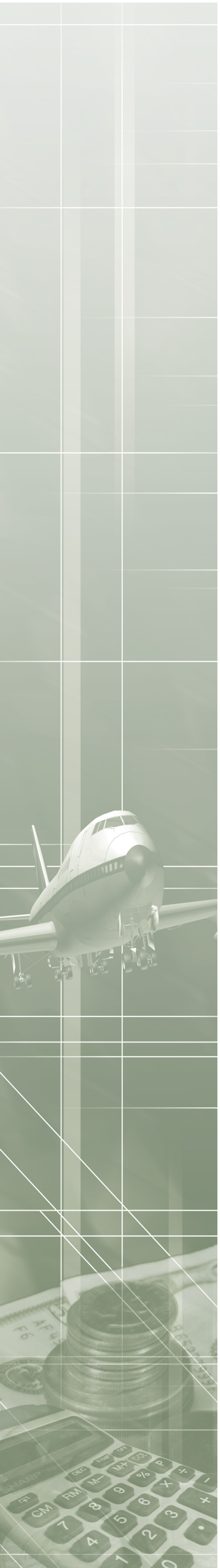

# 7. DIRECT LABOR

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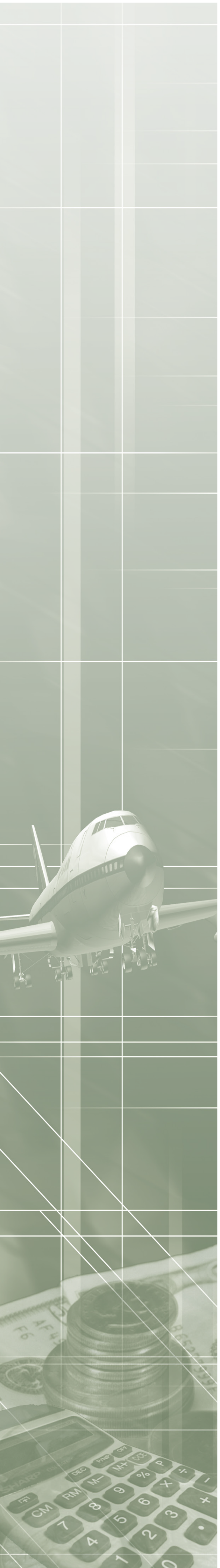

## 7.1 OVERVIEW OF DIRECT LABOR

This chapter addresses the terms, concepts, and issues involved in analyzing direct labor costs. In their simplest form, direct labor costs are the product of two components: labor hours and labor rates. When performing cost analysis, these components must be closely reviewed by the analyst, as well as by technical and audit groups, to ensure that the Government pays a fair and reasonable price for the work accomplished. This chapter will examine the formation and analysis of direct labor cost estimates. Table 7-1 provides a list of relevant labor terms and their definitions.

**Table 7-1. Direct Labor Terms and Definitions**

| Terms | Definition |
|---|---|
| Direct Labor | Work performed by individuals which is directly related to a specific cost objective. This work is readily identifiable with a particular product or service. |
| Indirect Labor | Work performed by individuals which is not identifiable with a single final cost objective but is identified with two or more final cost objectives or an intermediate cost objective. One example of indirect labor is the work expended by the controller of a company. The controller's work is not directly identifiable in the production of a specific product or service, since his or her work is spread across several projects or tasks. |
| Labor Hour | The unit of time by which direct labor activity is measured. |
| Labor Rate | The dollar amount paid to an individual per a given amount of time in consideration of work accomplished. |
| Labor Cost | The product (i.e., result) of multiplying labor hours by appropriate labor rates. |
| Labor Category | A grouping of workers with similar skills or expertise. |
| Labor Mix | The combination of functional skills and levels of worker experience required to accomplish a given task. |
| Basis of Estimate | A statement of the rationale used by a contractor to generate a cost estimate for a specific task or item to be produced. |

## 7.2 DIRECT LABOR HOURS

Examination of proposed labor hours is the first element of direct labor analysis. In most cases, the analyst can rely on technical personnel to provide recommendations regarding the number and type of labor hours proposed by a contractor. However, an analyst may occasionally find him or herself conducting a review of proposed labor hours. It is helpful to understand how a contractor estimates direct labor hours as well as the techniques used to analyzing proposed labor hours. This section will address the methods used to develop and analyze direct labor hour estimates.

### 7.2.1 Methods for Estimating and Analyzing Direct Labor Hours

Three basic methods are used to estimate and analyze direct labor requirements: **round table, comparison, and labor standards.** Round table and comparison methods can be employed for both manufacturing and engineering labor estimates; the labor standards method is primarily used to estimate manufacturing labor.

In the review of any project, these techniques may be used individually or in combination, depending upon the information available. Table 7-2 details the relative advantages and disadvantages of each method.

