AGING LIFTS

To rebuild . . .
To relocate . . . or
To replace?
. . . that is the question

The decision is not always obvious, and sometimes the three choices are interrelated.

"If, after an analysis, it is shown that a sizable investment would be required to gain only a short increase in lift life, replacement is probably justified."

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Every area owner or operator has in the past—will in the future—be confronted with rebuilding, relocating, or replacing his lifts. Often the choice between the three alternatives is not too obvious. In fact, all three are, to some extent, interdependent.

First, however, take a look at each lift choice separately.

REBUILD

Let us first ask the question: "Why does a lift that is functioning well need to be rebuilt?" The first answer to that question is simple: Codes have changed. Any lift that is over seven years old was built before the 1970 issue of ANSI B77.1, and since that time many code changes have taken place.

For example, almost all brake requirements have changed, especially those concerning emergency brakes. The day has passed when an emergency brake needed only to stop and hold a lift in a forward direction. Service brake and backstop brake requirements are also becoming more restrictive and their functions require constant checking.

Further examples include cable catchers and derailment switches which are now required by ANSI. New grip requirements, as well as chair clearance requirements, have also been added to the codes.

So you say, "The lift is under the Grandfather Clause." This may be true, but many state codes are allowing less and less out-of-code requirements to fall under the Grandfather Clause. A few states are even considering abolishing the Grandfather Clause altogether. But more importantly, the insurance carriers are becoming less willing to allow lifts they are underwriting to exist under the Grandfather Clause, even though the state or ANSI Codes may allow the variance.

However, let us say your lift does meet most code items. What other considerations should be examined? One of the most important non-code related items for rebuilding consideration is lift capacity. This is one of the most important aspects of your area's operation and growth. You may feel your lift has the maximum possible capacity, but get out your lift specifications and you will probably be surprised at the lift ratings; 800 or 1,000 people per hour?

There are many reasons for lifts being built with lower capacities. Manufacturers tended to shy away from lifts over 250 horsepower, triples and quads were not common, and mainly in the '60s, ski areas were just developing and the object was to get any capacity for the least amount of money. Today, however, those low capacity lifts are starting to hinder efficient skier flow. But to build new lifts is not as easy as it used to be. Not only are the environmental restrictions slowing new lift construction (if not stopping it), but the cost of new lifts is rapidly increasing. Therefore, new lift capacity in the form of upgrading or rebuilding may be the best alternative.

The third reason to consider rebuilding lifts is because the state of the art of lift design has dramatically improved and many components should be updated. Perhaps your prime mover, because of overloads caused by rapid acceleration, has finally worn out the gearbox. Not only do prime movers have more types of controls available today, but also many gearing design changes have been made in recent years. Maybe due to worn mechanical equipment and loading problems you would want to consider an overhead drive to facilitate bullwheel loading. This might allow your lift capacity to finally be achieved.

RELOCATION

Relocation of lifts can be broken into two categories: the relocation of a lift within the ski area and the relocation of a lift from one area to another.

As stated before, relocation, rebuilding, or replacement may go hand-in-hand. An example might be as follows: Assume your main lift is getting old, and its capacity is low. Upon examination of designs, it is concluded the lift cannot handle any additional capacity without extreme modification or complete replacement of terminals. You may also have a need for another lift at a different location, but this location will not see the skier traffic that your main lift requires.

Therefore, relocating your existing lift to the area that only requires low capacity and installing a new, high capacity lift on the site of your old lift may be the answer. Not only will you now have a new lift at an area of high skier traffic, but you will have another lift that could open more skiing terrain. Since the relocated lift will not be required to operate as much as it did previously, its life will obviously be extended.

Relocation of a lift from one area to another can be the result of several factors. An area that is no longer in existence may have good equipment on its slopes that it needs to sell. Or, one area may feel that it simply needs greater capacity on its slopes and therefore requires a new lift, but does not have the time or money to reinstall the existing lift. Many superb lift purchases have resulted from both these two possibilities. (Note: Brokerage firms can help locate lifts, bringing seller and buyer together.)

However, when relocating a lift either within your area or to a new area, one main consideration must be examined. What new code requirements or safety considerations must be met or in good conscience be required? This is a very important point. Many older lifts can be brought up to current codes without much difficulty, while it would be a technical nightmare to update others and simply would not justify the expenditures.

Another consideration is: How long has the lift operated at its present location? Are there many hours of operation left, or are they about exhausted? A problem that is also possible on lifts with many hours of use is that of fatigue of various components (particularly chairs and bullwheels). Also, what maintenance has been performed on the lift? Many times a simple visual inspection will answer this. Inspect any maintenance records that are available, and, if possible, talk to the people who performed this maintenance.

