RasTrac®

Improving the Efficiency of Snowplow Operations

Introduction

Municipalities, particularly those in the northern part of the United States, face the same challenge year after year in the winter season: keeping their streets clear of ice and snow.

Roads that are covered in snow and ice are unsafe for motorists. Worse yet, if the snow buildup is allowed to become severe enough, roads can become completely impassable. This could mean the complete shutdown of a municipality's day-to-day operations.

This is one reason why snow plows are such a critical part of a municipality's wintertime operations. However, keeping your entire municipality efficiently covered on a tight government budget is tough. There are numerous challenges in keeping your streets clear of the snow, slush, and ice that can be dangerous to commuters, including:

- Maintaining snow plows
- Optimizing plow routes for maximum coverage and efficiency
- Keeping municipal assets safe from damage or theft

These are just a few of the obstacles that municipalities face in trying to keep roads safe and clear in winter. At times, these challenges can seem overwhelming, but there are solutions.

To improve the effectiveness and efficiency of your snowplow operations during wintry weather, we've created this helpful guide. And, we're always just a phone call or email away if you would like to discuss our tracking solutions.

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The Biggest Challenge Facing Municipal Snowplow Fleets

Municipalities across the country are faced with the challenge of trying to cover increasingly complicated road systems with a shrinking fleet of snow plows. The first step in meeting the demand for keeping roads safe in winter is identifying your biggest obstacles to efficiency in snowplow operations.

With this in mind, what are the biggest efficiency challenges in your typical snow plow operation? Here are a few basic ones:

- Managing Your Stock of Ice Countermeasures
- Controlling Fuel Costs
- Creating Efficient Plowing Routes
- Maintaining Plows to Prevent Breakdowns
- Managing Driver Behavior

While there are many more potential challenges, these are some of the ones that have the biggest impact on snow plow efficiency. In the following pages, we'll take a closer look at each of these issues.

Managing Your Stock of Ice Countermeasures

In many municipalities, simply clearing the roads of snow piles isn't enough to make the roads safe to drive on. To stop roads from icing over and becoming too hazardous, municipalities apply rock salt and other substances to the road to melt ice or prevent it from forming.

However, even though rock salt is a fairly common and inexpensive commodity, it's all too easy for a municipality to run out of this anti-ice compound. In fact, in past years, many cities ran out of rock salt during heavy winters. When this happens, the cost of rock salt can skyrocket. This makes it more important than ever to efficiently manage your municipality's supply of road ice countermeasures.

Two ways you can improve the efficiency with which your municipality manages its supply of rock salt include:

1. Building the Stockpile During the Warmer Months.

The cost of supplies such as rock salt have been known to quadruple in the middle of winter when demand is high. By creating an accurate estimate of your municipality's winter season needs and purchasing rock salt during the spring, summer, or early fall, you can make more efficient use of your municipality's operating budget.

2. Increasing the Efficiency of Your Plowing Routes.

Re-plowing the same areas too frequently can cause your snow plow crews to waste resources by re-applying a layer of rock salt to roadways that don't need a fresh coat. This consumes extra resources without providing any real benefit for your municipality.

Addressing these issues can help you make managing your municipality's budget for ice countermeasures easier.

Of course, some municipalities are turning to alternative means of ice countermeasures, especially with the growing concern over rock salt's environmental impact.

Considering Alternatives to Rock Salt

Aside from rock salt shortages, there has been some concern that the chemicals used to create it are contaminating urban groundwater and even impacting wildlife. Roads & Bridges also notes that rock salt can impact our infrastructure, damaging bridges, roads, buildings, and other infrastructure components over time. Some municipalities have begun to wean themselves off of rock salt using the following methods:

Snow melt mats: These mats are embedded with heating coils to melt snow and ice. Cons include that they are limited in size and they consume electricity; which drives up energy costs.

Urea: Commonly used during the production of fertilizer, urea is great for deicing and is produced naturally, so it is not as poisonous to the environment.

Potassium chloride: Sold in pellets, this works quite well in temperatures between 10-12° F and is less harmful to the environment. Unfortunately it costs almost twice as much as rock salt.

Calcium chloride: For places reaching temperatures as low as -24° F, calcium chloride is a great (through expensive) alternative that's more powerful and faster-acting than rock salt.

Potassium acetate: This material can remove snow and ice even at temperatures below 76° F, however with a price 7-8 times greater than rock salts, it's not ideal for long stretches of road.

