Information Sheet No. 6a

STANDARD GENERIC CREW BUILD UP COMPARISONS

	STANDARD UK SQUAD		STANDARD CHINA SQUAD		STANDARD MIDDLE EAST SQUAD	
Discipline	NO OF MEN	%	NO OF MEN	%	NO OF MEN	%
PIPING & MECHANICAL						
Foremen	1	11%	3	12%	1	4%
Fabricator	2	22%	4	16%	2	8%
Pipe Fitter	4	44%	4	16%	4	16%
Pipe Welder	1	11%	2	8%	1	4%
Rigger	1	11%	2	8%	1	4%
Labourer			8	32%	8	32%
Crane Operator	Indirects		1	4%		
Mechanic	Indirects		1	4%		
TOTAL	9	100%	25	100%	17	100%
Against UK Standard				2.78		1.89

Productivity Assessment

INTRODUCTION

Production and Composite Rate

This is the golden key that unlocks the gate to the wealth of process estimating information that follows
Before one begins to think in terms of labour dollars for an estimate there are many things that must be considered, the most important of these being what we call productivity efficiency coupled with production elements. This is a must if the many man hour tables are to be correctly applied and these items must be considered for each individual project.
We have found, after much comparison of many projects, that productivity efficiency can be classified into five categories and that production elements can be grouped into six different listings or classifications. The six different listing of production elements are:-

1. GENERAL ECONOMY
2. PROJECT SUPERVISION
3. LABOUR RELATIONS
4. JOB CONDITIONS
5. EQUIPMENT
6. WEATHER

The five ranges of productivity efficiency percentages are:-

	Type	% Range
1	Very low	10 – 40
2	Low	41 – 60
3	Average	61 – 80
4	Very good	81 – 90
5	Excellent	91 - 100

After reading the above paragraph you might say that this is true but with a percentage productivity range so wide, how do I arrive at a definitive percentage? Should this be the case, let us now evaluate each of the six elements and give an example with each and see how simple it is to arrive at a productivity efficiency percentage.

GENERAL ECONOMY

This is simply the state of the nation or the area in which the project is to be developed. Things that should be looked at and evaluated under this category are:-

- Business trends and outlooks
- Construction volume
- The employment situation

Let us say that after giving due consideration to these items you find them very good or excellent. This sounds good but actually it means that your productivity range will be very low. This is due to the fact that business being excellent the type of supervision and craftsmen that you will have to draw from will be very poor. Because of this it will tend to create bad labour relations between your company and supervision, thus making very unfavourable job conditions. From this it would seem that the general economy of the nation or area sets off a chain reaction to the other five elements. This has been found to be true. On the other hand, let us say that we have evaluated this element and find the general economy to be fairly average. Here we find that the productivity efficiency tends to rise. This is due to the fact that under normal conditions there are enough good supervisors and craftsmen to go round, they are satisfied, thus creating good job conditions.

For our example, to show how the final productivity efficiency percentage can be arrived at, let us say that we are estimating a project in a given area and after consideration of this element, we find it to be of high average. Since it is of high average, but by no means excellent, we estimate our productivity percentage to be seventy-five (75) percent.

PROJECT SUPERVISION

What is the calibre of your supervision? What experience have they had? What can you afford to pay them? What have you to draw from? Things that should be looked at and evaluated under this element are:-

a) Experience
b) Supply
c) Pay

Like general economy, this too must be carefully analysed. If business is excellent, the chances are that you will have a poor lot to draw from. If business is normal, you will have a fair chance of obtaining good supervision. The contractor who tries to cut overheads by using cheap supervision usually winds up doing a very poor job. This usually results in a dissatisfied client, a loss of profit and loss of future work. However, the estimator has no control over this. It must be left to management. All the estimator can do is estimate his project accordingly.

To follow through with our example, after careful analysis of the three items listed under this element, we find that our supervision will be normal for this type of work and we arrive at an estimated productivity rate of seventy (70) percent.

LABOUR CONDITIONS

Have you a good labour relations man in your organisation? Are the crafts in the area experienced and satisfied? Are there adequate first class craftsmen in the area? Like project supervision things that should be analysed under this element are:-

a) Experience
b) Supply
c) Pay

The area where your project is to be constructed should be checked to see if the proper experienced craftsmen are available locally or will you have to rely on travellers to fill your needs. Can and will your organisation pay the prevailing wage rates?

For our example let us say that for a project in a given area we have found our labour relations to be fair but feel that they could be a little better. Since this is the case, we arrive at an efficiency rating of sixty-five (65) percent for this element.