**Table 7-2. Comparison of Labor Hour Estimating Methods**

| Comparison Factors | Round Table | Comparison | Labor Standards |
|---|---|---|---|
| **Relative Accuracy** | **Low--** Limited data are used | **Moderate/High--** Depending on data, technique, and estimator | **High--** Based on engineering principles |
| **Relative Estimator Consistency** | **Low--** Different experts render different judgments | **Moderate/High--** Depending on data, technique, and estimator | **High--** Based on application of uniform principles |
| **Relative Speed Of Development** | **Fast--** Little detailed analysis is conducted | **Moderately Fast-** Especially with repetitive use | **Slow--** Requires detailed design and analysis |
| **Relative Development Cost** | **Low--** Little development cost | **Moderate--** Depending on need for data collection and analysis | **High--** Detailed design and analysis cost |
| **Relative Data Required** | **Low--** Based almost entirely on expert judgment | **Moderate--** Requires only historical data | **High--** Requires detailed design and analysis |

<u>Round Table Estimates</u>

In developing round table estimates, experts are brought together to develop cost estimates based on their professional experience and judgment with little detailed support. Round table estimates are used in situations where detailed drawings, bills of material, and firm specifications are not readily available. As a result, round table estimates are most applicable and appropriate for contracts requiring substantial research and development or engineering efforts. Round table estimates should not be used when there is sufficient information and historical data available to use more detailed methods of cost estimation.

## Comparison Estimates

Comparison estimates utilize historical actual cost data gathered from the production of similar goods or services to estimate future labor requirements. The comparison between past and future items or services can be accomplished at a summary or task level. **Direct comparison** and additional methods of comparison are used for comparison estimates.

> **COMPARISON ESTIMATES:**
>
> When a contractor uses historical data to estimate labor hours, an analyst should be alert for any differences in working or operating conditions that may affect the applicability of historical data, including:
>
> - Specifications
> - Process steps
> - Equipment and tooling
> - Plant layout
> - Inspection procedures
> - Labor mix
> - Employee skill levels
> - Delivery schedules
> - Production rates and quantities
> - Plant capacity (full vs. idle)
> - Number of shifts
> - Hours of overtime

### *Direct Comparison*

According to direct comparison rationale, there is a direct relationship between same or similar efforts such that the hours can be directly compared. For a new effort, an estimator can modify actual costs or hours from a similar project to reflect the current situation. For a follow-on procurement, actual costs should be available from earlier work. Most contractors maintain precise historical data detailing the labor requirements necessary to complete a task level comparison. Examples of such data are the time required to assemble a part or to prepare an engineering drawing and the labor skill level required to complete a task within a given period of time. Direct comparison may be used to estimate the labor cost for an entire contract or only a small segment of a contract. Even a contract for a unique requirement may contain elements that are similar to work accomplished in past efforts.

When using historical data to project future costs, the analyst needs to consider abnormalities that skew the estimate. Contractors will usually estimate hours for future work based on past performance coupled with some form of an adjustment. One of the most common adjustments is the cost improvement or learning curve, which accounts for efficiencies realized by workers as they produce increased quantities of a particular item or a greater level of service.

**Learning (or cost improvement)** occurs as workers become more familiar with the process and perform their job more efficiently on later units than on earlier units. This directly affects labor estimates because workers need less time to produce the same amount

> **Learning (or cost improvement) curve** theory states that as the total volume of units produced doubles, the cost per unit decreases by some constant percentage. The constant percentage is the rate of learning and is 100% minus the slope of the curve. Once the slope is known, the curve can project labor costs into the future.

of units as the production process continues. Historical information on labor hour trends during previous contract performance can be used to support the development of a learning curve to be applied to future efforts. However, for the learning curve to be viable, there must be a significant amount of labor. If work is machine paced (e.g., an assembly line where work flow is kept constant) the possibilities for worker improvement will be limited.

There are numerous cost improvement curve theories which can be used to estimate labor costs. As a result, it is extremely important that assumptions regarding the development and application of a learning curve be included in supporting documentation when this technique is utilized. The reasonableness of the underlying assumptions will directly impact the validity of any estimates employing a learning curve. A detailed discussion on the actual application of learning curves can be found in Chapter 15, "Quantitative Analysis Techniques."

Adjustments for differences in the effort itself are also common. A product may be similar to, but slightly different than, a previously produced product. Also, a product may have been produced under slightly different conditions. These types of adjustment factors are commonly referred to as plant condition factors, manufacturing allowances, or complexity factors. These factors attempt to quantify past and future product differences in relation to the skill, effort, and materials required. Complexity factors can be used to adjust historical costs for technical differences in effort. Analyzing complexity factors requires technical support, as the factors are usually based on the professional judgment of a technical expert.

*Additional Methods for Comparison Estimates*

The following techniques utilize historical data and should be considered as imprecise methods which may be utilized by the analyst or technical personnel as a "sanity check" or as a rough order of measure estimate. Although these methods will not provide a pinpoint estimate, they may be useful in cross-checking other estimates or in situations that may require extremely quick estimates to be generated.

