

# **UNCTAD**

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**MONOGRAPH No. 1**

**CHANGING FROM DAYWORK PLUS  
OVERTIME TO TWO-SHIFT WORKING**



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UNCTAD Monographs on Port Management

A series of monographs prepared for UNCTAD in collaboration  
with the International Association of Ports and Harbors (IAPH)

Monograph No. 1

CHANGING FROM DAYWORK PLUS OVERTIME  
TO TWO-SHIFT WORKING

by

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Other monographs in this series:

- No. 2 Planning land use in port areas: getting the most out of port infrastructure
- No. 3 Steps to effective equipment maintenance

The views expressed in this monograph are those of the author and not necessarily those of the UNCTAD secretariat.

## INTRODUCTION TO THE SERIES

In the ports of industrialized countries, operating systems and personnel development are based on skills acquired through experience, on emulation of other industries and on the innovation which is easily undertaken in advanced industrial environments. These means are generally lacking in developing countries and port improvements occur only after much deliberation and often through a process of trial and error. Some means is required by which ports in developing countries can acquire skills that are taken for granted in countries with a long industrial history, or can learn from the experience of others of new developments and how to meet them.

Formal training is one aspect of this, and UNCTAD has devoted considerable effort to developing and conducting port training courses and seminars for senior management and to preparing training materials to enable middle-management courses to be conducted by local instructors. It was felt that an additional contribution would be the availability of clearly written technical papers devoted to common problems in the management and operation of ports. The sort of text that will capture an audience in the ports of developing countries has to be directed at that very audience, and very few such texts exist today.

Following the endorsement of this proposal by the UNCTAD Committee on Shipping in its resolution 35(IX), the UNCTAD secretariat decided to seek the collaboration of the International Association of Ports and Harbors, a non-governmental organization having consultative status with UNCTAD, with a view to producing such technical papers. This series of UNCTAD Monographs on Port Management represents the results of this collaboration. It is hoped that the dissemination of the materials contained in these monographs will contribute to the development of the management skills on which the efficiency of ports in developing countries largely depends.

Adib AL-JADIR  
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FOREWARD

When UNCTAD first decided to seek the co-operation of the International Association of Ports and Harbors in producing monographs on port management, the idea was enthusiastically welcomed as a further step forward in the provision of information to managements of ports in developing countries. The preparation of monographs through the IAPH Committee on International Port Development has drawn on the resources of IAPH member ports of industrialized countries and on the willingness of ports in developed countries to record for the benefit of others the experience and lessons learnt in reaching current levels of port technology and management. In addition, valuable assistance has been given by senior management in ports of developing countries in assessing the value of the monographs at the drafting stage.

I am confident that the UNCTAD monograph series will be of value to managements of ports in developing countries in providing indicators towards decision-making for improvements, technological advance and optimum use of existing resources.

The International Association of Ports and Harbors looks forward to continued co-operation with UNCTAD in the preparation of many more papers in the monograph series and expresses the hope that the series will fill a gap in the information currently available to port managements.

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## I. PREAMBLE

1. In 1981 the Port of Hull (United Kingdom) decided to introduce two-shift working in an area of the port previously operated on the basis of daywork plus overtime. This monograph describes the reasons for this change and chronicles the steps leading up to the introduction of the new working method.

2. Changing any long-established pattern of work requires careful planning and implementation if the desired objectives are to be achieved. This paper offers guidance, based on the experience of the Port of Hull, to other ports which may be envisaging a similar change.

## II. THE PORT OF HULL - BACKGROUND INFORMATION

### A. Facilities

3. The Port of Hull is a major port situated on the River Humber approximately half-way along the east coast of the United Kingdom. It is one of the oldest established ports in the country and ranks among the top six United Kingdom ports. It is a large port complex with some seven miles of river frontage and the various docks within the port comprise the complete range of facilities necessary to handle the wide band of trades which go to make up the traffic pattern for the port. These in-dock facilities include: a purpose-built container terminal; 11 RO/RO berths; a large number of modern transit sheds (served by quayside cranes of varying capacity ranging from 6 to 40 tons); floating heavy lift cranes; modern dry-bulk loading terminal; suction elevators; a large fleet of mechanical handling equipment for moving break-bulk general cargoes and for containers; and specialized equipment for particular trades. On the river frontage there are jetty terminals for liquid-bulk cargoes.

