener, brackets etc. adjacent to the members, they should be removed and re-welded, additional brackets or carlings should be fitted for reinforcement if deemed necessary.
- In cases where welds between web of transverse and Deck Plate is cracked or detached, they should be removed and re-welded and also, the length of the weld should be longer than the original one. (Tack welding should be increased, one side of the weld should be continuously welded or both sides should be continuously welded.)
- In cases where the above mentioned welds are detached and the deck plate or the transverse web are deformed abnormally, carlings etc. should be fitted for reinforcement.

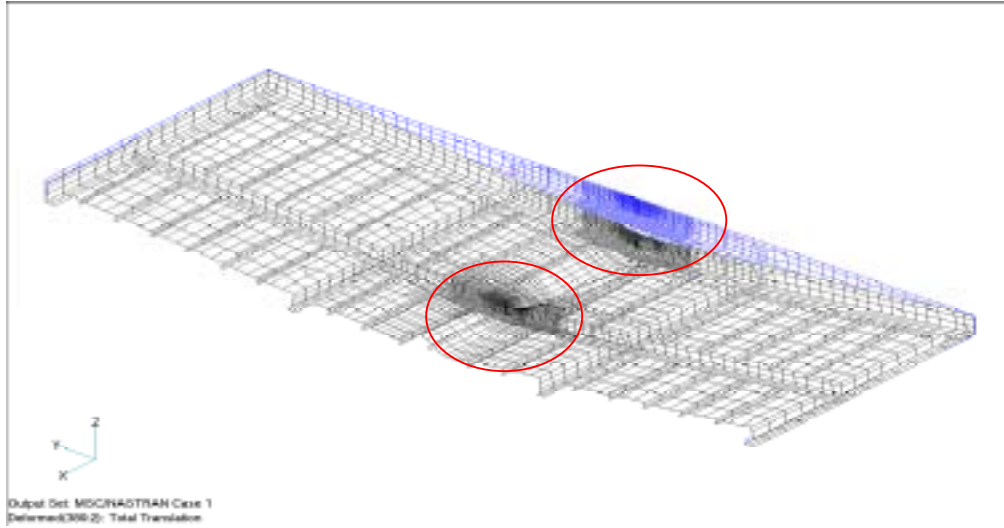


Figure 1. Bent Liftable Car Deck around the middle of Transverse (Sight from the reverse side of the deck)

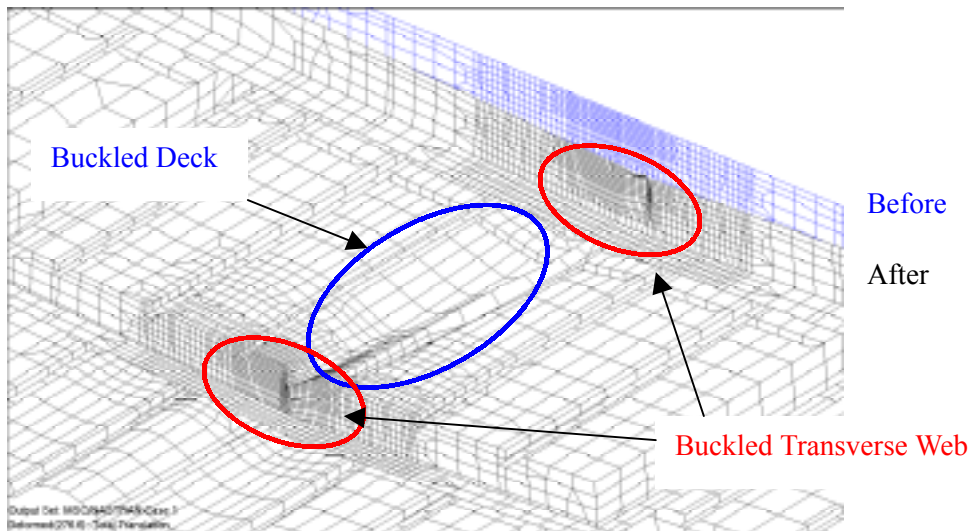


Figure 2. Buckled Liftable Car Deck Plate and Transverse Web (Sight from the reverse side of the deck)

