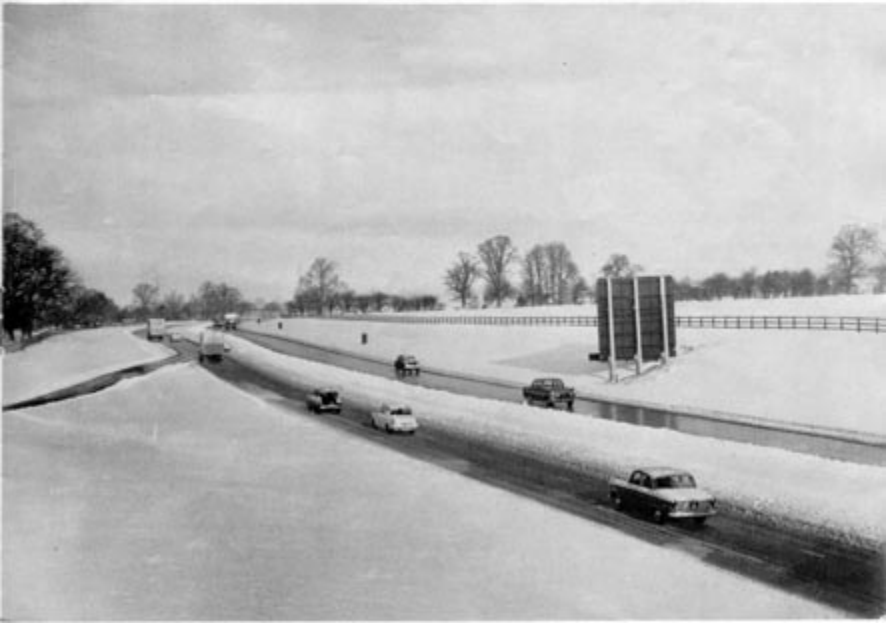
What comes before that winta pinta ?

by J. S. Selley, Sales Director, Atkinson's of Clitheroe Ltd

A TRUCK FOR ALL SEASONS

The role of a fleet of special Atkinson vehicles in the war against snow and ice on Britain's motorways



(Left) Views of the 1963 (top) and 1964 Atkinson vehicles for the motorway. Notice the wrap-round windscreen on the latest version.

(Below) Fibreglass seals the rear brake drums from the ingress of salt.

driven, but a vehicle of this size was found unnecessary : a design providing a 12-ton-capacity hopper is now considered adequate.

Atkinson's of Clitheroe produce the hopper and its spreading mechanism, a new design of which was so successful last winter that according to the Transport Ministry it represented "an advance on any comparable equipment used in other countries."

In cold weather the best method of preventing the formation of ice is to spread rock salt on the road before the conditions of freezing and high humidity arise. Salt spreading will also prevent the settling of light snow, and is gradually superseding the spreading of grit. The latter, whilst helping to stop skidding, does not prevent ice formation.

Hitherto the Ministry had made use of vehicles with various types of spreading mechanism. One spread its salt in an even fan shape behind it. If the vehicle had to depart from the centre of the carriageway, salt was laid either on the verges or on the central reservation. If it stayed in the middle of either two-or three-lane carriageways, it could interfere with traffic.

The second type could spread under the vehicle and to one side only, and the vehicle therefore normally remained in the slow lane. But if it had to move out on encountering, say, a very slow moving vehicle, salt was again lost and part of the carriageway remained untreated.

The latest vehicles are fitted with a system known as variable asymmetric spreading. This enables the driver to vary the width and direction of the spread according to the width of the road and the position of the vehicle on the roadway at any moment. It can also vary the thickness of the salt layer according to the weather conditions.