### B. Trades - traffic pattern

4. In common with other European ports, Hull has undergone a continuing change in recent years, both in cargo handling methods and in trading patterns. Today, there are a large number of regular RO/RO and LO/LO services to the near Continent (including passenger ferries), container/unit-load services to Scandinavia, the Baltic and the USSR, as well as a great number of regular deep-sea liner services carrying conventional/unit-load cargoes (mainly exports from the United Kingdom). Despite the ever increasing emphasis on rapid cargo-handling methods (containers, RO/RO, unit loads, etc.), some 25 per cent of the Port's tonnage is still handled by conventional means on and off deep-sea vessels. The latter therefore remains a very important part of the Port's traffic from the point of view of revenue and operational activity.

### C. Working patterns

5. Prior to the innovation described in this paper, the work patterns in the Port were based on daywork (08.00 - 16.30 hours) plus overtime (2 hours available each weekday, half-day Saturdays and full day Sundays as required by each vessel). The only exceptions were the common user container terminal and a "private" passenger/cargo ferry terminal complex, both of which operated on a two-shift basis, i.e. 07.00 - 14.00 : 14.00 - 21.00 daily. In terms of human resources approximately 15 per cent of the labour force were engaged on shift work, albeit on the container and passenger ferry terminals only, and only half of that 15 per cent were employed on the common user berths operated by the

Port Authority. Thus about 90 per cent of the labour force controlled by the Port Authority was employed on a daywork plus overtime basis. Even allowing for "terminal" \*/ mannings for some RO/RO berths and certain specialized labour allocations, well over 75 per cent of the work force was allocated to work on this basis day by day.

D. Conventional traffic

6. Competition between ports in the United Kingdom is intense and this is particularly so in the field of conventional cargoes. Prime factors contributing to this situation are:

(a) Over-capacity of conventional berths/ports in the United Kingdom and Northern Europe as a whole;

(b) The accelerating move away from conventional break-bulk cargo handling towards palletized/unit loads, making it easier for less experienced labour forces to compete with long established sophisticated ports, and leading also to a diminishing conventional cargo market.

(c) A below-average productivity rate per day in the Port of Hull by comparison with competing ports (particularly on the east coast of the United Kingdom and North Continent).

Of the above, the first two factors could be said to be beyond the control or influence of the port management: they arise out of the trading environment. The third element, however, is very much the business and responsibility of the port itself and in particular of the port management.

III. OBJECTIVES

7. As with any innovation, in considering the introduction of a change in working systems it is important to set objectives at the outset. But it is worth remembering that objectives will, of necessity, vary from time to time and from place to place. In the Port of Hull, in order to improve (or at least retain) its share of the conventional cargo market the Port Authority was determined to take action in the one sphere of influence open to it: namely to improve the port's performance. The Authority's special objectives therefore were:

(a) To improve productivity per day, and hence ship turnaround time, by at least 70/80 per cent. A marginal improvement is likely to have little effect on the market, in that it takes a long time for the message to reach the ears of customers, and in any case such improvements are often short-lived as old habits tend to creep back in all too easily. The improvement in productivity has to be dramatic if it is to impress the market.

(b) To widen the range of options open to existing and potential customers; i.e. to tailor the port's service to the need of each individual trade.

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\*/ "terminal" mannings comprise labour allocated for particular activities on a permanent (or semi-permanent) basis.



(c) To provide a smoother transition for those vessels working both break-bulk on conventional berths and requiring specialized container-handling facilities (already working on a two-shift system, as mentioned in paragraph 5 above).

#### IV. OPTIONS

8. It is relatively simple to identify a short-coming (such as productivity in the case of Hull) but how does one go about rectifying the situation?

9. Taking the example of productivity, one can:

(a) Extend the hours of work to handle more tonnage per day.

Note: Although overtime working by the same group of men beyond their normal working hours will achieve this to some extent, one must bear in mind:

(i) that there is a limit to the continuous number of hours any one man can work safely and effectively; and

(ii) that customers are already used to overtime working and therefore daywork plus overtime has become the norm.

(b) Handle more tons per hour.

(c) Extend the hours of work (significantly) and handle more tons per hour.

