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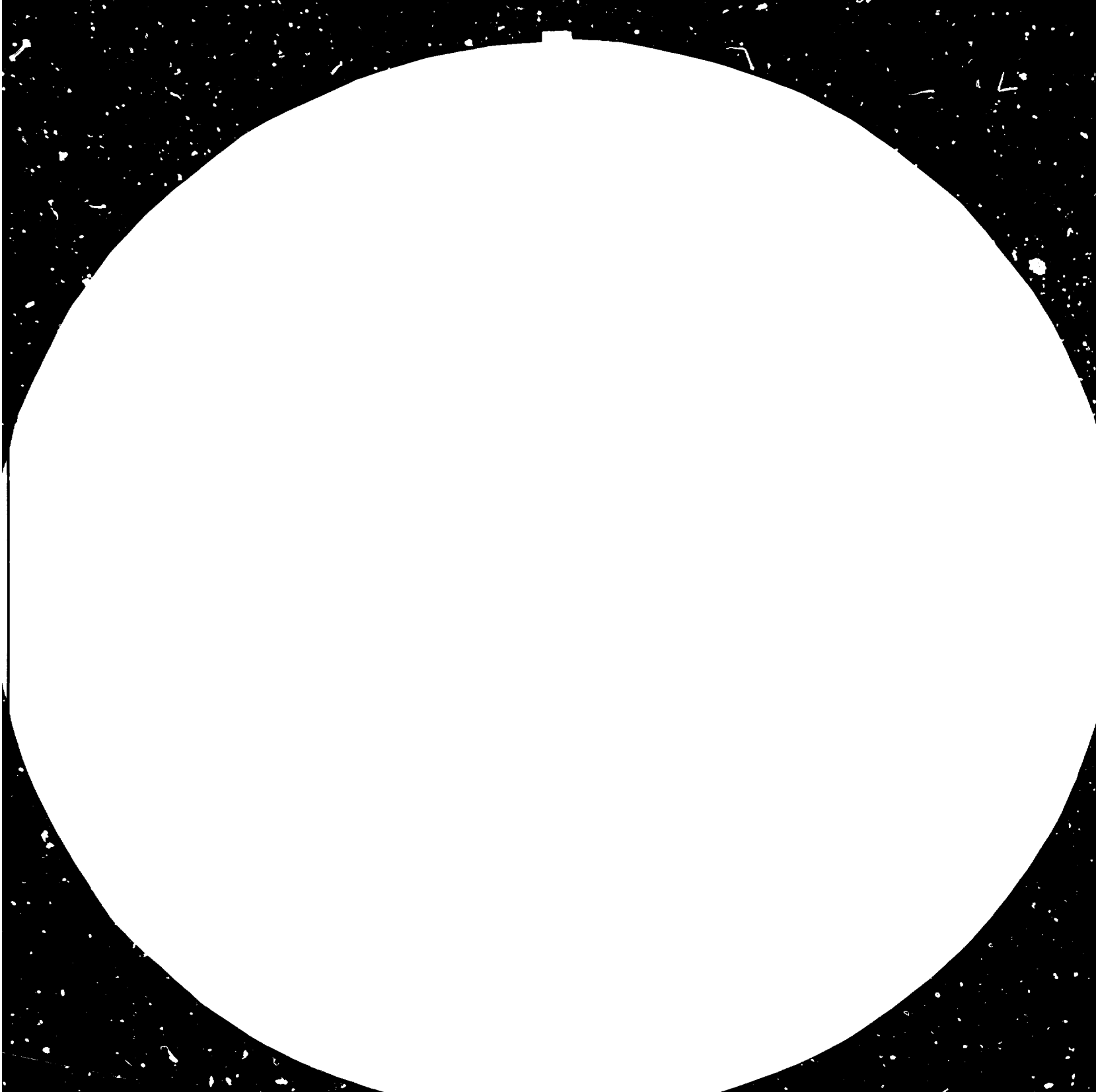
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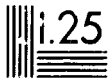
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Expert Group Meeting on Shipbuilding
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and the Pacific Countries

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PRODUCTIVITY IMPROVEMENT IN SHIPBUILDING*

prepared by

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1: INTRODUCTION

In assessing the world shipbuilding scene today, and in particular shipbuilding in Asia and the Pacific, the key element is a comparison of productivity. The productivity gap between the most productive of the world's shipbuilders and the rest, is where the thrust of improvement must be concentrated, and we would like to outline some of the factors that influence the size and shape of this gap.