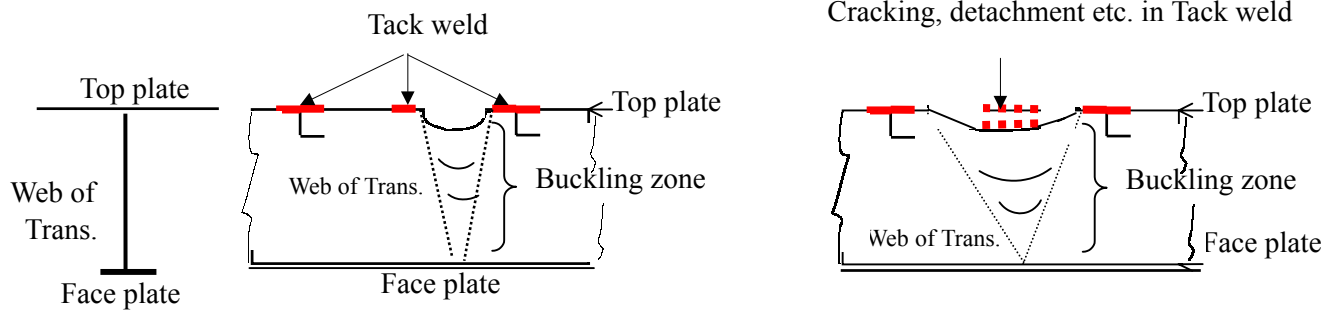


Figure 3. Cracking, detachment etc. in Tack weld and Buckled Trans.Web

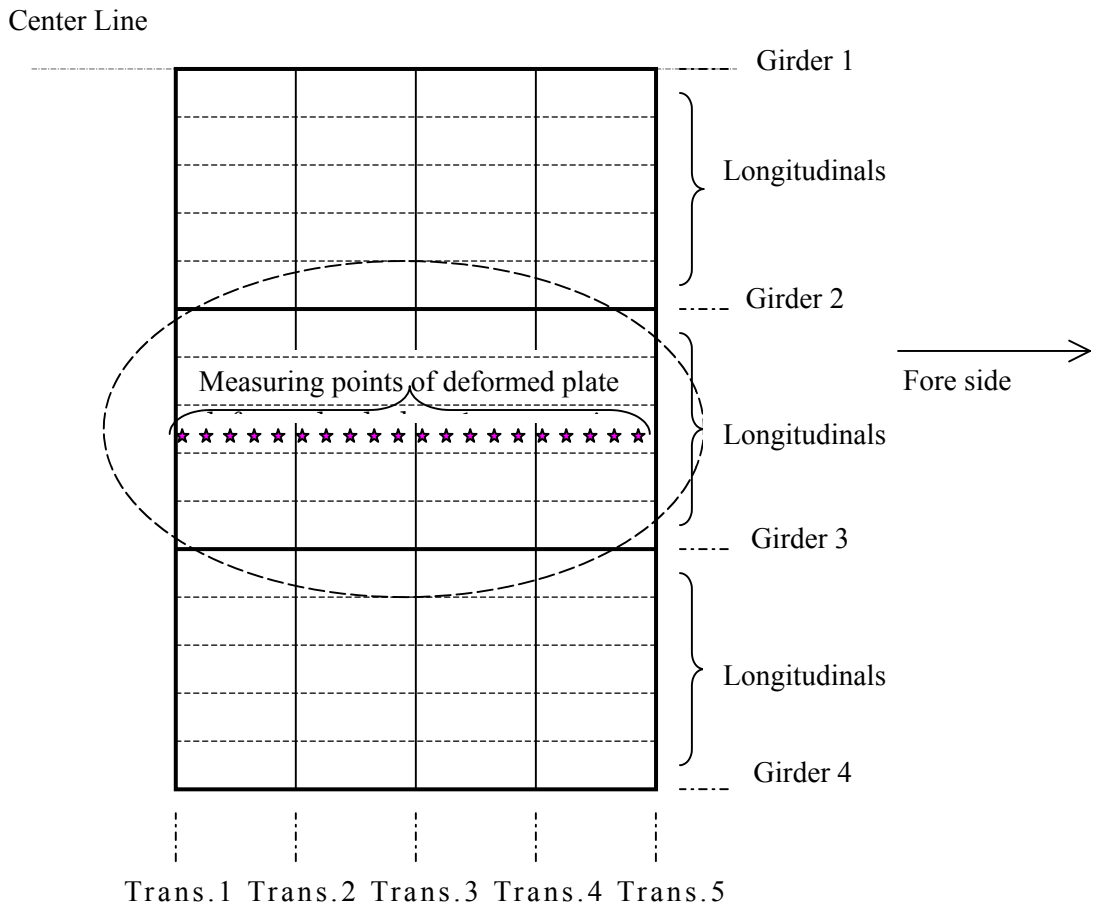


Figure 4. Measuring points of deformed liftable car deck plate (Longitudinal system) (Sample)

- Note significantly deformed plate around the middle of Trans. span
- Measure the deformation of the deck plate at 5 – 10 points depending on the deformation between Trans. and Trans.
- Measure the deformation by confirming horizontal level by the string method or a ruler etc. as a sample for a measuring method of the deformation.



Photo 1. Detached tack welding between Web of Trans. and Deck plate



Photo 2. Abnormal deformation of Deck Plate (凸)