10. It is by no means axiomatic that option (iii) is the best, although it may appear to be so at first sight. For example, if the cost in both wages and allocation of resources exceeds the capacity of the trade to pay for it and of the port to provide for it without seriously impairing other activities, then this option is just not viable.

#### V. RESTRICTING FACTORS

11. In assessing the means of achieving the objectives best suited to the particular situation at the Port of Hull it was necessary to look at these options in the light of the following factors:

(a) High average age of the Port's labour force (nearly 50 years).

(b) Dock workers in Hull (and in most large ports in the United Kingdom) are paid a fixed rate per day. This system had been introduced some years before, at the same time as all dock workers first became permanent regular employees. It replaced a casual employment system linked to piecework (i.e. the more tons handled, the higher the pay) and was considered by the dock workers to be a "hard won" improvement of their terms and conditions of employment. Even though now permanently employed, they would resist any return to a piecework system or at least one that could be afforded by the employers.

(c) A large part of the Port's conventional work was centred on deep-sea liner traffic where the need is to reduce days in port rather than hours per day. The difference in emphasis may be slight but it is nevertheless measureable.

(d) Cargo-handling costs per ton could stand only as much increase as would still leave sufficient room for a distinct improvement to the shipowner in his overall port costings; in other words, any extra cargo-handling costs must be more than offset by savings on ship time in ports.

(e) Hull had gained a reputation over the years as a port producing good damage-free stowages (particularly important on break-bulk general cargo vessels). The Port Authority had no wish to sacrifice this extremely valuable ingredient in its marketing package; it could not afford to substitute quantity for quality.

(f) Whatever means the Authority eventually decided to introduce, the change had to be made quickly. It could not afford the luxury of a long lead-in time. The change had to take effect in a matter of weeks from decision day rather than months.

12. Balancing all the above factors led to the conclusion that the most effective means of achieving the stated objectives would be to introduce some form of two-shift working in order to extend greatly the number of hours worked per day. Incidentally, the Port management also felt that the secondary objective of handling more tons per hour might also be achieved simply as a result of introducing a change into a long-established pattern of work, although this could not be predicted with any great certainty.

## VI. PREPARATION

13. Laying the groundwork for change is as important as the change itself. It is one thing to reach a decision that a certain course of action is necessary; it is quite another to achieve the change in prescribed time. This is particularly the case for port managers, who provide a service to so many differing elements and employ a wide variety of specialized and non-specialized labour. Port managers are never wholly masters in their own house; if the shipowner, shipper, receiver and so on do not like what the port manager is doing they simply take their business elsewhere, or demand better terms. It is not the same as in a manufacturing industry.

14. A change in working patterns in a port therefore greatly affects not only those who work in the port (which in itself is a major factor) but also those external influences which come together in a port area to make it a going concern. A port is the meeting place of, among others, shipowners, agents, shippers, receivers, customs officials, hauliers, railway companies, trade organisations/associations, as well as port management, trade unions and the labour force itself.

15. As a first step in the preparatory work at the Port of Hull a series of meetings were held at which representatives of all the various interested parties were brought together, with the aim of reaching a common understanding on what was needed for solving the Port's particular problem. It is not suggested that meetings bring all the various port elements together simultaneously are the only way of achieving a common purpose; indeed it would be obvious to many that such an unwieldy gathering cannot produce any kind of real conclusion. However, it is easier to introduce change if the atmosphere in the port is conducive to change. So it was that, notwithstanding the widely different views held on many aspects of the Port's operations by those attending the meetings, a consensus was reached identifying poor productivity as the major problem. This in itself could be considered a worthwhile result. The management's assessment that some form of two-shift working was necessary was shared by most (but not all) of the various parties. The next requirement was a detailed proposal to put before the trade on the one hand and the trade unions on the other. But in the meantime there was a good climate to work in.

## VII. SHIFT WORK/DAYWORK

16. It would be appropriate at this stage to define more precisely the difference between daywork plus overtime and shift work on a semi-permanent basis.

### (i) Daywork

In this system dock workers of various categories (cranedrivers, fork lift truck drivers, deckmen, riggers, foremen, tallymen, clerical superintendents, labourers, lashers, etc.) are required to report to a central point - say on a dock-by-dock basis - for daily allocation to vessels. They would not report for re-allocation until the vessel/job to which they had previously been allocated had been completed. Overtime is worked at the demand of the customer (be it shipowner, shipper, receiver) either on an extended weekday working and/or weekend working (as described in paragraph 5 above).