Beet juice: It's true, beet juice is becoming more and more popular for safe and effective snow removal and deicing. It is cheap, abundant, and works great even for large-scale projects.

Sand: One of the most commonly used alternatives to rock salt because it's cheap and also provides traction on slippery areas. However, it can cause a bit of a mess once snow melts.

Controlling Fuel Costs

Another major budgetary issue is dealing with the expense of keeping your snowplow fleet fueled and ready to go. For most municipalities, fuel costs are likely the single largest expense in your operating costs, and they can fluctuate wildly, making it difficult to budget for them.

While some municipalities might be investigating using alternate fuels, such a solution might not be practical on your budget, as replacing entire vehicles in the fleet can be expensive. Worse yet, certain vehicle powertrains might not function as well in the cold.

For example, the battery life of an electric car is adversely affected by temperature extremes. In fact, AAA reports that "Cold temperatures can sap electric car batteries, temporarily reducing their range by more than 40% when interior heaters are used." In addition, cold weather can drop the fuel economy on a hybrid by about 30% and electric vehicles nearly 40%.

This would certainly limit the effective operational range of a snow plow. So, it might be best to focus on finding other ways to improve fuel efficiency, such as by improving your snowplow route planning to increase coverage with fewer total miles traveled by each plow.

By lowering fuel spending, you can also free up resources for other operations.

Creating Efficient Plowing Routes

Improving the efficiency of your snowplow routes plays a major part in increasing the overall efficiency of your municipality's snowplow operations.

Creating more efficient plowing routes can help you save on resources such as rock salt and fuel, as you'll need less of each to cover a larger section of roadways.

Part of overcoming this challenge is finding ways to reduce overlap in coverage without leaving individual roads unplowed for too long and letting snow pile up higher than can be safely plowed.

Optimizing Snow Plow Maintenance

Vehicle maintenance can be incredibly costly. The more extensive the repair, the costlier the maintenance. Putting off vehicle maintenance for too long can be disastrous, resulting in on-the-road breakdowns in the middle of winter.

Optimizing maintenance for municipal snow plows can help conserve the budget without risking breakdowns that can strand workers out in the cold. Creating a well-optimized maintenance schedule, however, requires detailed information about each vehicle in your fleet, such as:

- Total distance traveled
- Key engine performance data
- Mileage since last routine maintenance
- Mileage on key vehicle parts (brakes, shocks/struts, wheels, etc.)

Knowing this information helps you know which vehicles are most in need of maintenance so you can prioritize the allocation of your municipality's vehicle maintenance budget.

Managing Driver Behavior

Driver behaviors can have a massive impact on the efficiency of your fleet of snowplows. Not just everyday driving behaviors such as acceleration, braking, and turning, but time spent in idle or not being on task.

Unfortunately, without a set of eyes on drivers or the vehicles in your fleet, assessing and managing driver behaviors is very difficult. To ensure that drivers are using smart driving behaviors and not wasting excessive amounts of time requires some form of tracking that allows you to accurately monitor driver behaviors.

For example, you can use GPS fleet tracking to monitor driver behaviors. Learn more about GPS fleet tracking in the next section.

About GPS Fleet Tracking for Snowplow Operations

In the previous section, there was a bit of information about some of the biggest challenges there are to optimizing the efficiency of municipal snowplow operations.

Now, let's take a look at two key technologies that you can use to help you overcome those challenges: GPS Tracking Devices and GPS Fleet Management Software.

These two technologies, when used in conjunction, can make optimizing the efficiency of your snowplow operations much easier than before.

A Bit about GPS Tracking Devices

Most people are now familiar with the term GPS, or Global Positioning Satellite. This technology allows for a vehicle's position to be tracked on a moment's notice by using orbiting satellites to triangulate the tracker's location. Consumers use this technology every day to help them navigate unfamiliar roads or find new locations.

Companies and government organizations now frequently employ GPS trackers to help them achieve a number of goals, such as preventing vehicle theft or optimizing deployments and route planning.

The benefits of GPS tracking devices for municipal vehicle fleets, including snow plows, are plentiful. However, a GPS tracker alone isn't a complete solution. This is where GPS tracking software comes into play.

A Bit About GPS Fleet Management Software

While GPS tracking devices allow for the collection of raw GPS data, fleet management software helps you interpret that data so you can make the most of it.

