



ABCs of the Business Behind Engineering

An Online Continuing Education Course for Engineers

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Mark J. Sheeran, P.E.

1.0 Income Statement

As an engineer, the language of calculus, physics, and chemistry forms the basis of our understanding of engineering. In business, accounting and financial statements form that same fundamental foundation upon which more complex topics are built.

The first financial statement we will discuss is the Income Statement. The income statement is a snapshot of the financial health of your engineering firm. The income statement displays the company's revenue, expenses, and net profit.

A typical income statement in our industry reads as follows:

Gross Revenue

 Less: Sub-consultants and Reimbursable Expenses

Net Service Revenue

 Less: Cost of Services

 Direct Labor

 Other Direct Costs (non-labor)

Gross Profit

 Less: Operating Expenses

 Indirect Labor

 Benefits and Payroll Taxes

 Depreciation & Amortization

 General & Administrative

 Insurance

 Rent

 Professional Services Fees

 Other

Less: Gain/(loss) on disposal of assets

Less: Bonuses

Less: Interest Expense (Income)

Less: Income Taxes (Federal, State, Local)

Net Income

Plus: Interest, Taxes, Depreciation & Amortization

Earnings Before Interest, Taxes, Depreciation & Amortization (EBITDA)

The income statement measures performance over a period of time. Typically, the income statement is prepared to show the performance over a year (e.g., from January 1st to December 31st), quarter, or month, but the income statement can be prepared over any period as desired.

Now, let's go into each of these sections in more detail.

1.1 Gross Revenue

Gross Revenue is the total amount of money that comes into the company, whether it is related to services actually provided by the company or provided by other firms working under the company (e.g., sub-consultants). For example, if a multi-disciplinary engineering firm (which we will refer to throughout this course as ABC Engineering) billed their clients \$1,000,000 over the course of a year, ABC Engineering's Gross Revenue for that year would be \$1,000,000.

1.2 Subconsultants and Reimbursable Expenses

Continuing the example above with ABC Engineering, let's make two assumptions (1) ABC Engineering's contract with the client gave them the ability to charge the client back for certain reimbursable expenses and (2) ABC Engineering did not perform all of the services required of them under their agreements in-house (i.e., in the case of this example, ABC Engineering had to "subcontract out" mechanical engineering services). In each of these cases, the money coming "in the door" for (1) reimbursements and (2) services provided by sub-consultants would be included in Gross Revenue as it is money coming into the firm. However, we must also book the corresponding cost associated with that revenue. These corresponding costs are known as sub-consultant and reimbursable expenses.

Some examples of reimbursable expenses are as follows:

- Travel Expenses
- Meals
- Lodging
- Parking
- Reproductions (copies)

In some cases, a company will charge an administrative fee on sub-consultant and reimbursable expenses to compensate the company for managing these additional activities. In the case of our examples here, however, we are assuming that both are passed through to the client at cost (e.g., 0% administrative cost or mark-up).

Continuing our example from above, let's assume that of the total gross revenue, \$15,000 was reimbursable expenses, and \$135,000 was mechanical engineering sub-consultant expenses. In this case, the Sub-consultants and Reimbursable Expenses would equal \$150,000.

1.3 Net Service Revenue

Net Service Revenue in the engineering industry is the revenue attributable to the work performed by the firm. Net Service Revenue removes the impacts of costs associated with sub-consultants and reimbursable expenses. Most of the metrics outlined later in the course are based on Net Service Revenue, not Gross Revenue.

Continuing our example from above, ABC Engineering's Net Service Revenue can be calculated as follows:

Gross Revenue	= \$1,000,000
Less: Subconsultants and Reimbursable Expenses	= <u>(\$150,000)</u>
Net Service Revenue	= \$850,000

Reviewing Gross Revenue and Net Service Revenue together is our first opportunity to leverage the income statement to tell us something about the operations of the company. For example, with ABC Engineering, we see that the pass-throughs (i.e., sub-consultant and reimbursable expenses) equals 15% of gross revenue. Alone, this may not tell us much; however, if we compare this to other companies in our industry, you will begin to see how ABC Engineering may differ from other firms. For example, if we determined that XYZ Consulting had a passthrough rate of 35% versus ABC Engineering's rate of 15%, we could draw the hypothesis that ABC Engineering performs more services in-house than XYZ Consulting.

1.4 Cost of Services

Cost of Services includes all of the costs directly involved in delivering a service. These costs are divided into Direct Labor and Other Direct Costs (ODC's), which are non-labor costs.

1.4.1 Direct Labor

Direct labor is the cost corresponding to the actual hours put into delivering an engineering service. Continuing our example from above, if ABC Engineering had a firm-wide average billing rate of \$50 per hour, and billed clients 6,500 hours over the course of the year, we could calculate the corresponding Direct Labor cost as follows: \$50 per hour * 6,500 hours = 325,000 of Direct Labor.