Superior Control of Spreading

A moving belt is provided in the floor of the body and feeds salt through two vertical trap doors, either of which can be opened or closed by an hydraulic circuit whilst the vehicle is in motion. This is one of the novel features of the arrangement. The salt falls through either or both of these doors onto a scroll mechanism, perhaps better known as a worm feed, which delivers the grains outwards from the centre of the vehicle to drop on to chutes on both sides of the chassis which, in turn, place the salt onto spinner discs provided in the design

The centrifugal action of these horizontal discs throws off the salt in the same way that a revolving record player table will throw off anything dropped on it. To make sure that sufficient velocity is imparted to the salt grains, the plates are fitted with several vertical lugs. These

spinners are conventional, but the arrangement—one on each side outboard of the main chassis side members, in conjunction with the dual trap doors—results in the superior control of spreading.

Local Authorities Responsible

All these special Atkinson vehicles are operated by county authorities from maintenance depots situated at regular intervals along the motorways. To find out more about how they fit into the winter programme, RANGEABILITY visited the depot at Watford Gap on M1 and interviewed Mr. P. H. Meacock, A.M.I.C.E., motorway maintenance engineer of Northamptonshire County Council, which is concerned with nearly 30 miles of the new London-Birmingham motorway.

Northants is one of several local authorities responsible for maintaining this motorway on the Ministry's behalf. Each authority pursues an independent maintenance programme, but the vehicles, depots, storage hoppers and other facilities are supplied by the Ministry.

The two depots on this part of M1 are served by five Atkinson vehicles, each of which is allotted a separate 5-mile section of motorway or a total of 10 miles of carriageway. Their main function is to prevent ice from forming by means of precautionary salting carried out in the light of weather forecasts supplied twice a day by the R.A.F. Meteorological Office situated at nearby Wittering.

By and large the maintenance staff keep normal working hours, but in extreme weather it is sometimes necessary to carry out salting operations during the evening to ensure that the road remains ice-free overnight. A salt spread remains effective for a period of 12 to 48 hours, depending on conditions.

Eliminating Danger Risk

It could be argued that a "salt-on-sight" principle leads to unnecessary waste, but the Ministry's policy is to eliminate the smallest possible risk of ice-formation. Road safety is beyond price, but it is interesting to note that the cost of salting the Northants section during December, January and February was £20,000. More than a million vehicles used the road and the cost per vehicle was less than 5d.

Must Anticipate Weather

To be successful the salting programme must anticipate the weather. Each day, County Hall obtains a Met report from Wittering at 9.30 a.m. and again at 3 p.m. This gives the general outlook, minimum and maximum air temperatures, wind direction and speed and, of course, the possibility of snow or fog.

Mr. Meacock may decide that salting is not necessary, but if the weather should deteriorate unexpectedly during the evening he can set salting operations in motion by telephoning his foreman, who will then pick up the vehicle drivers and take them to the motorway maintenance depot. If emergency measures were required during the night, the police would telephone him for instructions. However, an ice-report at that time would be regarded as a failure in the prevention programme.

Night to Remember

The events of the Big Freeze have now passed into a cold corner of history, but Northants is not likely to forget the night of January 19 when the county was swept by a blizzard. Throughout the following day a strong wind blew the powdered

concluded on page 13

(Left) Greasing points grouped in batteries on the offside frame member are among the points on a motorway vehicle being checked during assembly at the Preston factory.

(Below) Spinner discs provided in the Atkinson's of Clitheroe design throw out the salt during spreading operations.

and 1.6 to 1 and incorporates a lockable differential. A mechanical handbrake is used and the lower end of the mechanism is enclosed in a grease-filled box.

Chassis lubrication can be divided into three parts; automatic, group point and manual. A chart is installed in the cabs of the Scottish machines detailing the types of oil and grease needed and at what points.

The automatic system works when the vehicle is standing still with its engine running in the same way as when the vehicle is working. When the engine is running, the movement of lubrication through this system is controlled by an electric motor. When the vehicle is out of use, a battery-powered timer controls the sending of a pre-determined amount of lubricant at regular intervals.