With the right GPS fleet management software, you can:

- Check the current positions of each of your snow plows on an electronic map of your municipality.
- Plot optimal routes for your snow plows to take for clearing roads.
- Monitor total mileage and engine performance for each of your snow plows.
- Track how long it's been since a given road has been plowed with a color-coded map.
- Monitor key driver behaviors such as acceleration and braking habits.

Having access to this information makes it easier to optimize your snowplow operation's resource consumption by letting you make more efficient plowing routes and prevent wasteful activities.

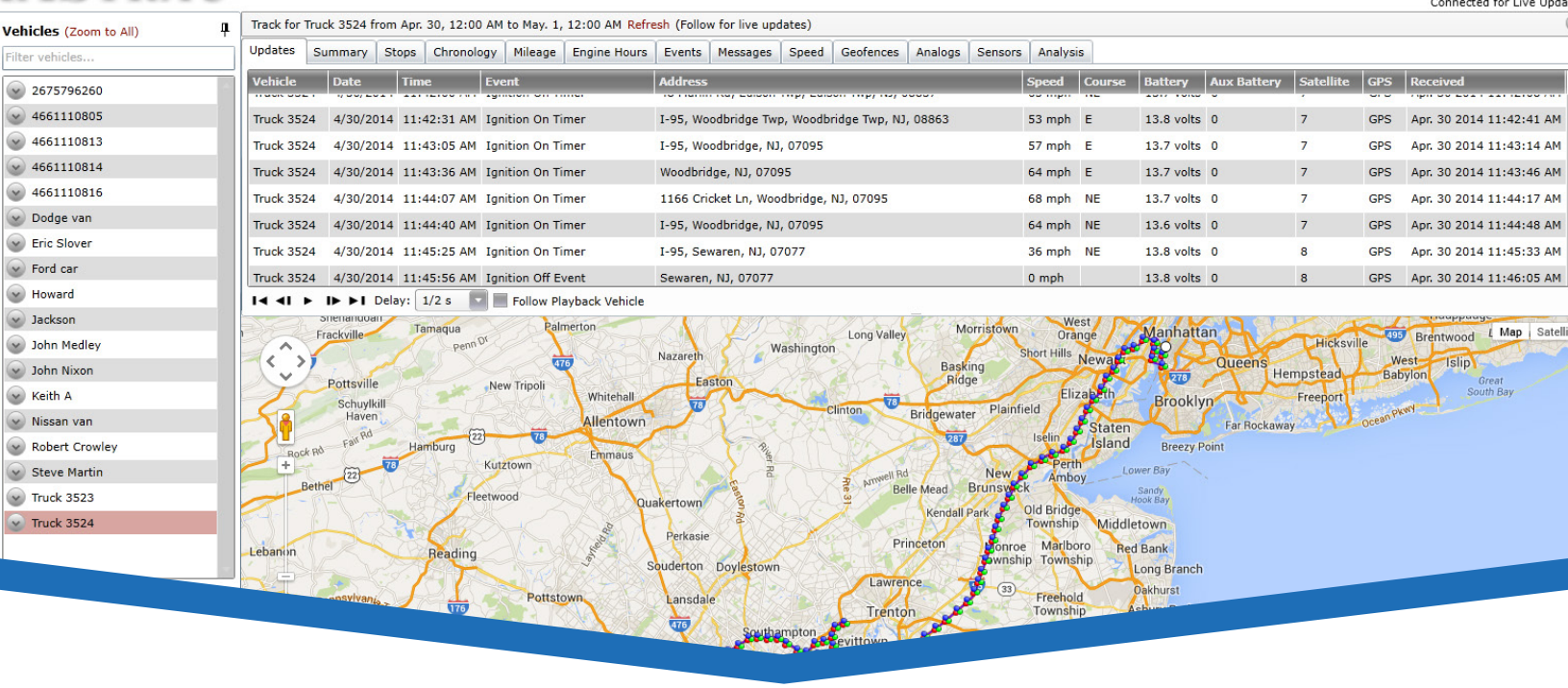
This same technology can also be applied to other operations, such as assigning police patrols or street cleaning routes, so there's utility to the software beyond snowplow optimizations.

Not All GPS Technologies are Created Equal

There are many GPS technologies that you can employ to help you optimize your snowplow fleet. However, not all of these technologies are created equally.