We would also like to raise another issue. There is a view that leadership of the race for shipbuilding excellence is continually changing from one developing nation to another. Shipbuilding applies a portfolio of technology, developed by many nations, to the developing nations' resources and provides an ideal catalyst for the broad development of industry in general. As the industry expands, so will progress be made with the development of new technology, currently bought by, for example, Korea, from the so called advanced countries.

2: THE PRODUCTIVITY GAP

2.1 Comparisons

There are of course, a number of elements that make up the total ship costs, but the element most under the control of shipyard management is that of labour.

The size of the labour cost is a function of both labour rates and productivity. For example, for the same type and size of ship, Japanese yards will use approximately only one third of the hours, and take half the time to construct that vessel, compared to many other yards in the United States, Europe and Asia.

The key issue here is that the Japanese and those other countries in the lead, are constantly working to keep ahead and widen the gap.

2.2 Curve of Constant Cost per Tonne

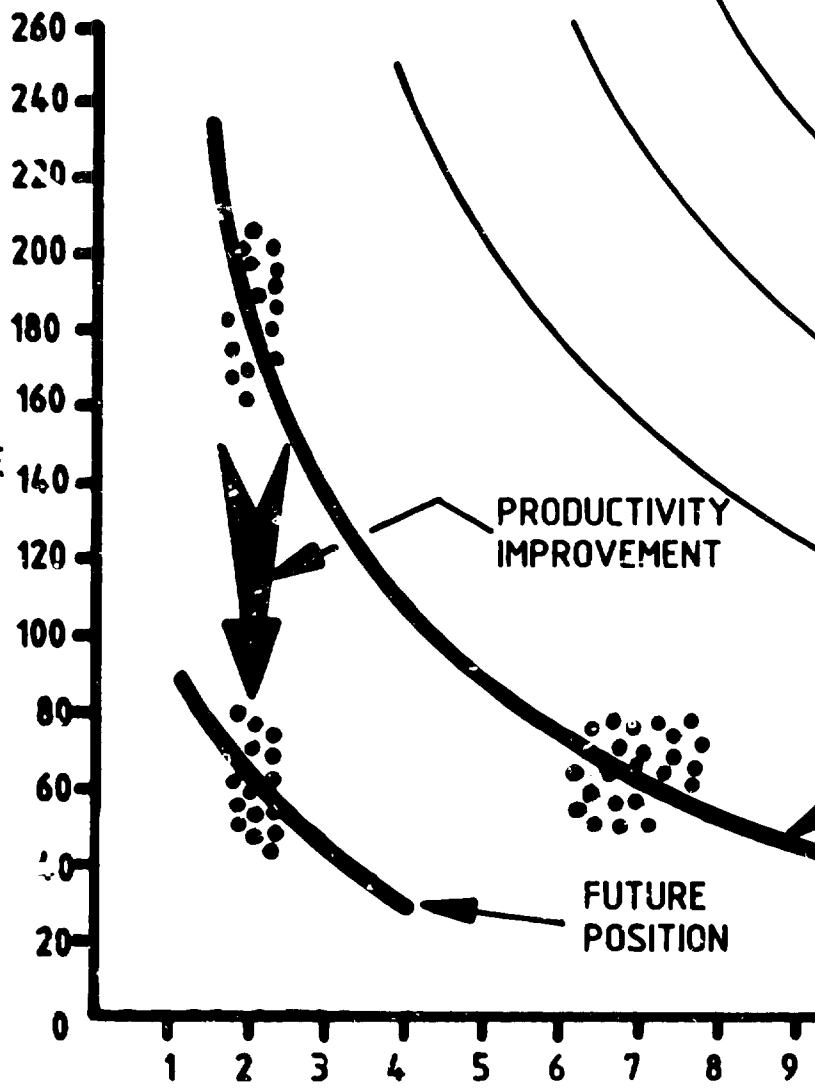
It is possible to draw curves of constant cost per tonne for all shipyards in all nations. (Figure 2.2).