Not every moving part needs constant lubrication and such points are connected by pipes to a battery of lubrication nipples mounted at an easily accessible point on the chassis frame. There are also a few parts, such as the fan pulley, which cannot be lubricated in any other way than applying a grease gun to the actual part.

The hopper and spreading mechanism on each gritter-snowplough is built by Atkinson's of Clitheroe Ltd., which is a member of the Solar Industries Group and completely independent of Atkinson Vehicles Ltd.

In the same way that the chassis was designed in conjunction with the Ministry of Transport, so the basic spreading mechanism follows the principles laid down by the Ministry.

Variable asymmetric spreading is used on the majority of the vehicles, which enables the driver to vary the width and direction of the spread according to the width of the road and the position of the vehicle on the roadway at any moment. Controls enable the spread to take place from either nearside or offside, or both, as required. It can also vary the thickness of the salt layer according to weather conditions, from as low as 1oz per sq yd up to 4oz.

A moving belt is provided in the floor of the body and feeds salt through two vertical trap doors, either of which may be opened or closed by an hydraulic circuit while the vehicle is in motion. The salt falls through either or both of these doors on to a worm feed, which delivers the grains outwards from the centre of the vehicle to drop on to chutes on both sides of the chassis. These in turn, place the salt on spinner discs.

The centrifugal action of these horizontal discs throws off the salt in the same way that a revolving record player table will throw off small objects dropped on it. To make sure that sufficient velocity is imparted to the salt grains, the plates are fitted with several vertical lugs. These spinners are conventional, but the arrangement—one on each side outboard of the main chassis sidemembers, in conjunction with the dual trap doors—results in the superior control of spreading.

Controlled density is essential on economic as well as technical grounds. Some 100,000 tons of salt were used on British roads in 1960 and an expert has forecast that this year the figure is likely to approach one million tons.

Salt spreading is normally carried out at between 30 and 35 mph, which is good testimony to the efficiency of this special design. The co-efficient of adhesion of a vehicle on wet ice is only 0.1, compared to a value of 0.8 to 0.9 on dry concrete. And the Atkinsons have to propel themselves through drifts with the added resistance of a plough.

Atkinson's of Clitheroe take the same care in protecting the body and spreading equipment as is given to the chassis, with the 11 cu yd steel body having a lining of glass-plastics inside and out. They also supply the 10ft wide by 33in high snowploughs, which have squeegee bottoms.

The high standard of reliability of this 6 x 6 Atkinson and its thorough proving also makes it an interesting proposition for off-the-road use, such as forestry or oil-fields work.

The Transport Ministry engineer who took this photograph (left) of the 1963 Atkinson prototype motorway vehicle reported that the only limiting factor on its speed under deep snow conditions was the driver's knowledge that damaging objects may have been hidden by the snow. As it was, it ploughed along this road at a steady 30 m.p.h.

(Below, right) A stretch of the London-Birmingham motorway during the Big Freeze. The condition of the road surface following preventive spreading of salt is clearly evident. At no time during last winter was traffic halved on M1.

THE Big Freeze of 1963 is now nothing more than a memory to most people in Britain, but engineers as far apart as London and Preston are at this moment applying to the design of a fleet of special vehicles the hard lessons learned at that time.

The results of their unseasonal efforts will be apparent next winter, though few of us will be aware of them; we accept matter-of-factly that as snow falls and ice forms during the night the roads should be clear the next morning.

North European Norm

In the early weeks of this year there was a great deal of criticism about the unpreparedness of Britain for the extreme weather conditions. Highway authorities came under attack, and were compared unfavourably with their counterparts in other countries. For one winter at least, the north European norm became ours too.

Yet these critics overlooked one important factor: drivers in Continental countries normally severely affected by winter conditions accept having to drive on compacted snow and ice for several weeks a year.

They also overlooked the fact that Britain was possibly the only severely affected country to keep its major motorways clear throughout the Big Freeze.