One GPS solution might not update positioning data frequently enough to give you a good idea of where your vehicles are at any given moment, others might be too complicated, flooding your screen with useless data that gets in the way.

When looking for a GPS fleet management system, you need a tool that's comprehensive enough to give you what you need, but simple enough to manage without a Master's degree in programming.



Discover Rastrac's GPS Tracking Tools

Rastrac's GPS tracking solution offers versatility combined with ease of use. Our GPS tracking tools have been used and proven with law enforcement and municipal organizations across the country, and now it can help your municipality with road maintenance. For example, solutions like StreetComplete equip your fleet with tracking software that helps you optimize plowing routes to be sure every part of a service area has been covered.

With Rastrac's GPS tracking solutions for government vehicles and equipment, you can:

- Dispatch the closest maintenance vehicles quickly and efficiently
- Monitor engine performance data to identify any need for repairs
- Monitor and regulate the amount of salt as snow and ice countermeasures
- Track the scheduled maintenance of individual vehicles

Rastrac gives you complete visibility into what's going on in the streets, in real-time, so you can help keep your city, county, or municipality moving in the right direction and operating at peak condition!

How Rastrac StreetComplete Works

StreetComplete is surprisingly easy to use for such a powerful route optimization tool. The plugin provides a report of all the streets in your municipality with an aging, color-coded map. You can establish parameters such as “time since a given road was last serviced,” and assign customized color codes for different time ranges.

The user-friendly, clearly-defined color coding system helps you manage snowplow deployment at a glance, allowing you to prioritize the roads that most need clearing.

The system can also help you find the most efficient routes for your snow plows to clear the most roads in the shortest time, increasing the area each snow plow can cover per gallon of fuel consumed.

For example, as a StreetComplete user, you could assign:

- A green highlight to roads that have been serviced in the last 1-3 hours
- A yellow highlight to roads that were serviced over 6 hours ago
- A red highlight to roads that have gone 12 hours or more without service

Now, you’ll know what’s been covered recently and what needs to be covered. The map plugin will automatically update colors as each road passes a given threshold to provide you with immediate updates.

What about Mobile Management?

Every year, the mobile devices that you use are becoming increasingly connected. In fact, fleet

management systems are evolving towards the use of mobile technology products such as smartphones and tablet computers.

For example, dispatch can alert drivers to accident sites that they may be approaching, giving the driver a heads up and improving safety. Additionally, drivers can contact dispatch and suggest strategic routes to take that may increase efficiency, or they can get traffic alerts to avoid gridlocked roads.

Because of the improved communication between drivers and dispatch, fleet managers at dispatch can quickly contact drivers if there is a sudden abrupt deceleration and verify the cause. This helps clarify the difference between bad driving habits and an emergency deceleration caused by an on-the-road incident.

In case of an accident, dispatch can send emergency vehicles straight to a driver's last known location, improving safety for snowplow drivers through better emergency response times.

Municipalities now have the ability to install an application onto an employee's smartphone or work tablet that turns the device into a remote GPS tracker. Many municipalities now use these devices to help keep in touch with workers in the field, passing along important information and situational updates.

3 Tips for Making the Most of GPS Fleet Management Technology

#1: Develop a Solid Strategy

As helpful as technology can be, it can't replace having a good strategy for managing your

municipality's assets. Tech can help you automate key tasks and processes, but it can't do your thinking for you.

When developing a strategy, make sure to keep your drivers and dispatchers in the loop. Not only can they provide valuable input, keeping them in the loop can be vital in making sure they buy into your strategy.

#2: Establish How Frequently Each Road Needs to be Cleared

Different parts of the country will have different levels of snowfall at different times of the year. This can have a serious impact on how frequently you need to plow each road to keep it clear of obstructions.

You might only need to clear a road once every day, or you might need to re-plow each road every 2-3 hours to keep up with snowfall in your area. Tracking historical data and upcoming weather reports can help you make smart decisions regarding how to optimize your snowplow routes.

#3: Keep in Mind That Collecting Data is Just the Start

Making the most out of a GPS fleet management solution requires that you know how to analyze data and use it to assess the performance of your vehicle fleet.

For example, if mileage is poor among your fleet vehicles, you need to check both driver habits and maintenance issues to try to determine the root cause. If drivers are accelerating/decelerating too hard, that increases fuel consumption. But, if drivers aren't accelerating or decelerating hard, there might be another cause for high fuel consumption, such as worn fuel lines, fuel injectors, or engine cylinders.