- **Ratio of Support.** This method is used on research and development contracts. It involves estimating man-months for the creative engineering portion of a project and relying on ratios, based on contractor experience, to develop the estimates for support engineering. The ratios are developed from contractor experience on similar projects. Average ratios from several similar projects within one company provide the best basis for analysis.

- **Production/Engineering Ratio.** This method should be used only as a test for reasonableness. Generally firms maintain an established and consistent ratio between production and engineering hours. When this ratio is askew it may indicate an abnormality in the proposed level of either production or engineering costs. Also, when reducing either proposed engineering or manufacturing hours, the ratio may be applied to hours which have not yet been adjusted. For example, a contractor proposes 5,000 manufacturing hours and 2,500 engineering hours. This yields a production/engineering ratio of .5 (or 50%) which has been verified (using historical data) to be a relatively accurate relationship. If the manufacturing hours have been reduced by 1,000 hours to 4,000 hours, then the ratio can be applied to the proposed engineering hours to calculate a new position of 2,000 engineering hours. This technique is especially useful during negotiations or other time constrained situations.

### 7.2.2 Labor Standards Method

The labor standards method utilizes objective labor standards which detail the benchmark or **"standard"** time needed for individuals to perform a repetitive function or task. The labor standards method is generally applicable only to manufacturing labor, as engineering and support labor functions are often too complex or unique to a particular project. When this method is used in developing cost estimates, the estimate will be composed of two components, the labor standard and a realization or efficiency factor.

> A **standard** is a predetermined "expected" cost that can be applied to activities, services or production per unit basis.

Labor standards are developed from data within the company (time-and-motion studies), data published by trade associations, and data gathered from various other reference sources. Labor standards are expressed as either an **output standard** or as a **time standard**. An output standard specifies a production rate for a given unit produced by a given production method. For example, an output standard for the hand assembly of particular items may be four parts per hour (i.e. four parts are assembled by hand every hour). This means that for this process, a qualified worker operating at a normal pace under proper supervision should be able to assemble four parts every hour.

A time standard is the amount of time required to produce one unit or complete one operation. Using the same example, the time standard would be 15 minutes per part (as four parts are assembled in one hour, one part should only take a quarter of this time or 15 minutes). Time standards include the basic (or leveled) time for a worker to perform a task plus Personal, Fatigue, and Delay (PF&D) allowances and special allowances. This relationship is as follows:

| **Standard Time** | = | *Leveled Time* | + | *PF&D Allowances* | + | *Special Allowances* |
|---|---|---|---|---|---|---|

**Leveled time** is the time that a worker of average skill, making an average effort under average conditions would take to complete the required task. The four most commonly used techniques for determining leveled time are: Time Study, Predetermined Leveled Time, Standard Time Data, and Work Sampling. Leveled time is usually determined by the minute or hour (Introduction to Cost Analysis, p8-32).

**PF&D allowance** is a factor added to leveled time in consideration of time the worker needs for personal needs (i.e., using the restroom or water fountain), fatigue (i.e., time to recuperate from fatigue inherent to the general working environment), and delay (i.e., unavoidable or unscheduled production delays such as a blackout or a shortage of materials). PF&D is usually measured by the minute or hour (fraction).

**Special allowances** are also included in Standard Time data to account for delays not included in the PF&D allowance factor. These are usually delays which occur periodically and not during every work cycle. Examples of these delays are oiling machinery or cleaning a work area. These allowances are first computed as hours or minutes and are then transformed into a percentage of the sum of the leveled time and the PF&D allowance. Using the formula above, a numerical example of calculating standard time is as follows:

| ***Standard Time*** | = | *Leveled Time* | + | *PF&D Allowances* | + | *Special Allowances* |
|---|---|---|---|---|---|---|
| | = | *2 hours* | + | *15 minutes* | + | *(5% X 2.25 hours)* |
| | = | *2.36 hours* | | | | |

When using labor standards, **a realization factor** can be applied to standard estimates. This factor represents the relationship between actual hours and standard hours and is derived by dividing the total actual hours expended on a task by the standard hour estimate. A factor of one means the company expects to achieve the standard; a factor less than one means the company expects to perform better than the standard; and a factor greater than one means a company will perform below the standard. The factor used is multiplied by the standard to produce the expected actual. For instance, if the standard time for assembling a part is twenty-five minutes and the contractor expects a realization factor of .95, then the expected actual time to assemble one part is 23.75 minutes (25 minutes x .95).

With an **efficiency factor**, the worker's actual performance is measured against the standard. An efficiency factor is calculated by dividing the standard hours by the actual hours. This figure is multiplied by 100 to determine the efficiency percentage. An efficiency percentage greater than 100% indicates that workers are performing better than the standard. In contrast, a percentage below 100% means workers are performing below the standard. The formula used to calculate an efficiency percentage is basically the reciprocal of the realization factor discussed previously.

The two factors are not exactly reciprocals of each other. Realization considers idle time and unmeasured work (unmeasured work is work without a labor standard backing it up). Efficiency, on the other hand, only measures actual work time on the task that is backed by a labor standard. Although the two factors are slightly different, a contractor will normally only use one of the factors in its estimating system.