On the London to Birmingham M1 and some other motorways, this was effected by a policy of preventive salt-spreading and, when necessary, snow ploughing. Special vehicles designed by the Ministry of Transport, Atkinson Vehicles Ltd., Preston and Atkinson's of Clitheroe Ltd., were largely responsible.

Some of these vehicles have now had three winters on the motorways, and each year sees further detail improvements in the continually growing fleet. The 1963 Atkinsons, for instance, bristled with anti-corrosion features—necessary to fight off the damaging effect of the salt they carried and spread. In the 1964 design, the prototype of which has just been completed at Preston in conjunction with the Ministry engineers in London, anti-corrosion steps have been carried a good deal further.

Enclosed Gearbox and Clutch

The six-speed gearbox is now fully enclosed to prevent the ingress of salt. So is the clutch, which will be operated hydraulically instead of manually. Fibreglass labyrinth mouldings will provide protection for the rear brake drums.

Integrally designed power-assisted steering is another new feature. This has no exterior ram, and requires no lubrication since it is kept continually oiled by the hydraulic fluid. An Eaton pump integral with the CAV dynamo is part of the steering improvements.

Clutch and brake pedals are of the pendant type, making it possible for the brake valve and clutch master cylinder to be brought into the cab for further protection from outside elements.

The driver's task has been further eased by housing all the controls in one panel on the front facia.

Vehicle Servicing Eased

Servicing has also been eased by re-positioning the greasing points in two main batteries on the offside frame member, one amidships and the other at the rear.

Seventeen Atkinson vehicles incorporating these improvements will be delivered to the Transport Ministry for winter motorway service in 1964. Like those built for last winter they will be all-wheel-drive six-wheelers with a 15ft. 1½in. wheelbase. Power unit will be a 6-cylinder diesel, which develops 165 b.h.p. at 2,000 r.p.m.

These latter vehicles incorporated many improvements over those produced in the early days of Britain's motorways. The first Atkinsons for this purpose were 16ft. 7½in. wheelbase eight-wheelers with six wheels

continued on page 10

A TRUCK FOR ALL SEASONS *(concluded)*

snow off the fields and many roads were blocked by drifts.

Snow fell again in the evening, and there was some drifting on the motorway including a formidable white wall near a low embankment at Quinton. Salting was completed by 9 p.m. on the 19th, but by 7 a.m. the next morning the Atkinsons were at work again. Speeds were down to 10 m.p.h., and salting and ploughing went on almost continually throughout the day. Traffic on the motorway did not stop, but it was a very near thing indeed.

Achieved in One Pass

From December to February 3,500 tons of salt were used, compared with 2,500 in the same period the previous winter. Each time the spreaders had to treat an area of 1¼ million sq. yds. and up to two ounces of salt were required for each square yard.

This formidable operation is achieved in one pass by the Atkinson vehicles, and as each leaves its depot at the same time the five sections of carriageway are completed simultaneously. Each vehicle has a carrying capacity of 12 tons and is loaded direct from a bank of hoppers kept full to avoid delays.

Prevents Snow from Adhering

Salt prevents snow from adhering to the road surface. Once salt has been laid, traffic in slow and centre lanes effectively disperse the snow. The fast lane, where the traffic is lighter, presents a separate problem : as snow forms on top of the salt drivers become less and less inclined to travel on it. This is where the Atkinsons' snowplough attachments come into their own.

Built by Howie in conjunction with the Ministry's M.E. Branch, the 12 ft. straight-bladed ploughs fitted with squeegee bottoms will effectively sweep the snow off the fast lane and onto the centre reserve. V-blade ploughs are not often used on the motorway because they spray the snow to either side. This is an effective method of breaking up large drifts, but on a multi-lane carriageway the controlled direction of sweep provided by the straight-bladed plough is more suitable.

After every round of duty the vehicles are washed and greased. In the early days, Northants experienced some difficulty with corrosion from salt, but Ministry research which culminated in the development of the new Atkinson vehicles has taken care of this problem.