If the curve of the current leaders is highlighted, countries on the line include:-

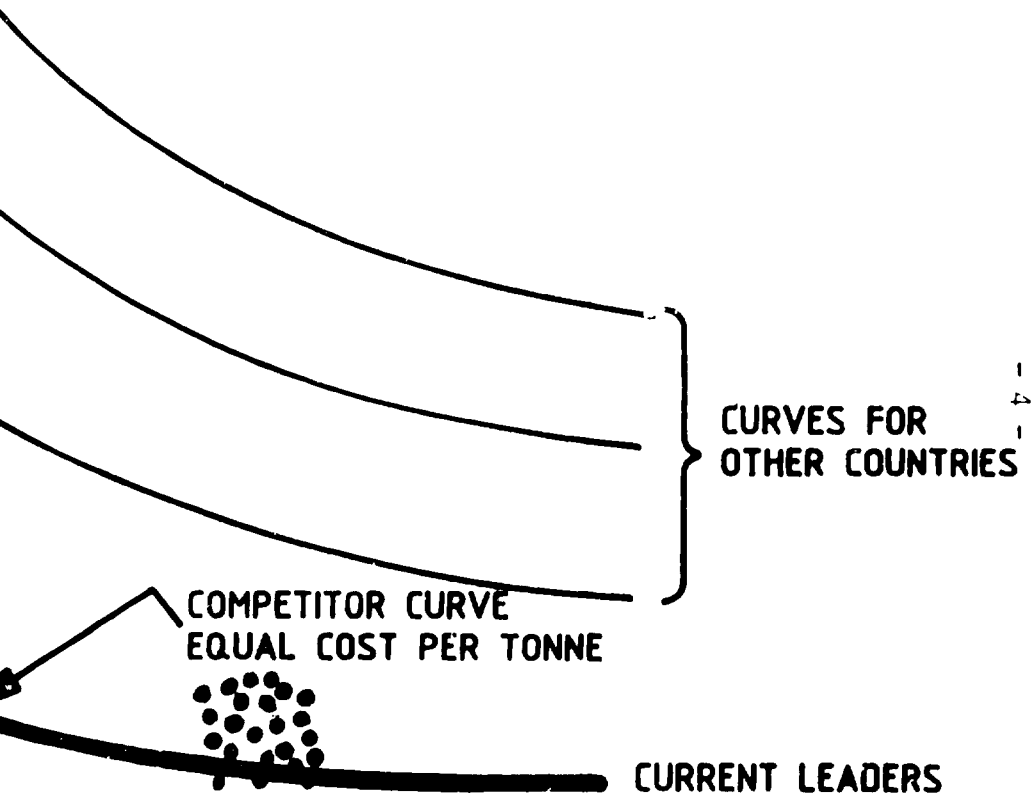
- Korea, with relatively low wage rates and (currently) poor productivity.
- Japan, with wage rates equivalent approximately to those in the UK and good productivity.
- Sweden and Denmark with some of the highest wage rates in the world, but, in some cases, the best productivity record.

Most other countries lie above the curve of best performance, thus illustrating the productivity gap. It is clear, that since wage rates are unlikely to fall, the only way of moving towards, or indeed below, the curve of best performance, is to improve productivity.

↑
PRODUCTIVITY
IN HOURS/TONNE



CURVES OF EQUAL COST



3: FACTORS THAT MIGHT IMPROVE PRODUCTIVITY

3.1 Management Action

There are a number of areas that management might consider for attention in order to improve productivity. In practice, action on a combination of fronts would be taken. Which are these areas? Consider:-

- Facilities
- Systems
- Unions, Trade Demarcation

3.2 Facilities

The question to be asked is, can capital investment lead to improved productivity? To help answer this question, it may be of assistance to consider what a number of countries are doing around the world.

In the Far East, the Japanese in some yards and the Koreans have made huge investments in facilities and shipbuilding hardware. As we know, the Japanese are among the most efficient in the world and the Korean Shipbuilders, whilst not at the top of the world league in terms of productivity, have learnt to use their new facilities well. To do this, they have purchased assistance, where necessary, from the international shipbuilding community.

In Scandinavia, there has been heavy investment in hardware and facilities and many of the yards in this area have good productivity and are extremely efficient.

In the UK however, there has been significant expenditure on modern facilities in some yards and these yards are among the most productive in the UK. But, they remain well behind the best in the world.

