COVERING ROTARY PUMPS WITH LEATHER

Some rebuilders are now considering using leather to cover their rotary pumps. This idea has recently appeared in the MMD and is again gaining approval. Why, I don't know.

The original pianos all used heavy rubberized cloth. Even European reproducing pianos in which cost was no object used cloth. The very expensive, top of the line Red Welte uses cloth. However coin pianos often used leather, so the thinking is thus: Leather was better for longevity and hard use in commercial environments. The environment would be determined by a continuous roll or automatic reroll/replay system and a coin box. In such an instrument, the pump might be going 12 hours/day. In every case, the pumps were replaced during a factory overhaul.

50,000 plays is what an instrument was usually rated for in commercial duty between overhauls. Commercial machines were often sent back to the factory for rebuilds and retrofitting, and their pump was no exception. The factory had to guarantee the instrument for another 5 years. In instruments belonging to stores open every day of the year, this limit was often exceeded before 5 years was reached. 10,000 plays/year was only 28 plays a day, or $1.40 to the proprietor. That earned him only $511/year at that rate. So you can see that many commercial coin machines had to bring in that much just to break even, since they also had to be maintained and tuned. In a 12 hour day, that's a little over two plays/hour. The proprietor would often keep his instrument playing and the door open to attract business.

In this industry there were route men who tuned and maintained these instruments. It was a year-round business and they saw every kind of failure that could be seen. Pumps were no exception, and leaky leather covers were frequent. Leather wears out just like shoes.

The belief that Autotypist pumps just kept going and going and going is also false. Autotypist pumps were high pressure pumps covered with very heavy leather. They supplied high tension vacuum of about 90-100 inches of water column at low volume capacity to operate an automatic typing system capable of making labels and typing mass-mailing form letters and envelopes, once an initial template was made. They would never be capable of operating a piano unless major changes were made. Their pump leather was heavy cowhide about 1/8" thick. It was not garment leather but industrial grade leather and the differences are day and night. When they closed, the rounded folded leather between bellows leaves was about 3/4" thick. This would never work in a high capacity rotary pump for 2 reasons; the leather is too thick so the moveable leaf would bottom out on it, and the pumping resistance for a higher capacity pump like that would be too high. It also required a larger motor.

Thinner leather would work fine for awhile, but since the reproducing piano's pressure varies so widely, the leather would eventually stretch and the pump would eventually loose power. When leather stretches it also becomes porous. And just as the Autotypist maintenance man had to coat the bellows with red rubber cement to keep it sealed, so also would the maintenance man coat a reproducer pump covered with leather. Many customers in the home environment would never realize the pump was losing power, and an examination would not usually show holes, but under

high tension, leather would cipher. Most coin op instruments play at a maximum pressure of about 20-25 inches. Reproducer pianos hit from 40 to 90 inches at times. The only times they play at 20 inches is when they are rerolling. 20" is their nominal pressure setting.

Coin pianos today do not get played much because they stay in private collections. But instruments which do get played commercially undergo the same wear and tear they got originally. Coin pianos and commercial vacuum instruments have high capacity, low pressure pumps which use thinner calfskin leather covers with stiffeners. Why? Because all but extra heavy industrial belting leather tends to stretch and cup into the bellows as the bellows is being pulled open. Without the stiffeners, the pump would lose up to 20% of its capacity because of leather stretch and distortion. Rebuilders who forgot to put these stiffeners in their rebuilt pumps often discovered that the instrument lacked capacity and would not properly play certain busy rolls of music. Repairmen who service these instruments should be able to tell anyone who will listen that in fact, leather pump covers wear out, and that they have to coat these covers occasionally to keep them sealed between tear-downs and overhauls.

Regarding leakage of calfskin, an example comes to mind. The Wurlitzer 153 tends to have rather marginal capabilities in its vacuum section of the pump at the original design speed, and a few rebuilders who have used leather on its vacuum reservoir discovered that this reservoir rarely closes more than about 25% and also lacks vacuum for some pieces of music. That causes missing notes. By coating the leather with rubber cement the reservoir is found to close about 50% on occasion, indicating an increase in tightness. But this rubber cement has to be reapplied and maintained, or the instrument will start missing notes again. Cover it with double-glued heavy bellows cloth and there will be no leakage for the life of the system.

The problem today is knowing what material to buy and the only way to do that is to buy many different samples and test them before you buy a large quantity of anything. Good leather will always beat poor cloth, any day. But good cloth will always beat the best leather, and without the need for stiffeners. Cloth tightness is a factor of good cloth, but the correct rubber and its thickness is one deciding factor of bellows cloth. At present, Player Piano Company's latest batch of #55 heavy bellows cloth is the finest they have ever sold. It has however, worn out too quickly in the past. That's why you don't take anything for granted and you test it first. The first check is to strip the cloth apart using muriatic or sulphuric acid. When you remove the strip sample from a closed jar, all that should be left is the rubber. Good bellows cloth rubber sealant is calendered and should mike about .030-.035." Too thick and it will wear too quickly, too thin and it will wear too quickly. The rubber should also be very live and snap back when stretched, and you should see no holes in the rubber. The better the rubber qualities, the better the life.

Any restored pump of mine will always have cabretta leather patches on the folds as well. So regardless how good the cloth may be, the patches if cabretta will wear like iron at the points of greatest stress. Although cabretta is totally unsuitable as bellows covers, it is the perfect leather for corners on bellows because it stretches in all directions easily.

The original manufacturers had access to industrial leathers which are seldom sold or even found, today, and yet they did not use it on reproducing piano pumps. There was a reason for that, and

that reason was not necessarily price. It was performance and longevity. The pump is the hardest working component of a player system. If after several hundred hours it wore out, it would take the manufacturer's reputation down with it. The player could have many other faults and still sell well, but the player whose pump traditionally wore out first was the one to be dropped from the inventories of all conscientious dealers across the nation first.

If you want to cover a reproducing pump correctly, you will use the correct materials. It's as simple as that.

Craig Brougher