

# Fuel Consumption on Locomotives.

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The following paper was read at a C.N.R. staff meeting in Quebec recently:

The year 1914 will be recorded in history as one of the most disastrous in recent times. We in this country, although far from the actual seat of war, have felt the effects. The demand for inland transportation the year round has brought into existence three great transcontinental railways, each of which is practising the strictest economy in maintenance, and operation consistent with efficiency.

Coal consumption, being one of the largest operating items of expense, has engaged the attention of railway officials in the past, and is still a warm subject of discussion. It is not my intention to deal with the question of mining, inspecting, transportation, or storage of coal, save to remark in passing it is obvious that a railway purchasing a large quantity of any material should have it given proper inspection by a man familiar with the product. The officer in charge of fuel, in order to get the best results, should co-operate with the operating officials, the mechanical department in particular, as this department consumes about 90% of all coal brought on the line. Where large storage plants are located, the engineering department can assist in reducing the cost of coal by providing the most economical plant to handle it from dump to tender. On a young and growing road this is sometimes difficult, as first cost must be considered and terminal defined, but this is bound to receive attention as maturity is reached.

When criticizing men and methods, we are all prone to forget that the whole world is a compromise. If we take as an instance the supreme law making body of the country we find it to consist of a parliament of men elected by the people, some of whom develop exceptional ability, some average, others are below average, yet all members other than cabinet ministers receive the same salary for service given. It is somewhat the same in railway operation. When we wish to ascertain the efficiency of the men who handle the coal and the locomotives we should compromise between the good and the poor, and find the average. Progress will be marked in so much as we are able to improve this average. This brings us to the question of what can be done to reach this end. Best results are obtained, when all operating officers, from the general manager down, take interest in this matter, and co-operate with the superintendent of motive power, or master mechanic responsible for the supervision and maintenance of locomotive equipment.

The instruction of locomotive men in the proper methods of firing and handling the locomotive is of great importance. The master mechanic should see that the money allowed for supervising and instructing the men is used to the best advantage. He should become thoroughly imbued with the spirit which animated that grand old pagan Seneca, when he remarked, "He that cannot live happily anywhere, will live happily nowhere." Thus fortified he may do effective missionary work. He should keep in personal touch with the men as far as possible, and it will be found beneficial to meet them in a body from time to time to discuss road service matters of economy, and while handing out suggestions he should keep a receptive mind for those offered which may be of practical use. This will create a keener interest and a better understanding toward fuel economy, for after all the men have no way of ascertain-

ing the aim and policy of the company in this matter, excepting through its officials.

Some years ago we got out a series of questions and answers on what we considered good practice. These were used by the road foremen when preparing firemen to pass as locomotive men. Changes and improvements have necessitated the adoption of a more complete treatment on this subject, therefore we have had printed and issued to the men a 1st, 2nd and 3rd series of questions and answers. These are not the opinion of any one man, but are what is considered the best combined thoughts of practical men throughout the continent on this subject.

About a year ago I instituted a system of receiving practical suggestions, tending toward any matter of economy, from the various leaders under my supervision. We are now carrying this further by inviting the rank and file to hand in any suggestions which may create a saving, our object being to make the men feel they are a part of the organization. The master mechanic should select road foremen or travelling locomotive engineers who have ability for the work and energy to apply it. The men selected should be allotted to territory which will permit them to ride on each locomotive at least once a month. They should work in close touch with trainmaster and dispatcher, and assist them in obtaining good road service. I think this is best obtained by allowing each road foreman to devote his time to the men and locomotives on his district, so he may see that the locomotive men and firemen understand their duties, and are following the instructions given them in regard to the proper method of handling and firing locomotives. He should fill out and forward promptly to the master mechanic's office the form furnished, entering on it any defects observed which would prevent the locomotive giving good road service. He should assist the superintendent in cases of discipline, and report to the master mechanic work performed.

Experience has taught me that it is rare that a traffic blockade occurs where the trainmaster, road foreman, and locomotive foreman work in harmony: this unity of purpose assists in keeping down fuel costs. It is the practice to issue a monthly performance sheet showing miles run to one ton of coal, and ton miles per ton of coal. To be of benefit care should be taken to have these as correct as possible, only coal used in service being noted against the mileage and performance of the locomotive; a separate rendering should be shown of coal consumed by the locomotive where no heated shop is provided, and where it must of necessity be kept under steam, and at times maintain heat in coaches, also where soft coal is used to heat shop plants, stations, conductors' vans, steam shovels, pile drivers, or for any other purpose. Where scales for weighing coal are not available, we have found by using the shovel as a unit we are able to ascertain the consumption on the trip very closely, no. 4 shovel carrying about 15 lbs., no. 2 shovel, used on smaller locomotives, slightly over 13 lbs.

The quantity of fuel consumed varies with different conditions on trains, grades, speed, and locomotives. Exact comparisons are impossible unless we know all the conditions, which is not often the case. However, we can compare men and locomotives on similar trains where the schedule is the same, and where an equal tonnage in passenger or freight cars is handled. We re-

ceive a statement each week showing any locomotive failures. It might be beneficial to show unavoidable detentions on the road, which are attributed to the locomotive, and for which, in order to make up and take the train into the terminal on time, the locomotive must burn more coal.

A record on the ton per mile per hour basis would in such cases give credit to the men and the machine. There died six years ago a man who fired the Rocket for George Stephenson. We can mark the great progress which was, during his lifetime, made by the mechanical men in developing the locomotive for the various classes of work, until today it is one of the most effective machines in existence, requiring great care and the prompt reporting and handling of repairs. With the installation of the pneumatic bell ringer and pneumatic fire door, the fireman is now permitted to give more attention to the actual feeding of coal to the firebox.

The successful development of the superheater and application of the brick arch have greatly reduced coal consumption. In order to get most benefit from high degrees of superheater steam, it is necessary to have all tubes bored and clean, and foremen and engineers should be on the alert to note any leaks in superheater units. Cylinder packing, piston rings, and piston valve rings should be kept in good condition. We favor the proper maintenance of the brick arch. The storekeeper by having a stock on hand is assisting to keep down fuel costs. Foremen assist in fuel saving by keeping an eye on the ashpit to see that coal is not wasted when fires are knocked, and by having instructions carried out regarding the overloading of tenders, as coal is expensive ballast. Roadmasters and bridge and building masters are saving coal by instructing their men in proper use of flags, so as to avoid unnecessary delay, as it costs about 300 lbs. of coal to stop and start one of our passenger trains when running about 50 miles an hour, and freight trains in proportion. The speeding of freight trains should be avoided, except in very special cases.

The superintendent who is keeping his freight movements under an average of 13 miles an hour, with a maximum of 25 miles per hour, and who has a dispatcher endeavoring to get trains over the road by avoiding station detentions as much as possible, and by loading to a maximum economical limit, and no more, is going a long way toward fuel economy. Watchmen, by preventing pilfering, and who educate the public that the company's coal is not common property, will save considerable fuel. The car department, in giving inspection to cars, materially assists in lowering fuel costs. Trainmen save coal by keeping locomotive men posted regarding work to be done along the road, thereby permitting the fire to be regulated accordingly. The agent who gauges closely the time at which trains will be ready to leave the yard, and orders locomotives to correspond, is preventing fuel waste. The call boy, by calling crews promptly, thus avoiding terminal delay, is adding his quota. With hearty co-operation and keeping everlastingly at it good averages will be obtained.

The Canadian Pacific Ry. has introduced on its dining cars a buffet, on which cold meats, salads, etc., are displayed under glass covers, giving passengers an opportunity to make a selection, the serving being done by an attendant in white uniform.