Efficiency is expected to be less than 100% and realization will be greater than one when the first few units of an item are produced. However, both factors normally improve as more units are produced. Various factors must be applied to standard times to reflect how individuals truly work in a manufacturing plant. Generally, these factors include **contingency costs** such as rework and repair costs.

> A **contingency cost** is a cost incurred due to a possible future event or condition arising from presently known or unknown causes, the outcome of which is indeterminable at the present time. Contingency costs are generally allowable in estimates if they arise from presently known conditions and can be predicted with a reasonable degree of accuracy.

Rework and repair occurs when a part or assembly is rejected in an inspection or test and sent back for correction of the deficiency. In addition, some completed parts and assemblies may be reworked to incorporate design changes. The concept of rework can be reduced to a number using historical data, which can be applied to labor estimates to cover these sort of possibilities. The cost of rework and repair should not be included in the labor standard, related allowances or the realization factor. Instead, it should be an adjustment accounted for separately. For manufacturing labor estimates, a rework factor is estimated as a percent of an element of standard time and is based on a firm's historical experience. If rework has been included in a contractor's labor estimates, it should be carefully examined with the help of technical personnel.

### 7.2.3 Analyzing the Direct Labor Mix

The first step in analyzing proposed direct labor hours is to examine the proposed labor mix. Determining the proper labor mix is an important component in estimating and analyzing direct labor hours because it is critical to make sure that the type of labor (manufacturing, engineering, or services) as well as the skill level of workers (entry-level, mid-level, senior etc.) is appropriate for the work being accomplished.

When contracting for professional services, the Government often establishes standard labor categories and requirements denoting the skills, education, and experience that individuals must possess to be qualified for that labor classification. These requirements may be ambiguous or vague and it can be difficult to match a contractor's proposed job classifications with Government requirements. When identified, this issue needs to be resolved, or the Government may pay higher labor costs than necessary for individuals who may not be as qualified as expected. In addition, the contractor's proposal could be considered nonresponsive to the Screening Information Request (SIR) if proposed labor categories do not meet the criteria delineated in the solicitation. In this situation, the analyst or Government technical officer should require the contractor to provide justification of the parity between the proposed labor classes and the SIR requirements.

Skill level is also important to review. Experts should not be proposed to perform routine or lower skilled functions, and vice versa. When lower skilled individuals are assigned to higher skilled tasks, the Government is not receiving the expertise and quality of service required by the task. Conversely, if higher-skilled individuals are proposed on lesser tasks, then the Government will pay an excessive amount for the value of work performed. For example, an entry-level engineer should not be tasked to design and validate a highly sophisticated computer system, nor should a senior engineer be tasked to perform basic technical drawings.

The primary goal when reviewing labor mix is to determine if the proposed labor categories correspond with the work to be accomplished. For instance, an engineer should not be proposed (and paid) to perform clerical functions or word processing. Similarly, software engineers should not be proposed to perform manufacturing engineering functions. Technical assistance is often required when reviewing the proposed labor categories.

## 7.3 DIRECT LABOR RATES

The second element of direct labor analysis is examination of proposed direct labor rates. As stated in Table 7-1, direct labor rates represent the dollar amount paid to an individual per a given amount of time in consideration of work accomplished. The following sections will cover the development of direct labor rates, analysis of those rates, labor rate agreements, labor laws affecting direct labor rates, and the concept of uncompensated overtime.

### 7.3.1 Development of Direct Labor Rates

To properly assess the reasonableness of proposed labor rates, an analyst must know how a contractor calculates proposed direct labor rates. This section will describe some of the factors a contractor considers when making decisions regarding employees' salaries. It will also briefly discuss the conversion of salaries into direct labor rates. Finally, it will detail the methods of proposing labor rates.

Compensation Factors

There are many factors a contractor must consider when deciding how much to compensate individuals. Two of the common factors are geographic location and intangibles. Available skills and cost of living describe the labor market of a geographic area. An area may have an abundance of one particular type of skill and scarcity of another. Areas experiencing an economic boom will have higher costs of living and companies will have to pay more for all human resources across all skill levels. Conversely, companies in areas with stable or depressed economies will generally pay less. (Cost of living is tied to supply and demand at a macroeconomic level. Discussion of this economic principle is beyond the scope of this handbook.) Cost of Living Allowances (COLAs) are given to employees via raises and other forms of compensation as conditions change.

Performance and flexibility are highly valued to contractors. Any individual who contributes to a contractor's mission in an above average manner will be paid more than the average worker. The more an individual is viewed as being key to success, the more willing a contractor is to pay higher than average wages and salaries to reward and retain such a person. Additionally, any individual who possesses a broad base of skills may be of more value to a contractor than a specialized individual. A contractor is able to respond to changing requirements, markets, and economic conditions with greater ease when it is able to use an individual in more than one area.

Methods of Proposing Labor Rates

Contractors may propose an individual's actual paid rate; however, they are more likely to propose some form of average labor rate. The following is a discussion on the use of individual and average labor rates.

