P&Q TECH

TRANSPORTATION

SIMPLIFYING THE SELECTION OF AGGREGATE RAILCARS

A comparison of gondolas and open-top hoppers, highlighting the advantages of both.

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Rail transportation of crushed stone, sand and gravel is becoming more prevalent as projects requiring these materials move farther away from quarry sites.

Rail is also increasingly of interest as material quantities increase to the point that trucking material is no longer an economically feasible option. Traffic congestion alone can make truck transport an unviable option.

Whatever the reason for considering railcar transportation, one of the first questions people generally ask is what type of railcar you're going to use. When looking at equipment options and selecting the best equipment to match the move, one needs to take into account a number of alternatives to obtain the right railcar for the situation. The process for ferreting out these alternatives goes something like this.

KEY CONSIDERATIONS

1. Understand your equipment options. To start, you have a choice of using either gondola railcars (flat bottom railcars with open tops and solid ends and walls) or open-top hopper railcars (open-top railcars with bottom discharge outlet gates).

2. Determine the destination capabilities and constraints. The capabilities of the location where material is destined is one of the most important determinations you can make. When it comes to key considerations, rail track space is the top factor here.

In many cases, there are land and track space constraints when trains run into major metropolitan areas. Often, a train or set of railcars is restricted to current track space without hope of expansion.

3. Determine the origin capabilities and constraints. After reviewing the destination capabilities, review the origin options for loading. Much like unloading considerations, loading options depend on origin yard configurations.

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GONDOLAS VERSUS OPEN-TOP HOPPERS

COMPARATIVE ITEMS	GONDOLA	OPEN-TOP HOPPER
Track space	Requires only enough track to accommodate railcars	Requires two times the railcar length to accommodate pull through of cars over pit or trestle
Optimal track design	Loading – loop track Unloading – ladder track	Loading – loop track Unloading – loop track
Unloading time	8 to 10 railcars per hour	15 to 20 railcars per hour
Additional equipment	Railcar topper or excavator Truck	Trestle or pit Conveyor Loader
Direct to jobsite	Car topper/excavator to truck	Conveyor/loader to truck
Stack out	Truck to pile	Conveyor to pile
Railcar unload operator requirements (minimum)	Skilled	Unskilled
Railcar body damage	Possible	Unlikely
Capital expenditure items loading railcars	Overhead loadout/conveyor Front end loader Track	Overhead loadout/conveyor Front end loader Track
Capital expenditure items unloading railcars	Excavator or car topper Trucks Track	Conveyor Possibly trucks 2x track
Operating expense items unloading railcars	Fuel, electricity, 2x labor, 2x repairs, 2 to 3x railcar repairs	Fuel, electricity, labor, repairs, railcar repairs

Source: Tealinc Ltd.

Generally, there are two options here working well for both gondola and open-top hopper railcars. One option is to use an overhead conveyor that leads directly to the railcar – or to an overhead weigh bin that then feeds into the railcar. This design works best on loop track or long lead tracks where all the railcars can be placed so they are only handled once for loading.

If there are multiple railcars being shipped – for instance, a train size of 50 to 100 railcars – this is the most efficient method of loading a train.

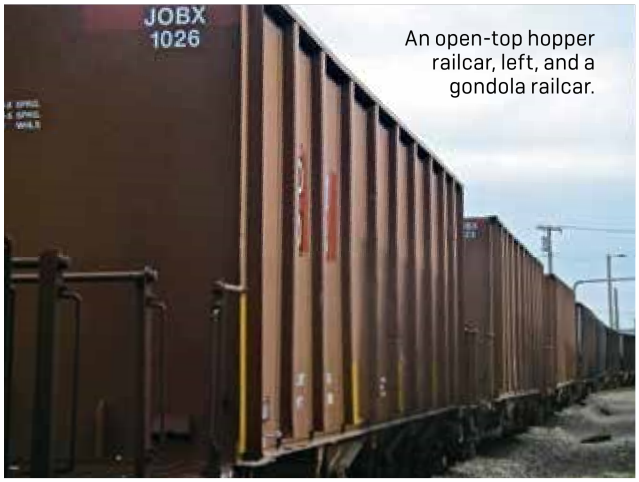
Another system is a manual design where railcars are placed alongside a product pile and a front-end loader is used to load the railcars. The closer the product pile lines up with the railcars alongside the loadout track, the less travel time the loader has and the quicker loadout will be.

In either case, the trade-off consideration is capital expense versus operating cost and speed and efficiency of loading and unloading.

4. How will you unload your railcar? This is where the primary difference between a gondola and an open-top hopper surface. A train or set of gondola railcars can be placed at one location and unloaded with a railcar topper or backhoe, or a side-of-rail unloading machine without requiring additional trackage to pull railcars over a trestle or other pit type of unloading mechanism. However, gondolas require the use of a car topper or a side-of-rail unloading machine of some sort unloading into trucks. This is an additional step in the unloading process.

