



**KENWAY
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August 20, 2014

Mr. Paul Holloway
Miller Construction, Inc
PO Box 86
Windsor, VT 05089

Brookfield BRFLBR (2)

Dear Mr. Holloway:

Nonconformance

After de-molding the hull for Pontoon 3 (PN 3-1), Kenway noticed several wrinkles on the part. The mold surface has resin rich lines and the bag side of the part displays wrinkles that protrude less than 3/16 in. above the surface (less than 1/8 in. beyond specification) and less than 3/4 in. wide. The wrinkles do not conform to: ASTM D2563, Table 1, Allowable Defects – Level II, which requires wrinkle height to be less than 10% of laminate thickness – in this case less than 1/16 in.

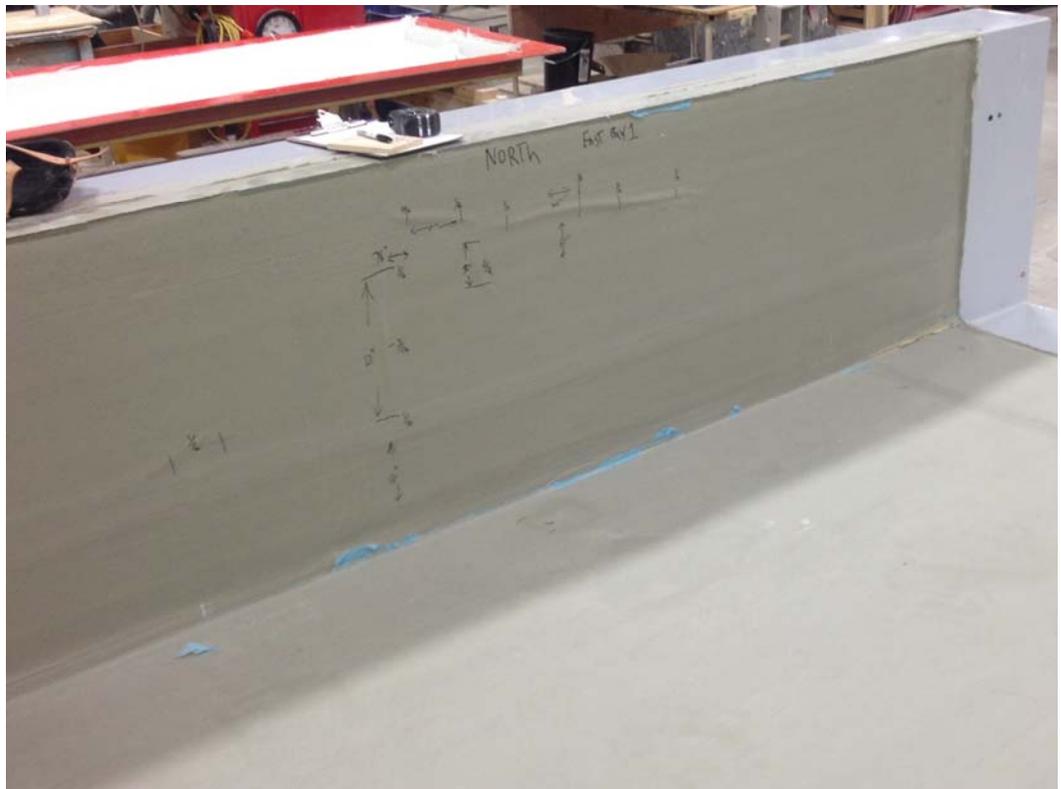


Figure 1 – Vertical Wall, Bay 1

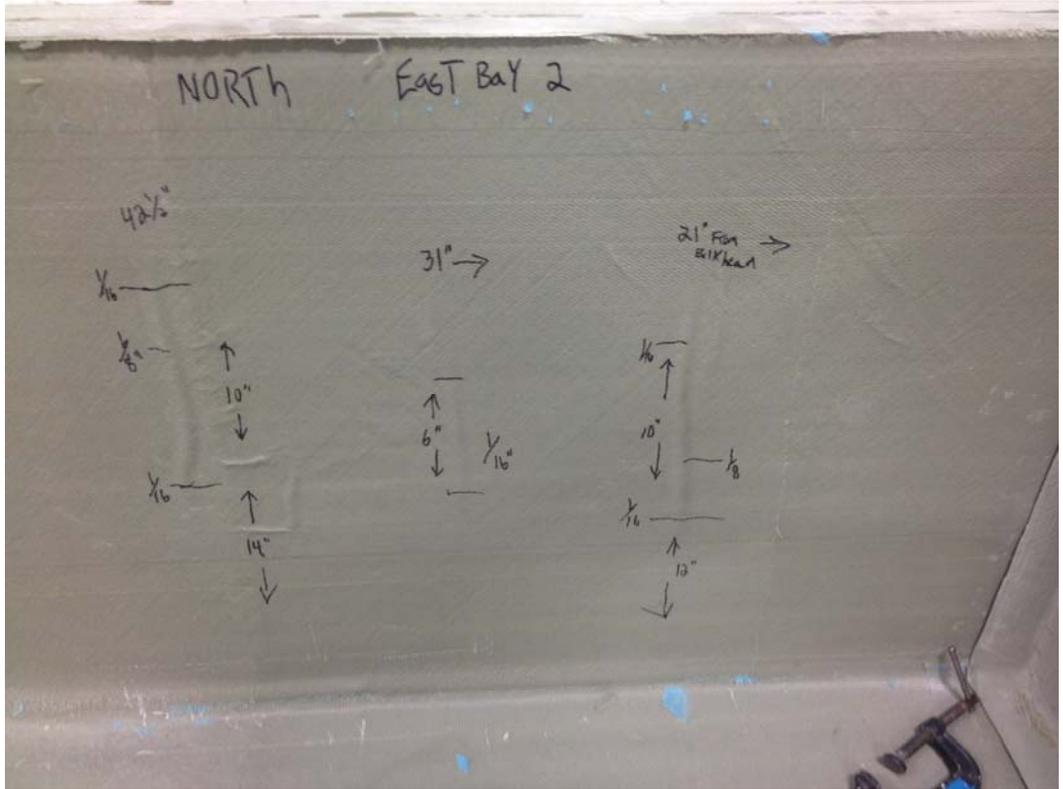


Figure 2 – Vertical Wall, Bay 2 (1)