(ii) Shift work (two shifts) - in the Port of Hull: 07.00 to 14.00; 14.00 to 21.00 hours. In this system, rather than being allocated on a daily basis, the labour force would be detailed for shift work for a minimum period of time (say at least one week), quite independent from the specific demand of any particular day. In other words, the labour force would report for duty at 07.00 hours or 14.00 hours continuously throughout the shift period. Obviously the actual hours of work can be tailored to suit any port's own needs or traditions, but the important point is that shift work effectively allocates men in advance of demand, whereas day work does not.

17. To keep a continuous service running men would be required either (a) to remain in the same shift for however long shift work is required, or (b) to rotate from one shift to another and to other job allocations not involving shift work in a regular pre-determined pattern. In practical terms to the port operator or stevedore, semi-permanent shift work entailing pre-allocation invariably means enhanced payments to the labour force as well. These payments (in addition to normal daywork payments) are paid in recognition of abnormal working hours (and also, to some extent, to make good the abolition of overtime, at least during weekdays). On top of this, overtime on the daywork system is borne by the shipowner/shipper "on demand", whereas shift work virtually eliminates overtime and thus removes the demand nature of the shipowners' costs. The port operator/stevedore therefore takes a greater share of the risk of continuous employment for his labour force than on the daywork system.

## VIII.TWO-SHIFT WORKING - FULL OR PART

18. In measuring productivity levels the major factor is of course the rate at which ships are loaded (or discharged), while in assessing the potential throughput for any given berth/port area what needs to be considered as well as ship working speed is the rate at which cargo is accepted into or delivered away from that port area.

19. When working ships direct to/from land transport, the stevedore is dependent upon an optimum supply of vehicles or rail wagons, often outside his own control. The stevedore has much greater control if he is working to or from his own transit sheds, but in either case the overall throughput of a berth is governed to some extent by:

(a) Dwell time of cargo in the port area, either prior to loading or awaiting delivery;

(b) Speed at which land transport (or, for example, river lighters) can move tonnage to and from the berth.

20. However, while recognizing these "constraints", the fact remains that it is very nearly the case that if one doubles the hours of work, one also doubles the throughput, or potentially so. Therefore to introduce two-shift work (thus virtually doubling the hours of port operations) throughput the port can go a long way towards doubling the overall capacity of the port (if there are no other restricting factors, e.g. supply of mechanical plant, etc.).

21. Bearing in mind the higher labour costs and predetermined nature of shift work compared to daywork, plainly one would only adopt full two-shift work (i.e. throughout the port) if there was a real prospect of doubling the total throughput. There would be no point in entering into higher fixed-cost agreements with the labour force if the traffic could not bear it.

22. In addition to these general underlying conditions, there would almost certainly be specific governing factors which would limit the degree to which two-shift working could be introduced without investing in an increased labour force or further plant and machinery, such as:

(a) The ratio of specialist to non-specialist labour is critical. This is particularly relevant in a port which is increasing the amount of mechanically handled tonnage compared to man-handled tonnage. The labour force is also likely to contain an imbalance (in the case of Hull, too much non-specialized labour compared to specialized labour).

(b) Each shift manning level would have to contain elements of all specialized skills required (they could not be left to demand allocation when the vessel arrived for example). There would have to be sufficient specialists (cranedrivers, foremen, clerks, tallymen, riggers, deckmen, fork lift truck drivers) on each shift to cover predicted demand in advance.

(c) What is true in paragraph (b) above for operational staff would also apply to maintenance staff. In effect, each shift would become a self-contained labour force backed up by its own maintenance crew, for all but long-term repairs.

(d) The servicing of mechanical equipment in a shift-work area presents different problems to those found in a daywork area. For example, most fork lift trucks used aboard ships are battery-powered, requiring regular re-charging of batteries. On daywork the standard procedure is to re-charge at night, allowing an 8 - 10 hour working period for the following day. In a shift-work system one would need a continuous supply of these trucks for sixteen hours a day. This means having a rotating supply of trucks re-charged as near the berth as possible to cut down transport time, and requires careful monitoring of the use of this particular resource.