Long Rest in Summer

In summer, the golden-yellow motorway vehicles enjoy a long rest during which they undergo a complete overhaul at the Ministry's main depot at Hendon. To some it seems ironical that these trucks, so carefully designed for all seasons, should be laid up so impotently for so long.

Beating the worst of WINTER

PICK the roughest day of a British winter and you will find a large number of Atkinson six-wheelers operating in conditions which are paralysing the rest of road transport.

They will be some of the 140 special 6 x 6 Atkinson gritter-snowploughs which have been built to date for keeping motorways and major trunk roads clear of ice, snow and slush.

The majority are owned by the Ministry of Transport, but operated by county authorities from maintenance depots along the motorways. There are also ten with the Scottish Development Department, which has another 74 on order, and two are being supplied to Lancashire County Council for trunk road work.

The latest vehicle is a most sophisticated design, incorporating features which have proved themselves since the first ones were built and others which have come in the hard way—operating experience.

Protection from the effects of the weather and the spreading salt is ranked in importance with the mechanical performance of the vehicle. The well-heated cab is of glassfibre construction, which is hard to beat for durability, and the frame and major frame components are painted with three thick applications of Epoxide WR plastic coating incorporating a catalyst. Other metal components, including the engine, go through a similar protective process. The underside of the cab floor and dash structure are coated with rubber-based underseal, while electrical terminals and entries and exits for wires are covered with a pvc coating.

Power unit is a 12.17 litre Cummins NHE 180B diesel and a six-speed ZF gearbox and transfer gearbox is used. The gearbox and hydraulically-operated clutch are fully enclosed to prevent penetration by salt or brine spray. Glassfibre labyrinth mouldings protect the rear brake drums, which are unlikely to be severely heated. ZF power steering is fitted and as this is an integral unit there is no exterior ram to protect. Clutch and brake pedals are of the pendant type, which allow the brake valve and clutch master cylinder to be fitted inside the cab.

Other special protective features include coating the brake cables with pvc, carrying axle, gearbox and fuel tank breathers by remote air lines into the engine compartment, packing suspension leaf springs with grease and on some machines covering them with leather or pvc gaiters. All air pressure piping is in nylon and the pressure piping and electric wiring is threaded through plastics tubing and run on the outside of the chassis for easy accessibility.

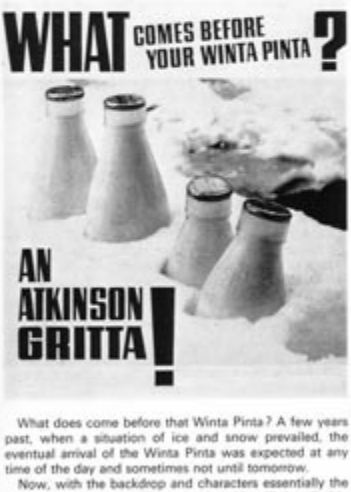
The three driven axles are Kirkstall units and the transfer box is now a ZF GA350 design which is mounted directly on the gearbox to reduce weight and allow a shorter wheelbase chassis to be used. The box has ratios of 1 to 1

The Transport Ministry engineer who took this photograph of the 1963 Atkinson prototype motorway vehicle reported that the only limiting factor on its speed under deep snow conditions was the driver's knowledge that damaging objects may have been hidden by the snow. As it was, it ploughed along this road at a steady 30 mph

Lancashire County Council has taken two of these chassis for gritter-snowplough work

From all of the names available for company titles it is extraordinary, but quite co-incidental, that two completely independent companies—Atkinson Vehicles Limited and Atkinson's of Clitheroe Limited (a member of the Cammell Laird Group)—located as closely as Preston and Clitheroe, should become so closely associated with the great move forward in the progress and improvement of winter maintenance equipment, especially in the field of motorway services.

I HAVE always liked an advertisement which was developed to impress on public authorities the vital importance of adequate winter maintenance services. I venture to repeat this as the introduction to this contribution to *The Atkinson*.