Open-top hoppers can simply be pulled over a trestle or pit and unloaded, but they require twice the track space as a gondola to allow for an over-the-pit unloading setup.

5. Who will unload your railcar? It's important to hire skilled labor when considering the unloading process for either car type. Working in a situation



An open-top hopper railcar, left, and a gondola railcar.

where the operator is 10 ft. in the air operating a car topper on precarious footing or working alongside the railcar without being able to see directly in the railcar requires skilled operators.

The open-top hopper railcar type unloads easily, simply allowing an operator to open a set of doors and dump the product between the rails. Open-top hoppers come with either a manual or automated door operating system.

The manual system requires a user to unlock a tab and pull over a cam system with a pry bar to free the doors. The automatic system requires wayside air or train air where an air hose is connected to the railcar, and a button is pushed to operate the doors (open and close). The doors can be operated individually or virtually all at once.

6. What will your track configuration look like? The track-side configuration, particularly for gondolas, must easily accommodate trucks during the unloading process, preferably on good roads that are designed for four seasons.

Track design can be of almost any configuration (i.e., loop, ladder). Generally, track designs are stub spurs or ladder tracks to take advantage of a more limited geographic footprint. Open-top hoppers require additional rail trackage.

OTHER THINGS TO PONDER

Consider that to unload a set of railcars or a train of open-top hopper railcars, the entire set must be moved to the handling yard or track, and the track configuration must not only accommodate the entire loaded train but also must have sufficient track to accommodate empty railcars after they've been pulled over a pit or trestle.

In most cases, loop tracks are designed when there isn't a land restriction issue to easily accommodate fast and efficient unloading.

Matching up railcar physical character-

istics with your origin and destination is another step you'll want to consider. There are several physical dimensions available in both open-top hoppers and gondolas. The key considerations are cubic capacity and track space requirements, or overall length of the railcar.

Generally, an open-top hopper railcar with 263,000 pounds gross weight on rail needs to have around 2,300 cu. ft. of capacity to accommodate 100 tons of product weight. A railcar with 286,000 pounds gross weight on rail needs to have around a 2,400- to 2,500-cu.-ft. capacity to accommodate 115 tons of product weight.

Track space considerations for true aggregate hoppers don't vary as much as gondola railcars. Most true aggregate open-top hoppers, whether 263,000 pounds or 286,000 pounds gross weight on rail, are between 2,300 and 2,500 cu. ft. capacity and generally always have 60-degree slope sheets. This is an important factor for easy unloading. For cars without a steep slope sheet, vibrators can be applied to the car to assist in ease of unloading.

Overall railcar lengths are also similar, generally measuring around 45 to 46 ft. But there are a number of ex-coal open-top hoppers ranging from 3,420 to 4,000 cu. ft. capacity at lengths up to 53 ft., 1 in. successfully running in aggregate service in areas that don't have track space issues.

A gondola at 263,000 pounds gross weight on rail should have around 2,200 to 2,400 cu. ft. capacity to accommodate 100 tons of product weight, and a railcar with 286,000 pounds gross weight needs to be around 2,500 to 2,600 cu. ft. to accommodate 115 tons of product weight.

When taking into consideration the railcars' track footprint, generally the shorter the space taken up the better. Track space and general real estate available to build track in aggregate operations are often a restrictive factor, particularly in established operations or where one is trying to penetrate a market in a major metropolitan area.

RAILCAR PHYSICAL DIMENSIONS (GONDOLAS SUITED FOR AGGREGATE)

CUBIC FEET CAPACITY	GWR	INSIDE LENGTH	OUTSIDE LENGTH	RAILCARS PER 1,000 LTF
3,000	263,000	65 ft., 6 in.	69 ft., 4 in.	14.4
2,494	263,000	52 ft., 6 in.	58 ft., 1 in.	17.2
2,600	286,000	47 ft., 0 in.	54 ft., 0 in.	18.5
2,361	286,000	42 ft., 0 in.	52 ft., 11 in.	18.9
2,520	286,000	36 ft., 10 in.	42 ft., 1/2 in.	23.8
2,490	286,000	35 ft., 10 in.	42 ft., 0 in.	23.8

Source: Tealinc Ltd.

TAKEAWAYS

There are a lot of variables to consider when using railcars to transport aggregate. By starting out with an analysis of physical railcar characteristics matched to your requirements and available resources, you will obtain a foundation from which you can work. **P&Q**

Darell Luther, the CEO and founder of Tealinc Ltd., has nearly 30 years of rail, truck, barge and vessel transportation experience, mostly concentrated in bulk commodity and containerized shipments.