

Automation of marshalling yards with particular reference to linear motors

F. T. BARWELL & D. J. LEECH

Mr J. H. Dodwell, Public Works Department, Hong Kong

Can the Authors say why a hump yard is assumed always to be large and expensive—surely it is also expensive to equip all of the classification tracks with mules, tracks for linear motors and their control gear? Why bother to try to save just one of the first three mules among so many? If energy conservation is so important, why cannot time as well as energy be saved by arranging for stage 1 to hand over to stage 2 on the run, as stage 3 hands over to stage 4?

61. With reference to §6, is it the rope which is powered either hydraulically or electrically or is the mule powered directly? In §8, are the 'hydraulic units' mules or flange squeezers? In §18, how does track gauge affect the calculations? In §29, is there some advantage in regarding Fig. 9 as a negative exponential curve? It could as well be regarded as a few horizontal steps.

62. As far as I can remember, British Railways built their big marshalling yards before the Beeching report,⁵ which almost completely rejected wagon-load traffic in favour of lifting containers on and off freightliner trains. Has there now been a reversal of policy?

Professor Barwell and Mr Leech

The conventional hump yard with its primary and secondary retarders, computer, control tower and carefully graded track layout is inherently expensive and can be justified only in the most important centres. One object of the Paper was to explore the possibility of automation of the smaller centres and another was to obviate the very high incidence of damage which arises from the lack of control of the actual impact velocities in those yards which have no influence on the motion of wagons once they have passed the secondary retarders. It is very difficult to obtain figures for the loss arising from damaged freight but it is considered likely that reduction of damage arising from better control would be sufficient to justify considerable investment.

64. The particular example chosen was an existing flat yard. A simpler operating pattern could have been achieved by revision of the track layout. The arrangement simulated was chosen from the simplest options in order to demonstrate the feasibility of the problem and optimization as such was not sought.

DISCUSSION

65. Different European yards have different drive systems as mentioned in §9. Thus the mules at Basle are propelled by wire ropes which pass round electrically driven drums situated in a tunnel under the yard and in some French yards mules are powered directly. The hydraulic units referred to in §8 are fixed to the track and operate on the flanges of the wheels.

66. The main effect of track gauge on the layout is on the length of turnouts of given radius.

67. With regard to the mathematical representation of Fig. 9, not only does the negative exponential curve possess mathematical convenience but also it provides a continuous function which is intuitively more acceptable.

68. The policy to be adopted regarding wagon-load traffic has varied from time to time and from place to place. Where private sidings exist the modern freight wagon provides a convenient and economical way for a manufacturer to receive raw materials. Despatch of finished products by this means is not always possible because the customer may not be connected by rail and some form of container or pick-a-back vehicle must be used.

69. The Paper was mainly concerned with North American conditions. Most manufacturing cities in Canada and the USA are provided with tracks (often in a deplorable state of repair) which go along and across public roads to serve factories which are remote from the main line of railway. Usually a locomotive makes a daily round of these factories collecting an assortment of wagons which have to be marshalled into trains at a central marshalling yard. In many cities these yards are too small to justify automation by conventional methods but a cheaper alternative could be applicable.

Reference

5. BRITISH RAILWAYS BOARD. *The reshaping of British Railways*. HMSO, London, 1963.