



January 2, 2004

Mr. Joe Smith  
ABC Company  
7990 Auburn Rd.  
Concord Township, OH 44077



Subject: PadPak<sup>®</sup> Package Designs & Testing with Fuel Transfer Pumps

Dear Mr. Smith:

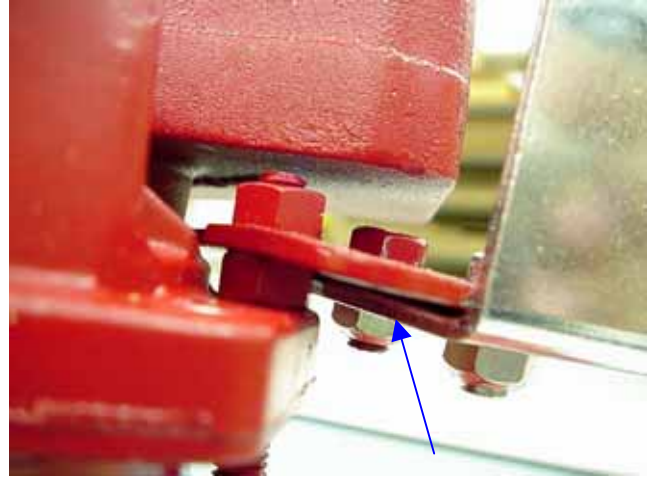
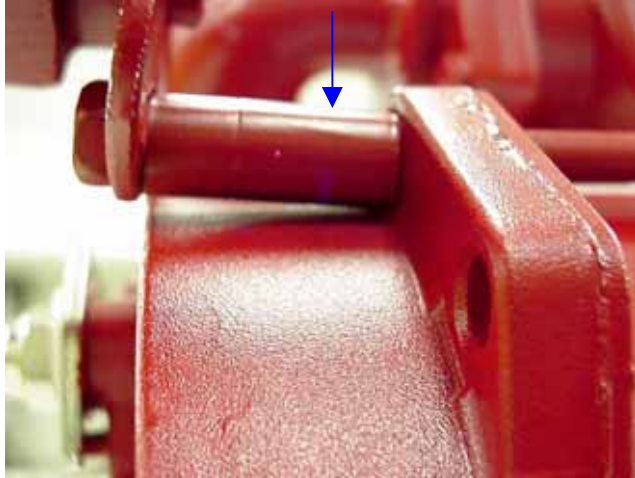
We designed a PadPak<sup>®</sup> package for the FR310 fuel transfer pump from your company. We also modified the package designs for the FR1210C and FR701 pumps that were documented in our report dated October 6, 2003. All three packaged pumps were vibration tested according to International Safe Transit Association (ISTA) Procedure 1G for packaged products weighing less than 150 pounds. Following are descriptions of the package designs, test procedure, and results.

**Condition of Fuel Transfer Pump FR310 & Current Package as Received:**

We received the packaged pump with punctures in the box as shown below. As we removed the foam-in-bag pads, it was apparent that the pump caused these punctures and sustained some damage.



Several components on this pump were bent as indicated below.



**PadPak® Package Design for Fuel Transfer Pump FR310:**

1. We used your current box for this design.
2. Coiled the hose and placed it in the box bottom as shown.



3. Produced a 14 ft. pad, coiled it fairly tight, and placed it inside the coiled hose.



- Produced two (2) - 78 inch coiled pads, and placed them on top of the large coiled pad as shown.



- Centered the pump on the coiled pads and pressed down to nest it into the pads.



- Produced four (4) - 78 in. pads, coiled and flattened them to form 5 pad thicknesses as shown.



7. Slid a pad in between each side of the pump and box as shown.



8. Produced a 78 in. coiled pad, and placed it on the pump to the side of the meter as shown. Placed the nozzle on top of the coiled pad, and the product information in the box corner.



9. Produced a 14 ft. pad, coiled it fairly tight, and centered it over the pump and pads as shown. Closed and sealed the box flaps.