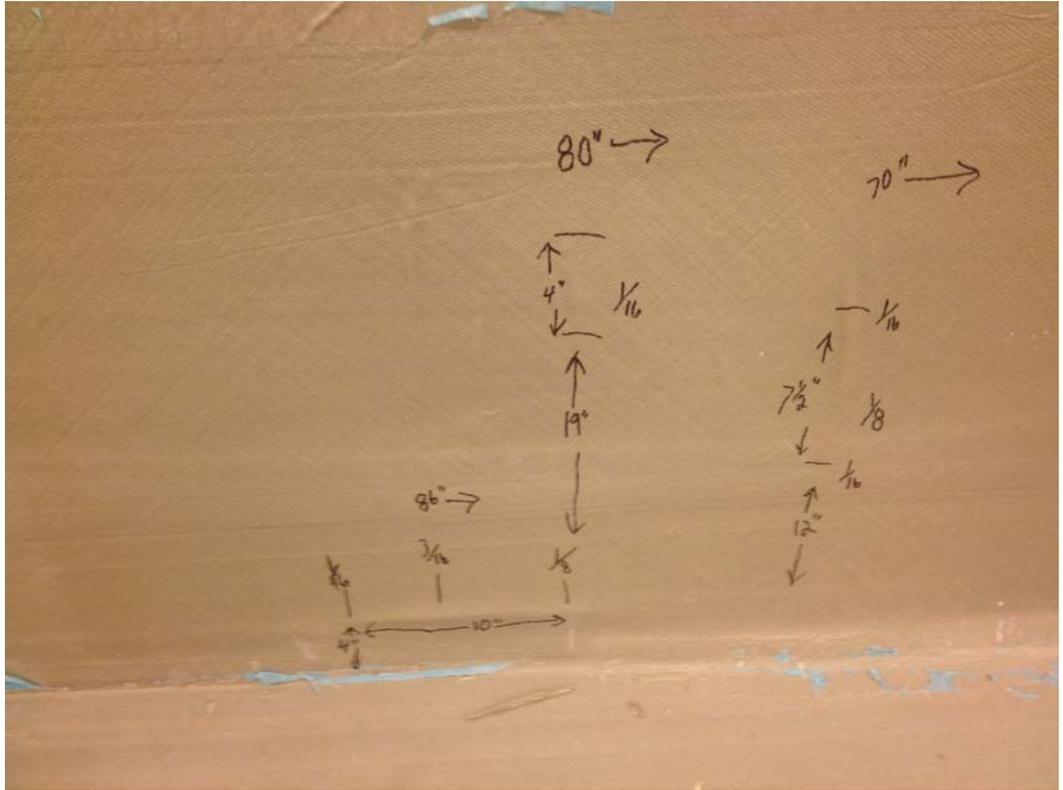


Figure 3 – Vertical Wall, Bay 2 (2)