23. Evaluation of the foregoing considerations may well lead a port manager to the conclusion that a partial two-shift operation is all that he either needs or can afford, that is to say the establishment of an area within the port entirely devoted to shift work but retaining daywork areas as hitherto. It was this particular formula that was eventually adopted for the Port of Hull.

24. It may well be possible for a system to be introduced which allows shift work and daywork to operate simultaneously on any one vessel, or indeed for any vessel to change its working pattern as it desires from day to day in any one port visit. However, this was not the case at Hull. Nevertheless, the following points (outlined in section I below), arising from the concept of a shift area contained within a port and operating in conjunction with a daywork area, will be valuable as a measuring device for those who are in a comparable position.

## IX. SHIFT WORK - AREA BASIS

25. By establishing an area of the port in which only shifts will be worked, and thus offering customers the choice of working day work as hitherto or shifts, there are a number of factors to be considered:

(a) In many ports (as in Hull) berths for vessels tend to be allocated on the basis of the nature of the trade, which in turn determines the particular facilities necessary to work the ship. These facilities could comprise for example transit sheds, cranaage of specific capacity, open storage areas, rail served or not, etc. Clearly, many different factors are taken into consideration when allocating berths, to which should now be added another overriding factor, namely the method of working arrangement required. A change of emphasis will have to be brought about from a trade orientated berth allocation to a working method basis for allocation.

(b) A greater degree of planning will therefore be required, since the berth situated in a shift area will be called upon to provide all the necessary facilities for all trades which demand to use the system. This compares with the daywork system where a berth/shed tends to gear itself up for one or a group of trades only.

(c) The area chosen for shift work must ideally include the greatest possible range of port facilities that can be incorporated under one area of control. In Hull, for example, the area selected comprises seven berths (deep-sea), three large transit sheds, wide berth aprons, and large open storage area, ro/ro berth, and full range of cranaage and mechanical handling equipment manned by 30 per cent of the port's total labour force. The area itself is close to the container berth (two of the seven berths are literally adjacent) and thus no in-dock towage/pilotage charges are incurred when moving vessels from the container berth to the conventional berths and vice versa.

(d) The port management structure may also need to be reorganized in order to assign specific managers/supervisors to fixed port areas. In the case of Hull for example, prior to the introduction of shift work, managers and foremen tended to look after trades rather than physical port areas. However, if a shift-work area is established then it is essential that management and supervisors have clearly defined responsibilities; the system needs to be based upon responsibility for an area, and not for trades (as these may be handled either in or out of the shift working area). In Hull a complete reorganization of the management structure was carried out prior to bringing in shift work, which greatly facilitated the eventual operation.

(e) Although in comparative terms a shift-work area may represent a relatively small proportion of the port's total capability, it must be remembered that there will be almost a doubling of throughput in that area. In effect then, the shift area will attract a proportionately greater percentage of that port's tonnage (certainly this will be so if the innovation is going to prove successful), leading to a move in the "centre of gravity" of the port's operations.

(f) An essential feature of two-shift working is the (effective) pre-allocation of the labour force, i.e. a specific number of men are detailed for shift work for an agreed period of time: the area will be manned by a "self-contained" labour force. This being so, there is no need for shift men

to report to a central port control (as possibly hitherto), and it will be necessary to establish reporting points of control within the shift-working area. One does not want to lose time at the start and end of shifts taken up by men travelling to and from their area. They know their area of work in advance. The method of shift allocation is dealt with below.

## X. SHIFT-WORK AGREEMENTS

### A. General comments

26. The introduction of full or partial shift work will necessarily be based upon some form of agreement with the trade unions (or the labour force itself), the essential points of which must also be well known to the customers - e.g. any restrictions that may be placed on the flexibility of movement of men from one ship to another within a shift is of vital importance to the trade itself.

27. In drawing up agreements, due regard should be given to the following points:

(a) In introducing two-shift working, the opportunity should be taken to adjust manning scales to realistic levels for modern cargo handling requirements (for example, there may be long established gang sizes which are no longer appropriate for current trading methods). It should be borne in mind that any over-manning there may be will be doubled on a two-shift system.

