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Shift Inhibitors

by Chris Webre

Working Together to Solve a Problem

Two years ago, the primary market for Safety Systems & Controls' (SSC) shift inhibitors was the refuse industry, with the school bus industry coming in a distant second. That has changed due to a conscientious local Ford Dealership doing whatever it could to help one of its customers – Continental Airlines. Ford, knowing that Continental was not completely satisfied with the durability of the drive lines on its flight kitchen trucks, thought SSC might be able to help because of our experience in prevention of shock load damage on refuse trucks.

How Do Shift Inhibitors Work?

TRANS-STOP shift inhibitors prevent operators of vehicles from changing direction of the vehicle and transmission until the vehicle comes to complete stop. We accomplish this by (1) mounting a spring loaded solenoid from a bracket and (2) attaching an arm with a curved ramp extending from and pivoting on the selector shaft. The solenoid pin rides on the curved ramp. The ramp has a "window" in it and that "window" intersects the solenoid pin when the transmission is shifted into Neutral. Every time the transmission is shifted through or into Neutral, we capture the transmission in Neutral unless sufficient brake pressure is applied. We use brake pressure switches to activate the TRANS-STOP solenoid. If sufficient brake pressure is applied, a green light illuminates on the dash of the vehicle instructing the operator it is okay to shift.

As an option, we offer throttle control. This feature prevents shifting out of Neutral if the vehicle's engine speed is above idle. By using an electric solenoid, the system can be set up to prevent shifting of the transmission during unsafe

operating conditions such as when booms, stabilizers, and lifts are not stowed properly, PTOs engaged, doors open etc.

Presently, inhibitors are available for Allison AT, MT, HT, General Motors 4L80, HD 400, and Ford C-6 and C-3 transmissions.

GSE Product Development Starts

With this background in inhibitors, we met Jim Houck, Manager of Ground Support Equipment, and Charles Bordelon, Supervisor of Ground Support Equipment, at Continental Airlines in Houston. They asked if we had an inhibitor that could be used on their flight kitchen trucks. Those vehicles have Allison AT-545 transmissions and hydraulic brakes. At the time we met, we had an inhibitor for the Allison transmission, but not for a vehicle with hydraulic brakes. We experimented a bit and came up with a hydraulic version. Jim commented, "The first hydraulic versions worked fine, but I had my doubts. I was concerned about potential clearance problems with the way SSC was running its hydraulic lines, not to mention my concerns about leaks."

Customers Help Refine Product

The first models worked well, but needed some tweaking. With the help of Jim and Charlie at Continental and other earlier customers, we were able to refine TRANS-STOP to its present form. Early changes included beefing up the way we locked the TRANS-STOP arm to the selector shaft by using an alignment brace instead of set screws. Jim and Charlie were right; they felt the set screws would not stand the test of time.

We sent a C-6 prototype to Hudson General at JFK. They field tested the system and were able to overpower the inhibitor with force applied to

the incab shift selector. The action bent the solenoid bracket and the solenoid pin slipped out of the window. As much as we tried to simulate this in the factory, we could not; but the true test of any product is done in the field, not in the factory. We engineered a stiffener for the SSC solenoid bracket which solved the problem and that is now standard.

We have had other suggestions from those in the GSE community, many of which we have used. We thank all of you for your help and ideas. Although we may have developed TRANS-STOP, it would not be in its present form without your input. Jim laughs even today about the first C-6 TRANS-STOP. His first comment was, "It's over engineered!" While he still feels that way, he appreciates that every kit is composed of premium components and it is engineered and built to last.

Jim and Charlie began to feel comfortable about the product itself, but they had concerns about how the drivers would react to it. In early December of 1995, they interviewed the drivers of the tow tractors and the flight kitchen trucks equipped with inhibitors. The drivers' general response was that, as long as you stop the vehicle before changing direction, you'll never know it's on there.

Jim and Charlie's first interest in TRANS-STOP was that it could help them reduce Continental's expenditures on transmission, rear axle and most of all, rear end failures. While they have not been able to accurately document the dollar savings achieved by installing shift inhibitors, they feel they are definitely benefitting in this regard. I asked them, "Now that you are familiar with TRANS-STOP inhibitors, what do you feel is one of its most important benefits?" Their answer surprised me.

Safety is the Number One Benefit

Jim, without hesitation said, "I feel while the prevention of drive line damage is very beneficial to our bottom line, it is almost secondary. I feel the safety aspect may provide an even greater benefit."

This confounded me at first. I understand how TRANS-STOP makes school buses safer by locking the transmission when a wheel chair lift

is extended or a utility vehicle when a boom is out of its cradle, but how is this similar to what we were doing on Continental's vehicles? He explained that vehicles can accidentally jump into gear, accelerate over chocks, or move before drivers have their foot on the brake. All of these can cause damage to people and property. And if that property happens to be an aircraft, you're talking major dollars.

Jim said, "You not only have to look at the cost of repairing the aircraft, but you have to factor in the cost of grounding a plane." He said costs for a plane being on the ground unscheduled can cost thousands of dollars per hour. I now understand why he feels the safety aspect of shift inhibitors may be his primary benefit.

Communication between manufacturer and end user is very important. Working together can be a win-win situation for both sides as it is with Safety Systems & Controls and Continental Airlines. We have come a long way in two years and with the GSE community's continued support and ideas, we will have many exciting years to come.

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