*Individual Labor Rates*

The individual-rate method involves singling out specific individuals who will work on a project and then pricing a contract by using their actual wage rates. These actual wage rates are usually available through the contractor's accounting system and readily available for incorporation into a proposal. The individual-rate method works well for some service type contracts or when an effort requires the specific skills of identifiable personnel who are key to the success of an effort.

While precise, this method is not practical in many situations. For example, in a large corporation, it is often hard or impossible to identify in advance the exact engineer or machinist who will work on a certain project. Large corporations usually employ many individuals at each skill level of various functional areas and may rotate these individuals between individual projects. Also individuals who are initially scheduled to work on a given project may be unable to do so when the project begins. This can be the result of scheduling conflicts with other programs, or employee turnover or promotion.

*Average Labor Rates*

Due to the complications described above regarding the individual-ratemethod, nearly all large and medium sized contractors employ the average labor rate method. Average wage rates typically measure the mean wage rates of each labor grade within a given direct labor function.

Within each unit of an operating plant there is usually a labor norm and cost pattern for each production situation and associated group of employees. Properly computed average rates will express this norm and equalize the effects of indeterminable factors (such as scheduling conflicts, turnover, promotion, etc.) associated with the individual rate method. The average labor rate method can involve the development of average plant-wide, departmental or individual labor category rates. Plant-wide rates are typically used by companies which produce a limited number of products that pass through all or most of a company's operating departments during manufacture. Departmental rates are usually utilized when significantly different processes require varying degrees of skill and work for a project does not occur in every department. Average rates by labor category are primarily used for engineering and support labor estimates in order to reflect the significant pay differences between various levels and areas of expertise within labor categories. Consider the following example regarding the development of an average plant-wide labor rate. As can be seen in Worksheet 7-1, this contractor maintains four manufacturing departments: Parts Fabrication, Component Assembly, Final Assembly, and Testing. Worksheet 7-1 also displays the number of employees and weighted average labor rate for each department.

**Worksheet 7-1. Plant-wide Labor Rate**

| Departments | Work Force Under Contract | Average Hourly Rate | Weighted Average Cost |
|---|---|---|---|
| Parts Fabrication (A) | 200 | $10.00 | $2,000 |
| Component Assembly (B) | 400 | 15.00 | 6,000 |
| Final Assembly (C) | 300 | 11.50 | 3,450 |
| Testing (D) | 100 | 18.00 | 1,800 |
| **Total** | **1,000** | | **$13,250** |
| **Weighted plant-wide rate = $13,250/1,000 = $13.25/hr.** | | | |
| *Note: Letters in parentheses ( ) are Department Codes.* | | | |

Note that the average hourly rates in the worksheet above represent departmental averages. As mentioned previously, departmental rates are appropriate for manufacturing when various products will not all go through the same departments.

The labor category average is a common method for computing labor rates. This type of average is used mostly for engineering and support labor. A contractor can better match the skill mix of the effort at hand with the use of labor categories segregated by function and skill level (e.g., senior engineer, junior contract administrator etc.) Each category represents a weighted average of the actual labor rates of the people who are grouped together in a particular labor category.

A simple average of average hourly rates is never appropriate. It skews the cost of an effort. After reviewing Worksheet 7-1, a simple average rate would compute to $13.63. That is $.38 higher than the weighted average of $13.25. The Testing Department skews the labor rate upwards, even though they are only 10% of the effort. Simple averages assign equal weighting to all. Independently, the hourly cost difference does not appear significant; however, the difference rapidly accumulates for labor intensive efforts involving hundreds if not thousands of hours.

*Converting Yearly Salary to an Hourly Labor Rate*

The labor rates in cost proposals are most often expressed as a cost per hour worked for a particular category or skill level of labor. Computing an hourly rate is simple if compensation is measured by an hourly wage. The wage rate is the labor rate. However, annual salaries require conversion. This process is also relatively simple, but often not well understood.

Most companies base labor rate calculations on 2,080 hours per year. This is derived by multiplying 40 hours per week by 52 weeks per year. Dividing annual salary by 2,080 renders the labor rate. Annual hours minus

**compensated personal absence** hours results in what is considered the **productive man-year**. The total productive hours multiplied by the labor rate produces the **total productive year salary**. The remaining portion is paid in the form of holidays, vacation, sick leave etc.

Variations to the above example include uncompensated overtime, which is discussed later in this chapter. Additionally, some companies may add fringe benefits directly to the labor rate instead of using an indirect rate. Others may exclude compensated personal absence from the labor rate by dividing salary by the productive man-year in lieu of the full year. This is most often the case when a company is paying cash to employees in lieu of compensated personal absence.

### 7.3.2 Analysis of Direct Labor Rates

This section will cover the analysis of direct labor rates by assessing their reasonableness and examining labor rate projections and escalation practices.