REPLACEMENT

Just when is your lift "shot"? This is a difficult and complex question to answer, but nonetheless a question that will become more frequent in coming years. In general, the answer is a combination of engineering judgment and economics. A thorough examination of the lift should be made to determine the useful, remaining life of the components, especially structural members, as well as mechanical and electrical components.

If, after an analysis of these components, it is shown that a sizable investment would be required to gain only a short increase in lift life, replacement is probably justified. It boils down to a budgeting problem.

Let us assume a lift is of a 20-year-old vintage, and has been operating nearly 1,300 hours per season. Already you have made a few "repair" welds to the bullwheel spokes. The terminal structure has also been welded through the years around the base of the main members, and the majority of the footings are in a bad state of deterioration (many surface cracks and spalling). In addition, the sheave train machinery and sheaves are badly worn, and the gearbox and/or other gearing is making considerable noise. This is a hypothetical case, but all indications are to replace the lift.

One last comment on replacement: Fatigue is the failure of a structural member that has a repeated load change or is constantly being flexed. A parallel example would be the repeated bending of a piece of wire . . . a piece of wire back and forth. Eventually, it breaks.

As stated before, bullwheels and chairs are subject to cyclical loads and bending (flexing) situations. If you are now starting to "repair" weld your bullwheels, chair hangers, or even a tower, watch out. You are probably starting to see fatigue. We used a 20-year-old lift for an example, but fatigue could show up in a 3-year-old lift just as well, if it were improperly designed. Currently, there is much discussion of magna-fluxing and x-raying of members. Magna-fluxing will show surface cracks and irregularities while x-raying will show voids in the members, but neither will show where or if fatigue will develop. Fatigue will first appear as a crack and then rapidly develop to failure—perhaps in a few days. If you happen to magna-flux or x-ray the area after the crack has appeared you obviously will see it, but consider yourself lucky to have found it before the member failed. Therefore, if you are starting to see these types of problems on your lift, contact the manufacturer or a ski lift engineer immediately.

REBUILDING/RELOCATION EXAMPLE

An area has a 15-year-old lift manufactured by a reputable lift builder on its main slope. The lift has a capacity of about 700 people per hour, and has been used approximately 900 hours per year.

Let us first look at this lift with the possibility of rebuilding it to a higher capacity. Consider the following: 1. Can all structural, mechanical, and electrical components withstand the higher capacity? 2. What new mechanical requirements (brakes and drive components) will be necessary? 3. What tower changes or possibly new towers are required? 4. What new codes will the lift be required to meet? 5. What additional safety features should be added?

These are certainly not all the considerations that need to be examined, but they do provide the nucleus. By giving thought to the above questions, and also referring to the current codes, you may be able to determine to a large extent just what will be required to upgrade your lift.

However, the next step is to bring into the picture a qualified ski lift design engineer. Utilizing the knowledge and experience of an engineer who has dealt specifically with ski lifts will probably give you the answers to the above questions in the least amount of time. Without his aid, much money might be wasted on rebuilding some components of the lift while others are just not technically feasible to update.

The next important step is to determine what back-up information on the lift is available. If the lift manufacturer is still in existence, then probably they can provide this material. In general, most current manufacturers keep good records and drawings of lifts which they have built. By utilizing this source, the ski lift engineer can determine what equipment needs upgrading and what needs to be replaced.

Let us assume, though, that your lift is an orphan lift or that the original manufacturer does not wish to become involved with rebuilding work. In general, if drawings and specifications can be obtained, either through your own records or a state or federal agency, then again the answers can generally be determined.

Now that the ski lift engineer is armed with the plans and your ideas, an exact cost and engineering feasibility plan can be determined.

To correlate our example now to a specific lift in question, a 100 horsepower chairlift of similar specifications and requirements was relocated from one area to another and rebuilt in 1977. The capacity was increased from 720 people per hour to 1,000 people per hour. Even though this particular lift was 15 years old, a new emergency brake, cable catchers, and derailment switches were the only items required to bring the lift up to 1976 ANSI B77.1 Code and applicable state code.

The lift was very well-built, well maintained, and as discussed before, structurally the lift was very sound. Drawings were available, and all necessary calculations and drawing packets were created for the area and the authorities having jurisdiction. The area bought the lift, relocated, rebuilt, and installed it for just over $100,000. Considering the cost of a new 100 horsepower lift, the area has a good lift that will give them many more years of use for a fraction of the cost.

In conclusion, if rebuilding, relocation, or replacement has finally confronted you, remember the following: 1. Is the lift structurally sound? 2. What use and care has the lift received in the past? 3. Are drawings and specifications available? 4. What new code requirements and your own safety considerations will the lift be required to meet?

By answering these questions, using your own judgment and that of professional people, many years use from older lifts may be realized. And one last comment: If there ever is a doubt as to the safety of your lifts, consult a manufacturer or ski lift design engineer, because the safety and reputation of the skiing industry depends upon us all.