3.3 Conclusions

To summarise therefore, it is clear that good facilities are definitely an element in the thrust towards high productivity. However, it is not possible to become efficient by capital investment alone and we must look further to discover what else is necessary.

4: SYSTEMS

4.1 Questions

The questions to be asked here are: can the implementation of sophisticated computer systems lead to productivity improvements? Or, more basically: what sort of systems will lead to a better and more competitive level of productivity?

Once again, examination of what a number of countries have done may help to answer the questions.

4.2 Typical Approaches

In Japan, investment in highly sophisticated computer based systems has not been as great as in some other countries. However, this is not to say that systems have been ignored: on the contrary, a considerable effort has been expended to ensure that simple, often manually based systems are efficient, understood and appreciated by the total workforce and well used.

It is probably fair to say, that certain yards in Europe and in the United States have a lead over the Japanese in the implementation of CAD/CAM systems. The Japanese initially concentrated their computerisation efforts in the area of material control systems.

Some Korean yards have however, obtained highly sophisticated computer based manufacturing control systems, but, in spite of this, are not yet at the top of the productivity league table.

In the UK, many yards have also made, and are continuing to make a substantial investment in the area of systems. Few of these yards figure near the top of the productivity league table.

4.3 Conclusions

As with facilities and capital equipment, investigation shows that implementation of systems will not necessarily lead to a breakthrough in productivity improvement, and we must look further to obtain the complete solution.

5: UNIONS, TRADE DEMARCATION

5.1 Attitudes

In many countries, both in the East and the West, it is believed by management that obstruction and lack of flexibility on the part of the workforce are major factors causing low productivity. These factors may be apparent either through a formal Trades Union machinery, or direct from the shop floor itself.

Some years ago, W E Deming, whose work on quality circles is well known, wrote: "Traditional managers believe that there would be no problems in production if only workers would do their jobs. Pleasant dreams - the workers are handicapped by the system".

In the Far East, the labour force is often not as regimented as a lot of people believe and in Japan there are demarcation restrictions.

In Scandinavia, the Unions are strong, but work with management to achieve high productivity. In the UK however, although flexibility agreements have been negotiated over the years, the labour has not always been organised to work effectively and flexibly.

5.2 Conclusions

Once again, it is reasonable to conclude that Trade Unions, workforce attitudes and trade demarcations do not, in themselves, provide insurmountable barriers to the improved productivity that we all seek.

6: KEY ASPECTS

6.1 The Questions

If, as has been suggested, investment in facilities and systems alone do not guarantee improved productivity, and if the attitudes of the workforce or trade demarcations are not an insoluble problem, what avenues are open to management? What is the key?

The key is the ability to organise work, such that both facility utilisation and labour utilisation are optimised.

6.2 Work Organisation

In order to achieve this organisation of work, three elements must be tackled:-

- Standardisation

Increased standardisation will make it possible to identify and set up workstations with limited product variety.

- Specialisation

With simplified production, increased specialisation of processes and equipment will lead to greater efficiency.

- Simplification

Simplification of interim products will lead to reduced work content and easier production.

6.3 Mass Production

The fundamental rule of mass production, as defined by K Yacota and T Kuriyama is: "The same personnel, working in the same work place, make repeated operations to produce large numbers of cheaper products".

It is possible to achieve a large degree of mass production in shipbuilding. The "large numbers of cheaper products" passing through a workstation will be sufficiently similar, through the use of standardisation and simplification, to enable specialised processes and equipment to be introduced and used.

6.4 Work Organisation Characteristics

Good work organisation is characterised by:-

- High utilisation of area
- Clearly identified workstations
- Clearly identified products
- Packaged materials
- Relevant technical information
- Simple but effective planning systems
- Appropriately trained workforce, of correct numbers
- Good housekeeping

6.5 Characteristics of Productive Yards

Finally, it is possible to define the characteristics that will be found in all highly productive yards, in addition to the pre-requisites of suitable equipment, systems and labour. These are:-

- Clearly Defined Objectives and Policy

These provide a consistent framework for all company activities.

- Short Build Cycles

Create the pressure for implementation of the standardisation, simplification and specialisation approach.

- Overlapping of Steel and Outfit Work

Enables reduced cycle times to be achieved. Further, they provide flexibility in manufacturing.