(b) The opportunity for dock workers to earn overtime during weekdays will, by definition, be eliminated. For this reason, and also to compensate for working unsociable hours, a corresponding increase in the basic wage rate will have to be negotiated. At Hull a shift work premium of basic rate plus 11 per cent was initially introduced (subsequently increased to basic plus 15 per cent to provide improved incentive).

(c) Flexibility within the area should be the keynote - movement from hatch to hatch and from ship to ship within a shift is absolutely vital. Unless the total labour force is increased pro rata, on each shift there will be less men available than hitherto as the labour force will have been spread over two separate shifts. Therefore, lost working time is very much more difficult to recover at a later stage in the operation.

(d) Care should be taken to avoid creating in-built slack periods in the two-shift system. For example, if road hauliers cannot match their working hours to the extended port working hours there is no point in manning for forwarding and receiving during "dead" periods. One may find that this activity would be better worked on daywork or one shift per day only.

(e) Certain jobs do not need to be perpetuated through two shifts and can quite easily be done on one shift only per day. An example of this type of job would be daily measurement of cargo in sheds or quays etc.

(f) Welding a "team" together will invite comparison between one group of port workers and another (even if this did not exist before!) which will lead to some adjustment of whatever historical agreements the management may have had with individual trade unions.

(g) Shift-work manning should be self-contained and completely independent of outside resources.

(h) By extending hours of work at both ends of the working day one must not overlook the means of getting the labour force to and from their places of work. The manager/supervisor may find it necessary to arrange transport in the town/city area linked to his own working hours to ensure that his labour force arrives and departs on time. One thing is certain: he cannot afford late starts and early finishes.

B. Area shift agreement

28. The salient features of the arrangement which is based upon the establishment of a shift area (surrounded by a sea of daywork, so to speak) are:

(a) Unless one creates two entirely separate labour forces of shift workers and day workers (this may prove an acceptable solution in some countries but is virtually denied to management in the United Kingdom) one will need to have some method of moving men in and out of shift working.

(b) The method of allocation adopted in Hull was to detail a specific number of men per shift (comprising an agreed ratio of specialists to non-specialists); each group of men are allocated to shift working for a period of two weeks and change from the a.m. to the p.m. shift each weekend. Men allocated to shifts are taken from the general pool of labour on a rostered basis. A typical cycle of allocation would be:

Week 1	a.m. shift
Week 2	p.m. shift
Week 3	daywork
Week 4	daywork
Week 5	Annual leave
Week 6	a.m. shift, etc.

Note: Owing to the imbalance at the Port of Hull between specialists and non-specialists, certain key workers were of necessity worked over a shorter time cycle than in the example given above.

Allocation to shifts is predictable and, in the Port of Hull, by 11.00 hours each Friday all men for the following two weeks of shift work have been allocated to their respective shifts for the ensuing week.

(c) Allocation to ship/shore work within the shift work area is easily done at the shift control point, bearing in mind that the men are already in their areas of work.

Note: It may be found advisable to institute a system whereby on the first shift of each shift period men report for duty 15-30 minutes in advance of their start time.

## XI. TRIAL PERIOD

29. It is as well to check on what has been achieved so far. We have:

(a) identified the problem (in Hull's case low productivity);

(b) gained general acceptance by all parties (i.e. both port users and dock workers) that the problem did exist and that it had to be tackled;

(c) concluded that the best way to improve productivity would be by introducing some form of two-shift working into what up until now has been a full daywork system;

(d) established that there was neither the justification nor resources (physical, financial, human or mechanical) to warrant a complete changeover from total daywork to total shift work;

(e) concluded that the optimum arrangement therefore, i.e. the system most appropriate to meet the Port of Hull's own particular objectives, would be to introduce two-shift working into part of the port only, using 15 per cent of the labour force on each shift;

(f) concluded that this shift work area must be under one management responsibility and offer the greatest range of facilities in the form of berths, transit sheds, cranes, equipment, general layout and back-up land.

30. Since there is no substitute for actual experience, shift working should be introduced initially for a trial period. A three month trial was conducted in the Port of Hull. This period allows sufficient time for the greater part of the work force to rotate through the shift work system and also for sufficient experience to be gained of the new system by the trade and the port operators themselves.