<u>Assessing Reasonableness of Direct Labor Rates</u>

Understanding the factors and methods considered and used by a contractor is half the effort in assessing reasonableness. In addition, the analyst must answer questions such as the following:

> **EXAMPLE**:
>
> Salary: $50,000
>
> Compensated personal absence hours: 160
> (10 holidays + 10 days vacation = 20 days x 8 hrs/day)
>
> Labor rate: $50,000 ÷ 2,080 = $24.04
>
> Productive man-year: 2,080 - 160 = 1,920 hours
>
> Productive hourly rate: $50,000 ÷ 1,920 = $26.04
>
> Productive year salary: 1,920 x $24.04 = $46,157
>
> Compensated Personal Absence:
> $50,000 - $46,157 = $3,843.

- Are the labor rates reasonable given skill level and geographic location of the performance?
- Do the skill levels proposed correspond to skills required? (See section 7.2.3)
- Will the performance occur in a location other than one of the contractor's offices and plants?
- Will the contractor hire labor in those areas?
- If so, do the labor rates reflect the general rates of the area?
- Are labor rates covered by a current collective bargaining agreement? Is that fully explained?
- Overall, are rates sufficient to prevent abnormal attrition?
- Are the labor rates calculated properly?
- Are proposed average rates suitable for the effort? (For example, does a contractor use engineering department rates that cover the

full range of expertise, from junior to senior, when the immediate effort requires only junior engineers? In this case, a labor category average is more appropriate.)

There are several resources available to assist an analyst when answering these questions. Watson Wyatt Data Service (WWDS) is a source for survey information on wages and salaries. The Bureau of Labor Statistics (BLS) also publishes several surveys such as the Occupational Compensation Survey. Government data, however, are usually not as comprehensive or detailed as some of the commercial surveys such as those published by WWDS.

## Projecting Direct Labor Rates

Previous sections have focused on determining labor rates based on current rate data. However, when evaluating a contractor's proposal, an analyst is generally evaluating projected labor rates. In other words, the contractor is proposing what it believes will be the labor rates when contract performance actually occurs. Analyzing projected rates is one of the most difficult tasks in pricing. There are various internal and external forces which can cause labor rates to change. Changes in skill levels due to force reductions or increases can cause labor rates to fluctuate while a changing economic climate or changes in Government policy can also force labor rates to change. All of these factors, together with the passage of time, must be taken into account when projecting labor rates.

### *Trend Analysis*

Trend analysis is one method available to project future labor rates. It is best used when there are little data on cost of living and merit increases. This method of analysis is based on the assumption that wage rates will follow the same pattern or trend that they have shown in the past. By employing linear regression techniques to historical wage data, an analyst can attempt to predict future wage rates. Linear regression involves drawing a line of best fit through certain data points where the rate is plotted on the y-axis and time is plotted on the x-axis.

### *Escalation of Direct Labor Rates*

Escalation factors are another method used to project labor rates. These factors are comparable to inflation rates where the analyst establishes a base amount in a base year and applies some percentage increase for a given time period. Escalation factors are available for many different applications. For instance, there is a rate available for all steel products and a separate rate for half inch steel sheets. Other factors may cover specific geographical areas or wages for different skill levels within a labor category.

There are several sources of wage rate escalation factors. A widely-accepted source is Global Insight (GI). GI rates are privately produced escalation factors based in part on BLS indices for material and labor, such as the Consumer Price Index and the PPI. GI incorporates economic and social variables into its economic forecast models.

Three variables must be known before proper analysis of projected rates can occur:

- A reasonable base rate,
- The period(s) of performance, and
- An acceptable and applicable inflation index such as those produced by GI.

Once these variables are known, the next step is to determine to what points in time labor rates should be escalated. Either a **Midpoint of Effort Estimate (MPE)** or a discrete year-to-year estimate is appropriate. For ease of use, convert the escalation percentage as follows:

> To find the **midpoint of effort estimate (MPE)** use a labor loading schedule to find the point in time where half of the labor hours are expended (this is not the same as the midpoint of the performance period). The base rate requires escalation to that point only. This is a fairly efficient means of projecting rates when the contractor does not provide visibility into annual rates.

$$4.0\% \approx .04 + 1 = 1.04$$

Now escalate the base rate to the desired point in time. For example, assume that a contract requires performance in 1997 and that a 4% annual escalation applies. It is 1995 and the effective rate is $15.00. The calculations are illustrated below:

1995 = 15.00
1996 = 15.00 * 1.04 = 15.60
1997 = 15.60 * 1.04 = **16.22**

**or**

1997 = 15.00 * (1.04 * 1.04) = **16.22**

The escalated wage rate for 1997 is $16.22. Escalation to a quarter or to a month is often required. In these cases, simply convert an annual escalation rate to a quarterly rate or a monthly rate by dividing the annual rate by four (4) to find the quarterly rate or by twelve (12) to find the monthly rate, i.e., 4% = .01/quarter or .0033/month.