What does come before that Winta Pinta? A few years past, when a situation of ice and snow prevailed, the eventual arrival of the Winta Pinta was expected at any time of the day and sometimes not until tomorrow.

Now, with the backdrop and characters essentially the same, there is a very different story with milk handled in bulk and conveyed over greater distances, subjected frequently to centralized distribution and expected to be on that doorstep in time for the traditional British start to the day. Many other commodities are subject to bulk handling and centralized distribution and in addition there is the ever-increasing volume of traffic to contend with in delivering on time.

All this adds up to a challenge to public authorities to have available equipment and services which can cope with the snap winter conditions so prevalent in this country where, incidentally, there is the highest traffic density in Europe.

The majority of the public regard these situations purely from the viewpoint of personal experience and understandably look upon the problem as one which only occurs with two or three isolated incidents of snowfall in a winter. This viewpoint is in fact a compliment to the services which have been developed and are now operated by the public authorities throughout Britain.

The true picture is that added to these visual incidents is the menace of snap frost and the all too frequent condition known as black ice. In this country and many areas of Northern Europe this situation is caused by a high incidence of moisture in the atmosphere, accompanied by a sudden fall in temperature, particularly during the night or just before the dawn. The result is the development of a thin film of ice on the road and pathway surfaces which is not visible and immediately reduces the contact between wheel and road surfaces with resultant uncontrollable skid or, in the case of the pedestrian, loss of contact between shoe and pavement with uncomfortable physical reaction!

Preventive and remediable action on the part of the public authority has to be immediate and the techniques now developed with machines and materials make

Clearing a way in conditions which could paralyse other motorway traffic

The most recent congress was held earlier this year at Berchtesgaden, Bavaria, and a notable exhibit which caused much interest at the working trials, was the Atkinson/Atkinson MoT snowclearing vehicle. This was a joint project between Atkinson Vehicles Limited and Atkinson's of Clitheroe Limited and was made possible by the kind co-operation of the Ministry of Transport who loaned the vehicle to be sent and by the County Authority of Westmorland whose County Surveyor provided a trained operator. The journey involved a distance of 1 645 miles with climbs to a height of over 6 000 feet on difficult and treacherous mountain roads and was accomplished without the need to break the customs seals for tools and spares—which speaks well for both Atkinsons.

These trials attracted the attendance of the BBC2 "Wheelbase" production team and a few weeks later formed a full feature in the weekly programme. Our vehicle, being the only British mobile equipment entered for the Congress, was featured briefly although it had been the intention of Brian Robins, the producer, to cover in full our successful trial which concluded with the award of a Congress medal for the development of modern snow clearing equipment.

Unfortunately, up in the narrow, snow covered mountain passes, the local police suddenly decided to create a one-way traffic system which was perhaps beneficial to the delegates but trapped the BBC2 team who were eventually seen to be protesting vigorously to the officials as the trials terminated.

Several delegates from the UK, including the writer, were interviewed for the programme—quite an ordeal especially with the added physical discomforts and influences on ones face (and nose!!). The posing of unrehearsed questions of a contentious nature by experienced interviewer Miss Judith Jackson and the knowledge that in providing the spontaneous answer, once said there was no retracting, created within ones head the feeling of a miniature computer attempting an output record. The eventual presentation was quite kind to all who participated. If a criticism was invited the justifiable comment would be that there was an over accent on one particular equipment of German origin and it would have been encouraging to see the team equipped with British cars instead of very new vehicles of German make.

Many people are surprised that we in the UK can offer winter maintenance services to many European countries who have continuous snow and ice conditions throughout the winter months. The fact that we can and do so, is proved by successful exports to many European countries.

At first sight, the reason may be obscure. By comparison with continuous winter conditions for several months, which permit economically the setting up of permanent departments for snow clearance, the spasmodic incidents of snow and ice in the UK call for emergency services manned by operators who are normally engaged on day to day routines. Therefore, the operation must be backed up by the highest degree of mechanisation. This necessity has put British equipment in the vanguard and the services now operated in this country are recognised and renowned.