## XII. CHARGING STRUCTURE - SHIFT WORKING

31. Break-bulk port handling rates are traditionally based upon a rate per ton (either measurement or deadweight) and of course each port has its own established "tariff" or agreements with its own customers. However, unless the port has worked shifts beforehand (and even that may not be relevant if they have been worked on a casual basis) it will need to devise a new structure of charges.

32. On daywork the shipowner will expect to move X number of tons per day plus (say)  $\frac{Y}{2}$  in overtime (for which he pays extra). On shift work he will expect to move something like 2X tons per day; but will he expect to pay double the amount he normally pays for day work? The answer, bearing in mind the motive for introducing shift working in the first place, is likely to be emphatically no! He will rightly argue that port costs have not doubled.

33. Consequently, aware of what the market would bear, the Port of Hull introduced a shift work tariff based upon:

The daywork rate per ton (X) plus overtime (Y) plus a small percentage (Z) equating to the original daywork rate (X) plus 15/20 per cent.



The actual formula to be adopted in any given port is of course determined by the market environment of that port. In the Port of Hull the formula proved to have been pitched at about the right level (a) to meet the additional costs, and (b) to prove sufficiently attractive to the shipowner and to improve throughput.

### XIII. RESULTS

34. It will be recalled that in the Port of Hull an essential feature of the move from daywork to shift work was the speed with which it could be brought about. The sequence of steps outlined in this paper (i.e. decision, consultations, evaluation leading to detailed shift working plan and final implementation) involved an over-all time span of six weeks, from decision to commencement of shift working. However, having started on a new course, a port needs to ensure that (a) the course is correct, and (b) it is not diverted from it. Hence monitoring of progress is essential.

35. After the initial trial period of three months in the Port of Hull an analysis of the results of the experiment highlighted the following:

(a) Actual output per day increased by over 100 per cent compared to a daywork shift exclusive of overtime. In fact, the output in each of the two shifts equates to that achieved in a day work plus two-hour overtime period, thus doubling output per day. (Actual results described herein exceeded expectation as outlined in section XII.)

(b) The full potential of doubling throughput of a given berth was able to be realized at Hull because the constraining factors discussed above (cargo dwell time, speed of tonnage movement inland) had sufficient built-in slack to accommodate the improved ship working productivity without creating congestion. However, it should be stressed that the speed by which cargo is cleared away from the port (or the converse) must match the demands of ship working if the full shift-working potential is to be realized.

(c) Savings in ship time to the shipowner are progressively greater in proportion to the amount of cargo handled: in-port time is virtually halved and the greater the tonnage the greater the saving in time.

(d) In a port at which arrivals and sailings are restricted to high-water periods, small vessels moving relatively small quantities of cargo are more readily turned round between successive tides. For example, if high water falls at midday:

Shift-work time available before  
next high water = 9 hours (12.00 to 14.00 : 14.00 to 21.00).  
Daywork time = 5 hours (13.00 to 16.00 + overtime).

Therefore a vessel with (say) an eight-hour cargo working programme could complete and clear the port by the time of the next high-water period, thus saving the 12 hours port time that would have been incurred had the vessel worked daywork. In the latter case the vessel would have been compelled to complete its programme of work the following morning and sail on the next day tide.

(e) A reduced number of cranes were used to handle a much higher tonnage over greatly extended working hours, putting infinitely more stress on maintenance and incidentally reducing the time span between succeeding crane inspections. Hence the need for on-the-spot maintenance is heavily underlined.

(f) Shipowners' initial caution in opting to use the new arrangements has been replaced by an increasing faith in the system, which has proved itself capable of spectacular performance.

(g) What is good for the shipowner is not, however, necessarily good for every shipper receiver. In a small number of cases, especially those where vessels work direct to transport, shippers and receivers may be reluctant to provide the additional transport required per day. However, this must be seen as a short-term consideration since in the longer term improved productivity in the port is bound to be reflected in the port's reputation and could lead to a beneficial effect on freight rates applicable to the port and the popularity of the port among a wider span of cost customers.

36. In summary, the experiment at the Port of Hull has proved itself by achieving the objectives set at the outset: so much so that at the end of the initial trial period, shift working was extended both in time and in terms of the area involved, and it is still operating today. With the right motivation and an atmosphere conducive to change, and if the sequence of events is followed and due regard is paid to the many factors which arise from this innovation, there should be no reason why it will not work equally well for other ports.