## Utilizing Forward Pricing Rate Agreements & Forward Pricing Rate Recommendations

The job of analyzing direct labor rates is often made easier through the use of Forward Pricing Rate Agreements (FPRA). Contractors often estimate labor rates for use in all proposals submitted during a specified period of time. These rates are referred to as forward pricing rates. In the interest of promoting consistency in estimating, minimizing administrative accounting costs, and streamlining the proposal negotiation process, contractors often enter into Forward Pricing Rate Agreements with their cognizant government officials. FPRAs are negotiated between the Government (cognizant administrative contracting officer (ACO)) and the contractor and can cover rates for labor, indirect costs, material obsolescence and usage, spare parts provisioning, and material handling. FPRAs are initiated by either the contracting officer or the contractor and are generally helpful when the Government is dealing with a significant volume of pricing actions submitted or to be submitted by the contractor. These agreements require close monitoring for any changes in the contractor's rate outlook, so that those changes can be promptly incorporated into the agreement. Either party may cancel the agreement. As long as the FPRA is valid, all that is required of the analyst is to ensure the contractor complies with the agreed upon rates already deemed reasonable by the ACO.

In the absence of a FPRA, the cognizant ACO may unilaterally issue a Forward Pricing Rate Recommendation (FPRR). These rates, while not binding to the contractor, establish the Government's negotiation objective. Analysts should obtain supporting data and information for FPRRs to help the contracting officer achieve the recommended rates.

In the absence of ACO rate agreements or recommendations the analyst can request rate recommendations/rate checks from DCAA.

## Developing and Utilizing "Wrap" Rates

Wrap rates refer to rates which include other costs in addition to labor costs. For instance, a contractor recently completed a six month effort performing engineering services for an FAA Program Office. The Program Office determined that it needed three additional months of services. The contracting officer then directed the contractor to propose three additional months using the same level of effort as in the previous six months. Actuals to date for the first six month effort are shown in Worksheet 7-2:

**Worksheet 7-2. Calculation of Wrap Rates**

| | |
|---|---|
| Labor $ | $850,000 |
| Overhead | 800,000 |
| Other Direct Cost | 250,000 |
| **Total Cost** | **$1,900,000** |
| Total Labor Hours | 50,000 |
| **Wrap Rate** | **$38.00** |

A wrap rate for the above costs can be calculated by dividing the total cost by the total labor hours ($1,900,000/50,000 hours = $38.00). This rate is then used to estimate the costs for the next three months, assuming the same level of effort. Thus, the contractor's estimate would include the costs for labor, overhead, and ODCs without estimating each element separately.

Avoid using wrap rates if possible. They are only reliable if the effort being estimated requires the same amount of material, labor hours, and labor mix as the previous effort upon which the rates are based. If not, the use of a wrap rate may result in inaccurate coverage of labor and/or material costs.

### 7.3.3 Uncompensated Overtime

Hours worked in excess of 40 hours per week by exempt (salaried) employees are called uncompensated overtime.

Using the Forty-Hour Week approach, a contractor requires salaried employees to record a maximum of forty hours in a week regardless of the actual hours worked. Uncompensated overtime under this approach may be accounted for in different ways. In some cases, a company's policy is to record only labor to the cost objectives worked on during the first eight hours of the day, and the excess hours are not accounted for formally. Another variation is one in which company policy permits salaried employees to select which cost objective to charge their excess hours. This can result in the government and/or specific contracts being charged more than its fair share of labor and associated indirect costs.

The Total Time approach is quite simple. All hours worked by salaried employees are to be recorded and allocated to the cost objectives benefiting from the work. There are three variations to account for UCOT discussed in the DCAA Contract Audit Manual, 6-410.2.

**DCAA CONTRACT AUDIT MANUAL (CAM), 6-410, UNCOMPENSATED OVERTIME:**

DCAA provides three acceptable methods for accounting for UCOT.

- **Method 1:** Calculate a separate average labor rate for each period based on the salary paid divided by the total hours worked and allocate costs to cost objectives based on that calculated rate.
- **Method 2:** Assign the total hours on a pro rata basis to all cost objectives worked on during the pay period.
- **Method 3:** Allocate costs using an estimated hourly rate for the year, and credit any variance to an indirect account.

DCAA supports the Total Time approach because it fully complies with Federal Acquisition Regulation (FAR) 31.201-4 (Allocability) (which is the same as AMS Procurement Guide T3.3.2.A.2.d), cost accounting standard (CAS) 401, and CAS 418.

Non-proponents of Total Time accounting say it provides contractors with a way to obtain a competitive advantage because it spreads the same salary dollars over a greater number of hours than simply by dividing by forty hours per week. This argument, however, ignores the risk of mischarging/overcharging labor costs to the government that can occur under the 40-hour week approach.

## 7.4 BASIC ELEMENTS OF DIRECT LABOR SUBMISSION AND ANALYSIS

There is no standard format used by contractors when they submit information regarding direct labor cost estimates. However, depending on the Section L Proposal Instructions, contractors are often required to submit direct labor information as a time-phased breakdown of labor hours, rates, and cost by the appropriate category, and to furnish the bases of estimates. This ensures that the contractor provides information which will enable the Government to properly and comprehensively evaluate a contractor's proposal. Case Study 7-1 provides a simple illustration of the types of direct labor information that a contractor should submit.