In the particular field of motorways it is my forecast, based on opinions expressed by overseas specialists, that the pattern of the British snowclearing service developed by the Ministry of Transport will become the future system adopted on European autobahns and autoroutes.

Broadly, winter maintenance falls into two categories, neutralizing black ice and snowclearing. The aim of the authority is one of prevention in preference to correction.

Extremely efficient plans of operation keyed to local conditions and traffic flow are determined by each authority in advance of the winter season. Usually arrangements are made with the Meteorological Office local weather services for advance warning of imminent or forthcoming adverse weather so that, dependent on this information, the appropriate degree of emergency service can be put into operation.

The normal treatment for black ice is a light application of ground rock salt, grade 4, which is spread on to the road surfaces in advance of the threatened condition so that the formation of ice is prevented and road conditions remain safe. The treatment can be effective for as long as 24 hours and with the snow duty officer rests the responsibility for subsequent action if the emergency condition prevails.

With snow a similar pre-treated technique applies as the objective is to establish a salt film between road face and the fall of snow. This assists the follow up snowploughs with their rubber squeegee pads on the plough blades, which skim the road surfaces clear and prevent snow from compacting on to the road face. If a snow fall is persistent and continuing, additional salt applications are made to build up a snow/salt 'sandwich' so that passing traffic will quickly and effectively aid the break-up and melting of the packed snow.

The modern trend is to move away from the use of grit and sand, except where compacted ice exists, and to use rock salt. This is more effective and does not leave blocked gulleys or drains—an expensive and laborious clearing job—which can easily cost more than the actual expenditure on salt.

In an average winter, the quantity of salt used in the United Kingdom now approaches 1 000 000 tons as compared with 100 000 tons less than ten years ago. It is important that the application is made quickly and evenly over the entire width of the surface to be treated, this being a requirement for safety and the protection of road

Ploughing and salt spreading simultaneously in the outer lane of a section of motorway.

construction materials. Rates of application vary from as little as 0·4 ounces per square yard for a preventive treatment up to 4·5 ounces in severe conditions of heavy snow and very low temperatures.

Appreciating that most of these services operate during the night and early morning it is most important that the comfort and welfare of the operators is taken into account. The day of the open truck and shovel has gone and the norm now is the heated-cab bulk spreader and snowplough, with controls positioned in the cab and easily accessible to the driver. Loading is by mechanical means, either power shovel, loading conveyor or hopper.

The ultimate in specification and performance for this work is the equipment installed and operating throughout the entire motorway network of the United Kingdom. This is the Atkinson/Atkinson machine, which has been developed for the Ministry of Transport and the Scottish Development Department and is now being adopted by some county councils and local authorities.

It is fundamentally a special purpose-built chassis, a large capacity spreader body and heavy-duty snowplough. The machine operates at speeds of up to 35 miles per hour while ploughing or spreading to cover the entire width of a three lane motorway with salt. The selected density of salt per square yard remains consistent independently of variations in the speed of travel. The controls provide for this coverage to be applied with the vehicle travelling in either of the three lanes. With fully mechanised depots, loading with salt is accomplished in a few seconds and the hopper capacity permits maximum range without refilling.

At the opposite end of the problems of winter maintenance is the future prospect of improved services for pedestrians. The advent of shopping precincts and pedestrian walkways and the noticeable improvement in highway services is directing the attention of the authorities to the need for power operated machines designed to operate on footpaths.

Such a product will shortly appear on the market. Perhaps one day "Do-it-yourself" kits will appear for the enthusiast, like the little man on his way to the patent office!

Meanwhile Atkinson Vehicles Limited and Atkinson's of Clitheroe Limited continue to look over the Channel to potential export developments and to the time when the winter services and equipment we have reviewed extend via the Channel Tunnel to spread (and snow-plough) over the autobahns and autoroutes of Europe and further afield.