JOB CONDITIONS

What is the scope of the work and just what is involved in the job? Is the schedule tight or do you have time to complete the project? What is the condition of the site? Is it high and dry and easy to drain or is it low and muddy and hard to drain? Will you be working around a live plant? Will there be tie-ins making it necessary to shut down various systems? What will be the relationship between production and construction staff? Will most of your operations be manual or mechanised? What kind of material procurement will you have? There are many items that could be considered here, dependent on the project, however, we feel that the most important of these items that should be analysed under this element are as follows:-

a) Scope of work
b) Site conditions
c) Material procurement

d) Manual and mechanised operations

By careful study and analysis of the plans and specifications coupled with a site visit you should be able to correctly estimate a productivity efficiency percentage for this item.

For our example, let us say that the project we are estimating is a complete new plant and that we have ample time to complete the project but the site location is low and muddy. Therefore, after evaluation we estimate a productivity rating of only sixty (60) percent.

EQUIPMENT

Do you have ample equipment to do the job? What kind of shape is it in? Will you have good maintenance and repair help? The main items to study under this element are:-

a) Usability
b) Condition
c) Maintenance and repair

This should be the simplest of all elements to analyse. Every estimator should know the type and kind of equipment his company has as well as what kind of mechanical shape it's in.

Let us assume for example, that our company equipment is in very good shape, that we have an ample supply to draw from and that we have average mechanics. Since this is the case we estimate a productivity percentage of seventy (70)

1. WEATHER

Check the past weather conditions for the area in which your project is to be located. During the months that you will be constructing what are the weather predictions based on these reports? Will there be much rain or snow? Will it be hot and sticky or cold and damp? The main items to check and analyse are as follows:-

a) Past weather reports
b) Rain and snow
c) Hot or cold

This is one of the worst of all elements to be considered. At best, all you have is a guess. However, by giving due consideration to the items as outlined under this element your guess will at least be based on past occurrences.

For our example, let us assume that the weather is about half good and half bad during the construction period of our project. We must assume then a productivity range of fifty (50) percent for this element.

We have now considered and analysed all six elements and in the examples for each individual element have arrived at a productivity percentage. Let us group these percentages together and arrive at a total percentage.

	Item	Productivity %
1	GENRAL ECONOMY	75
2	PRODUCTION SUPERVISION	70
3	LABOUR RELATIONS	65
4	JOB CONDITIONS	60
5	EQUIPMENT	70
6	WEATHER	50
	TOTAL	**390**

Since there are six (6) elements involved we must now divide the total percentage by the number of elements to arrive at an average percentage of productivity.

390 / 6 = 65 percent average productivity efficiency

At this point we must caution the estimator. This example has been included as a guide to show a method that maybe used to arrive at a productivity percentage. The preceding elements can and must be considered for each individual project. By so doing, coupled with proper man-hour tables, a good labour value estimate

can be properly executed for any place in the world regardless of its geographical location and whether it be today or twenty years from now.

Next we must consider the “All In” labour rate.

Lost Time Calculations

Lost Time Calculations - Table 1 of 2

LOST TIME CALC		MODULE YARD 1		MODULE YARD 2		SITE WORKING NORMAL		SITE WORKING SHUT DOWN	
Description		**Working Hours**	Mins / day	**Working Hours**	Mins / day	**Working Hours**	Mins / day	**Working Hours**	Mins / day
First thing	Clock on & walk to work face	0.17	10	0.17	10	0.17	10	0.17	10
First thing	Waiting for Permit	-		-		0.08	5	0.25	15
Mid morning	Tea break	0.25	15	0.25	15	0.25	15	0.25	15
Lunch	Clean up, clock off, clock on walk to work face	0.17	10	0.17	10	0.17	10	0.17	10
Last thing	Walk to cabin, clean up & clock out	0.17	10	0.17	10	0.17	10	0.17	10
Overall	Loss of Prod for extended working							-	
Weather	Loss of Prod for wet, humid weather	0.33	20	0.33	20	4.00	240	4.00	240
Shift Changeover / Perr	Change over period							0.58	35
	Sub total	1.08	65.00	1.08	65.00	4.84	291	5.58	335
	Total Non Productive / week (6 days)	6.50		6.50		29.06		33.47	
	Total Hours available	60		60		60		60	
	Lost Time %	**11%**		**11%**		**48%**		**56%**	
	SAY	**11.00%**		**11.00%**		**48.00%**		**56.00%**	

Lost Time Calculations - Table 2 of 2

SITE WORKING		Weeks	Hr / Week	Hours
	Summer	26	60	1560
	Winter	26	60.00	1560
				3120
	Winter Hours available			1560
	Winter Lost hours (from below)			858
	Balance Winter Hours worked			702
	Lost winter hours as % of available			55.00%
	As minutes / day, average in winter			330
WINTER WORKING	Total winter hours @ 60 hrs / wk	1,560		
BAD LIGHT	Hrs / day	6		
	Hours per day lost due to light		3	
	Hours per week (6 day week)		18	
	Hours per year (26 winter weeks/yr)			468
SNOW	Avg days / week lost due to snow	1.5		
	Avg hours / week lost due to snow		15	
	Hours per year (26 winter weeks/yr)			390
	Total lost hours			858