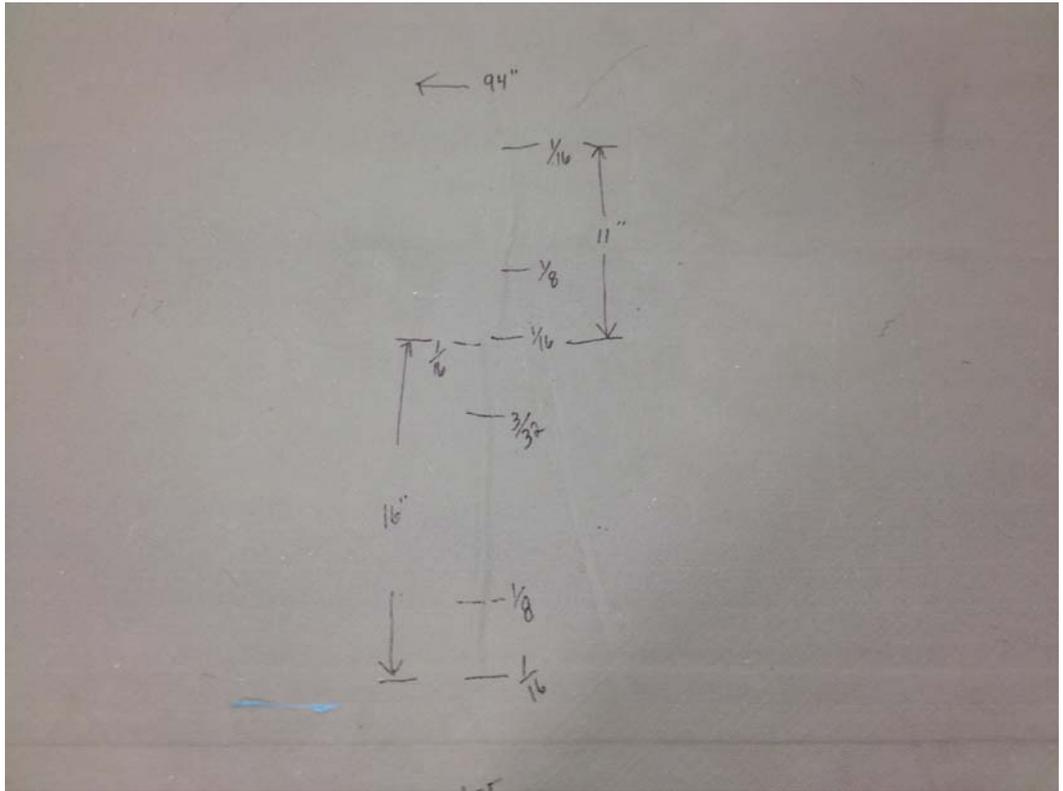


Figure 4 – Floor, Bay 2

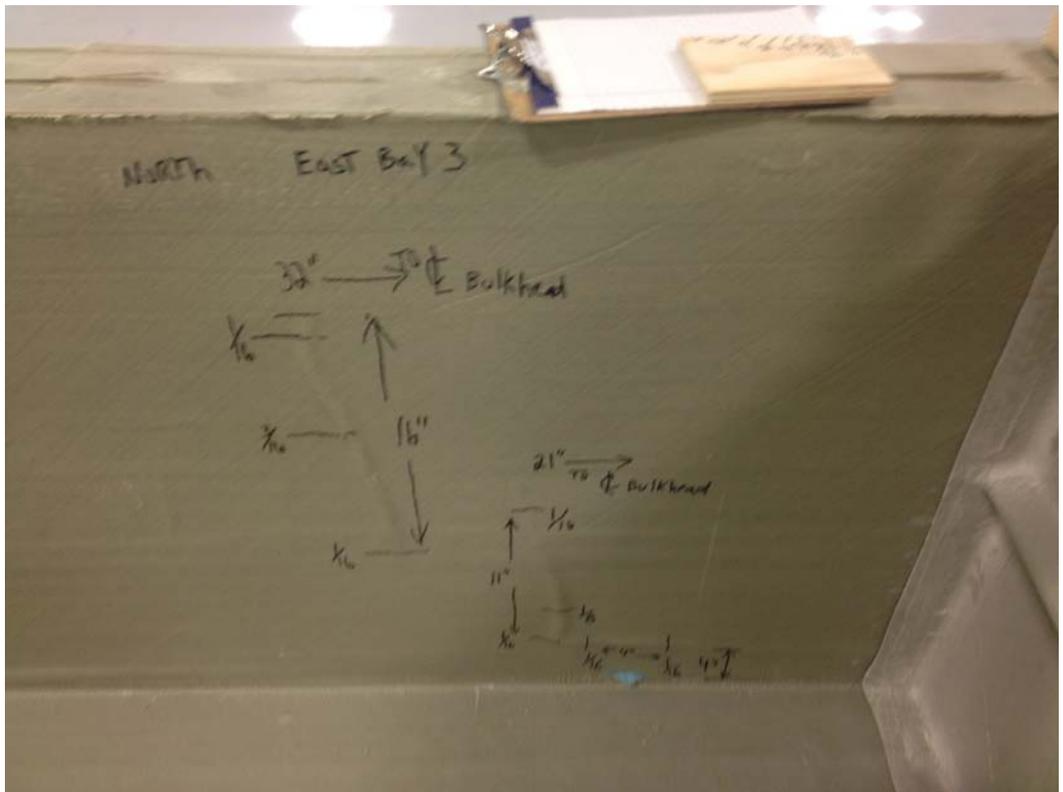


Figure 5 – Vertical Wall, Bay 3

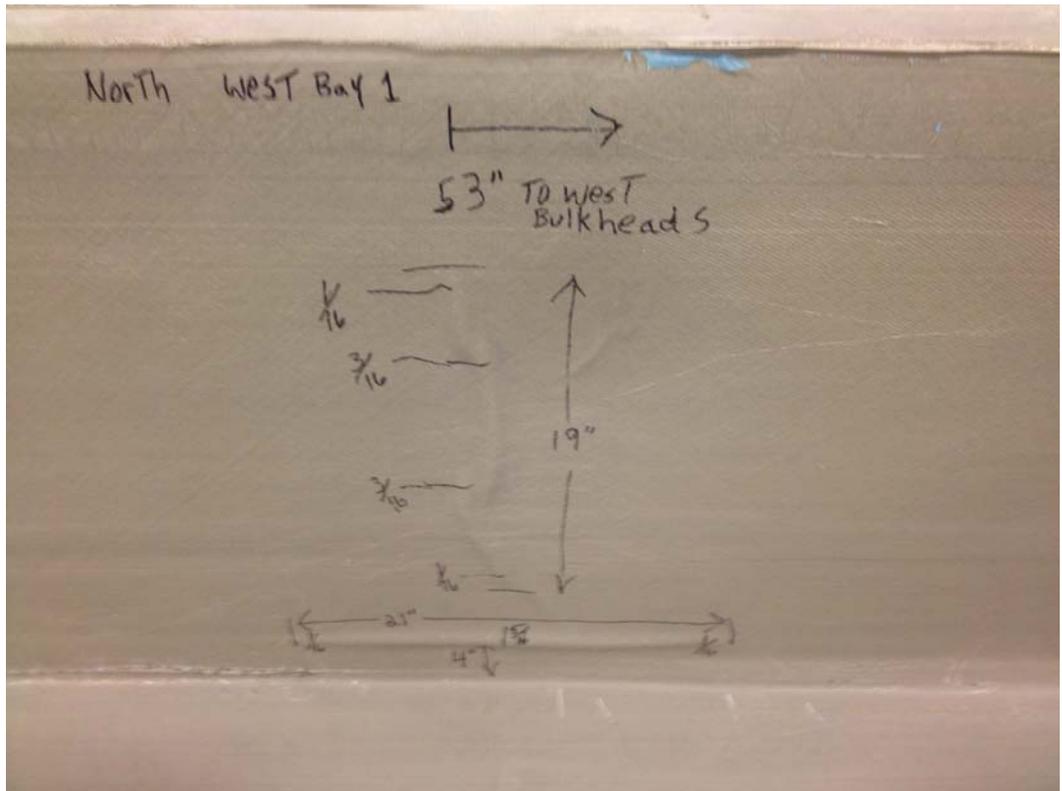


Figure 6 – Vertical Wall, Bay 4

Root Cause

These wrinkles were not observed immediately after the part was laid up, but they became more pronounced after the part was under bag for a week during the stop work order. The wrinkles were likely caused or at least exacerbated by being held and cycled under vacuum during the week while vacuum leaks were being investigated. Also, movement of feet and knees on the un-infused layers during part layup may have caused slight wrinkling of the initial layers and may have been exaggerated when the part was put under vacuum. The wrinkles were not identified during the pre-infusion inspection.

Resolution

Kenway recommends performing the following steps, which have been approved to repair wrinkles in PN 2-9a (NCR 5), to repair the 5 nonconforming areas where wrinkle height is equal to or greater than 1/8 in. and wrinkle length is equal to or greater than 12 in.

1. Grind down the proud areas on the bag surface to satisfy flatness requirements.
2. Grind out the resin rich areas on the mold surface at a 12:1 taper.
3. Replace ground out material with glass specified for the project with each ply tapered to fit the cavity.
4. Vacuum infuse the area with resin specified for the project and allow to cure.
5. Remove infusion consumables from the area and inspect for proper wet out.

Future fabric layup will include the use of spray adhesive on all areas that require a person to work on top of the material during layup, as indicated in NCR 5. However, we have also identified that placing HDPE sheet over the fabric as the part is being laid up mitigates that negative impact associated with walking/crawling directly on the fabric.

This has been included in the corrective action plan as best practice along with a “hold” for final inspection by the Quality Assurance Manager prior to infusion to specifically check for fabric wrinkles.

Please forward this nonconformance and the corrective action for review and approval.

Sincerely,

A handwritten signature in black ink that reads "Jacob Marquis". The signature is written in a cursive style with a large initial "J" and "M".

Jacob Marquis, P.E.
Senior Project Engineer