Analytics help you dig deeper into the root causes of specific issues with your vehicle fleet. The better your analytics tools are, the more informed and accurate your decision-making will be.

Check out the next section for information about the benefits of using GPS fleet management software for your snowplow operations.

6 Benefits of Using GPS Fleet Management for Snowplow Operations

Now that we know a bit about what GPS fleet tracking systems involve and how the software works, what are the benefits of using such systems for your snowplow operations?

Here are a few benefits:

#1: Increased Safety for Snowplow Operators

One of the reasons why your municipality needs to plow roads clean of snow is that driving on such roads is inherently unsafe. Particularly deep snow can obscure obstacles such as speed bumps, bollards, and even illegally-parked cars from view.

Worse yet, ice can cause some plows to lose traction and crash, or cause vehicles following behind the plow to do the same. Extreme cold can even cause a so-called “winter-proofed” engine to seize up and fail.

Any of these situations can be hazardous for a city worker, primarily because it strands them out in the cold. The longer it takes for help to arrive, the more danger the worker is in.

GPS systems increase safety by helping to improve emergency response times. With a GPS system, dispatch can give emergency responders the last known GPS location of the snowplow, reducing the time they spend looking for the stranded worker. Just a few minutes can mean the difference between recovering a healthy worker and that worker suffering from hypothermia.

#2: More Efficient Route Planning

One of the biggest benefits of using GPS tracking software is that it can greatly increase the efficiency of your snowplow routes. With GPS software, you can find the most efficient routes for your snow plows to follow to clear the largest area in the least amount of time.

This allows plows to cover more ground per gallon of fuel consumed, increasing efficiency.

Also, if you use software plugins such as Rastrac StreetComplete, you can track how long it's been since a given road was last cleared.

#3: Improved Dispatch Control

When an emergency occurs and a specific road has to be cleared right away for emergency services, GPS fleet management software can allow dispatchers to see exactly which plow is closest to the route that needs to be cleared.

This saves time that would be spent having different plow drivers sound off and trying to figure out which one is closest. This helps emergency services such as fire engines, police cars, and ambulances get to where they need to go faster, which can save lives.

#4: Improved Vehicle Maintenance

GPS trackers can relay important vehicle performance data to fleet managers. Information such as total mileage, engine performance, and total operational time is crucial when planning an efficient vehicle maintenance schedule.

Using this information, you can prioritize vehicle maintenance on those vehicles most in need of servicing to maintain fuel efficiency and prevent costly breakdowns.

This benefit isn't limited to snow plows either. Many municipalities use GPS fleet management systems to optimize vehicle maintenance for their entire fleet of municipal vehicles. This helps municipalities make the most of their maintenance budgets.

#5: Preventing Wasteful Driver Behaviors

Things such as rapid acceleration, hard braking, and excessive idle time all add to the wear and tear on a vehicle, as well as the fuel consumption of that vehicle. These bad driver behaviors can be identified using GPS tracking so that you can correct them.

This helps reduce fuel consumption, as well as the need for excessive maintenance.

#6: Theft Prevention/Recovery

While a snow plow might not be the most obvious theft target, each plow does represent a significant investment of taxpayer dollars. When one of these vehicles gets stolen, it can have an enormous impact on your operations, as you'll have one less vehicle to try and cover your territory with.

GPS devices are excellent tools for helping prevent vehicle loss through theft. With GPS tracking, you can see where a vehicle is located, or pass along its last known coordinates to police. Some systems even allow you to remotely disable a vehicle's starter so that thieves cannot drive it too far.

These features greatly improve your chances of recovering a stolen vehicle intact, saving a ton of money on new equipment costs.

Overall, the benefits of applying a GPS tracking solution to your snowplow fleet are much greater than the investment.

Conclusion

Improving the efficiency of your municipality's snowplow operations can be difficult. Each municipality faces different challenges, which makes it so that there's no "one size fits all" solution.

Challenges such as budget limits, unique weather patterns, and even random emergency situations can all complicate the task of increasing efficiency for your municipality.

However, there are tools out there that can help you increase efficiency. With some time and effort, and some collaboration with your municipal workers, you can create a plan for improving your city's snowplow operations, and keep your roads safe and clear for all drivers.

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