## CASE STUDY 7-1. SUBMITTING DIRECT LABOR INFORMATION

**Background:**

ABC Company proposes a direct labor estimate of $330,615 for the design of a new air traffic control communications system. ABC Company provides a time-phased breakdown of labor hours, rates, and cost by appropriate labor category, and furnishes bases of estimates. The following paragraphs and tables detail how ABC Company estimated its direct labor. In Table 7-3 ABC Company divided the project into three sequential tasks. ABC Company then estimates the number of drawings needed to complete each task and the amount of labor hours needed per drawing to determine the total number of labor hours needed per task.

**Table 7-3. ABC Company Time-Phased Labor Hour Estimate**

| | | |
|---|---|---|
| Task 1: | 5,000 drawings @ 3 hours per drawing | 15,000 |
| Task 2: | 2,000 drawings @ 3 hours per drawing | 6,000 |
| Task 3: | 900 drawings @ 3 hours per drawing | 2,700 |
| | **Total Hours:** | **23,700** |

In Table 7-4, ABC Company estimates the labor functions required to accomplish each task. ABC Company proposes a labor mix of three engineering labor categories: design, communications, and drafting. Table 7-4 provides a breakdown of the hours proposed under each appropriate labor category.

**Table 7-4. ABC Company Labor Hour Estimate By Labor Category**

| Engineer | Task 1 | Task 2 | Task 3 | Total |
|---|---|---|---|---|
| Design | 4,500 | 1,800 | 810 | 7,110 |
| Communications | 7,500 | 3,000 | 1,350 | 11,850 |
| Drafting | 3,000 | 1,200 | 540 | 4,740 |
| **Total Hours:** | **15,000** | **6,000** | **2,700** | **23,700** |

In Table 7-5, ABC Company provides the cost of the labor estimates by each labor category. Using proposed labor rates for this contract's period of performance, the ABC Company calculates the total proposed direct labor cost to the Government to be $330,615. Table 7-5 provides a breakdown of the cost by labor category.

**Table 7-5. ABC Company Labor Cost Estimate**

| Engineer | Total Hours | Labor Rate | Total Cost |
|---|---|---|---|
| Design | 7,110 | $16.50 | $117,315 |
| Communications | 11,850 | $11.50 | $136,275 |
| Drafting | 4,740 | $16.25 | $77,025 |
| **Totals:** | **23,700** | **$13.95** | **$330,615** |

As an integral part of the bases of estimates (BOEs) for proposed labor costs, ABC Company furnishes narrative descriptions supporting the estimated amount of hours and rates proposed for each labor category under each task. The bases of estimates will provide the Government with sufficient information to conduct a proper review of ABC Company's proposal. For instance, a Government technical officer may question why it takes three hours to complete a drawing, or why 50 percent of the proposed labor costs are needed for the drafting function. Similarly, an analyst or an auditor can question the basis of proposed rates and identify any abnormalities or problems.

## 7.5 COST REALISM AS RELATED TO DIRECT LABOR

Cost realism refers to the existence of accurate, factual, verifiable, and predictable data and an estimating methodology relative to what costs would most likely be incurred by the contractor providing a given product or service, utilizing the contractor's proposed technical and management approach. Cost realism means the costs in an offeror's proposal are 1.) realistic for the work to be performed, 2.) reflect a clear understanding of the requirements, and 3.) are consistent with the various elements of the offeror's technical proposal (FAA AMS Procurement Guidance T3.2.3A.1.i.1).

Most of the information required to assess realism is used to determine cost reasonableness. As can be seen in Table 7-6, many of the tests for realism have been discussed previously in order to determine reasonableness.

**Table 7-6. Assessing Cost Realism As It Relates To Direct Labor**

| Cost Issue | Relevant Concerns |
|---|---|
| Basis of the Labor Rates | • Were actual salaries used?<br>• Is it a combined pool of labor categories?<br>• Is there Service Contract Act compliance?<br>• Were BLS, DOL or private area wage surveys used? |
| Escalation | • Is the escalation reasonable when compared to contractor's salary increase policies and experience?<br>• Is the rationale for labor rate escalation realistic? |
| Labor Categories | • Do the proposed categories correlate to the technical proposal?<br>• Is the rationale for the distribution of the level of effort sound?<br>• Is there a congruent relationship among the various labor categories, consistent with the levels of education, experience, and expertise required? |

## 7.6 SUMMARY

An analysis of direct labor must encompass labor hours and labor rates with emphasis on cost realism and reasonableness. An analyst must examine the direct labor mix to determine whether proposed labor categories and the skill level of proposed workers are appropriate for the work to be accomplished. Analysis of direct labor rates must address development of labor rates, focusing on compensation factors, conversion from annual salary to hourly labor rates, and methods of proposing labor rates. The analysis of direct labor rates should also assess the projection of labor rates and utilize FPRAs, if available.