1.4.2 Other Direct Costs (non-labor)

Other direct costs (non-labor) are those costs that are part of delivering the engineering service, but, as the name would suggest, not labor-related.

Continuing our example from above, let's assume that ABC engineering spent \$50,000 over the course of the year on non-labor related direct costs. An example of this would be non-reimbursable reproductions. In this case, ABC Engineering would show \$50,000 of Other Direct Costs (non-labor) on its income statement.

1.5 Gross Profit

Gross profit is calculated as net service revenue less cost of services. Gross profit is the company's profit before operating expenses, interest payments, and taxes, and represents the company's profit from production (e.g., the profit derived from providing an engineering service).

Continuing our example from above, ABC Engineering's gross profit can be calculated as follows:

Net Service Revenue	= \$850,000
Less: Direct Labor	= (\$325,000)
Less: Other Direct Costs	= <u>(\$50,000)</u>
Gross Profit	= \$475,000

Reviewing gross profit as compared to the net service revenue of a firm is another opportunity to leverage the income statement to tell us something about the operations of the company. Looking at the gross profit as a percentage of net service revenue (i.e., the gross margin) allows us to compare similar companies to each other and to the industry as a whole. In the case of ABC Engineering, we see that their gross profit margin equals 55.9% (calculated as \$475,000 / \$850,000). If we found that XYZ Consulting's gross margin was 50%, we would know that ABC Engineering converts more revenue dollars into gross profit than XYZ Consulting. We will be able to better

understand the forces that are driving this difference, leveraging the metrics we will discuss in Section 2.0.

1.6 Operating Expenses

Operating expenses, sometimes referred to as overhead, are all of the costs not directly associated with delivering the engineering service but are necessary to support the ongoing operations of your engineering firm. Examples of operating expenses include the following:

- Indirect Labor
- Benefits and Payroll Taxes
- Depreciation & Amortization
- Insurance
- Rent
- Professional Services Fees (e.g., legal and accounting)
- Office supplies
- Repairs and maintenance costs
- Advertising and marketing costs
- Travel costs

1.6.1 Indirect Labor

Indirect labor, in contrast to direct labor, is all of the hours incurred by the firm to support ongoing operations that are not spent directly delivering an engineering service. In other words, they are hours that do not directly create revenue. Indirect labor typically comes from two buckets of personnel – (1) non-billable hours from staff that provide engineering services and (2) overhead staff whose hours are always non-billable.

Let's break each of these two buckets down with an example.

First, for bucket #1, let's assume that Engineer A is working on a project, and her hourly rate is \$75 per hour. This particular week Engineer A works 20 hours on the project and spends 20 hours on non-billable tasks (e.g., professional development, business development, etc.). For the week, Engineer A generated \$1,500 of direct labor ($20 \times \75) and \$1,500 of indirect labor ($20 \times \$75$).

Second, for bucket #2, let's assume that the CEO spends 100% of her time on non-billable tasks (e.g., growth strategy, operations management, etc.). In addition, the CEO

has an assistant whose hours are also non-billable. In our example, the CEO's hourly rate is \$200 per hour, and the assistant's rate is \$25 per hour. In a week, the CEO and assistant would generate \$9,000 of indirect labor ($40 \times \$200 + 40 \times \25).

In the case of ABC Engineering, for the purposes of our ongoing example, let's assume that over the course of the year, ABC Engineering incurs \$135,000 of indirect labor.

1.6.2 Benefits and Payroll Taxes

Benefits and Payroll Taxes are employee costs above and beyond direct and indirect labor. More on each of these topics immediately below. For the purposes of our ongoing example, let's assume that over the course of the year, ABC Engineering incurs \$70,000 of benefits and payroll taxes.

1.6.2.1 Benefits

Whether legally required or used to entice employees to join, engineering firms often provide a variety of benefits to their employees, such as health insurance. The costs associated with these benefits are captured on the income statement under Benefits and Payroll Taxes.

1.6.2.2 Payroll Taxes

Payroll taxes are imposed on employers per the federal and state tax code. These taxes are paid by the employer based on the employee's wages. There are also payroll taxes that are paid for by the employees through deductions on their payroll. The costs associated with the employer's share of payroll taxes are recorded on the income statement under Benefits and Payroll Taxes.

1.6.3 Depreciation

In cases when an asset's useful life is less than one year, the IRS does not require depreciation. If the company needs an asset with a useful life greater than one year, the company must depreciate the asset on the balance sheet (more on this later) and record the depreciation expense over the useful life of the asset. This annual expense is recorded on the income statement under Depreciation and Amortization, depending on the asset type.

Now, let's look into book value.

1.6.3.1 Depreciation

Depreciation is the expense of using tangible assets, meaning fixed or tangible assets that have a useful life greater than one year. Some examples of tangible assets are buildings, equipment, and vehicles.

- Buildings