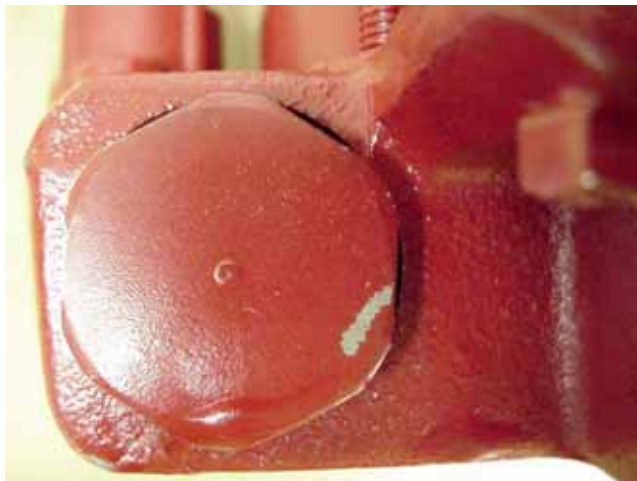
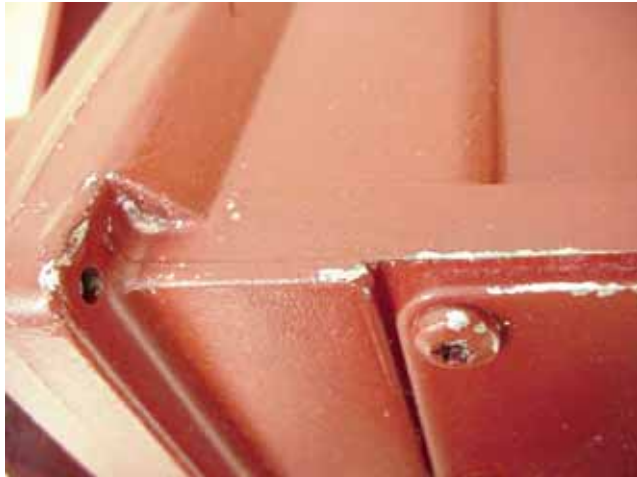


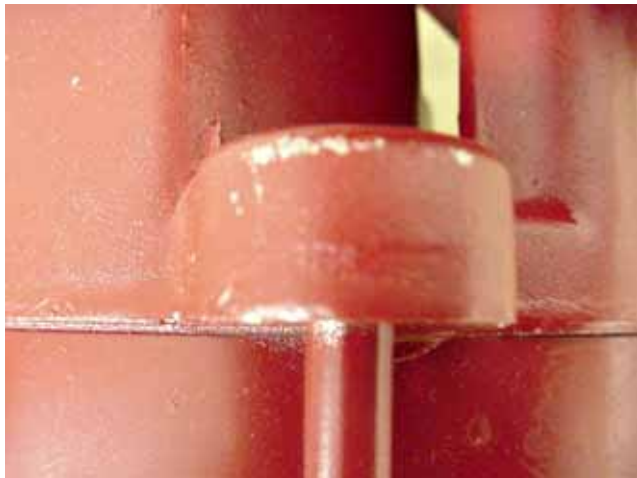
10. Total PadPak<sup>®</sup> used in this design was 73.5 linear feet.

**PadPak® Package Designs for Fuel Transfer Pumps FR701 & FR1210C:**

We slightly modified the package designs that were documented in our October 6, 2003 report. In both packages, we reduced the pad lengths from 48 inches to 44 in. Otherwise, the same packaging procedure was used with each pump. This reduced the total PadPak® per package to 14.67 linear ft.

Before repacking and testing, we inspected these pumps and noticed some paint and metal scratches that we marked with masking tape. Some of these marks are shown below.





**Vibration Testing:**

The three packaged pumps were random vibration tested for one hour according to ISTA Procedure 1G. This consisted of 30 minutes on each package bottom, 10 min. on top, 10 min. on one side, and 10 min. on one end. After testing, the pumps were removed from the packages and inspected.

Some additional paint abrasion was observed on all three pumps. The most noticeable marks were on model FR701 as shown in the bottom two photos. Model FR310 had several marks along the edges of one end as shown in the right photo. Model FR1210C had the least amount of abrasion (not shown).



**Summary & Comments:**

ISTA vibration testing of the PadPak<sup>®</sup> package designs indicates that some paint abrasion may occur during UPS or other single parcel shipments. If this is a concern, we suggest considering the use of plastic bags around the pumps. The PadPak<sup>®</sup> material used in these designs was 2-ply 50/50.

The packaged pumps will be palletized and shipped to you via common carrier during the week of January 5<sup>th</sup>. This is a good test to determine how the package designs perform in this shipping environment.

Thank you for the opportunity to work on this project. If you have any questions please feel free to call me at (800) 726-7257, ext. 8094.

Sincerely,

A handwritten signature in black ink, appearing to read "Ed Martis".

Edward S. Martis, CPP  
Packaging Engineer