

Costing of Occupational Injuries

The three-step costing system described here allows a company to make an immediate estimate of the total cost of injuries, and to apportion that cost among its divisions or operating units.

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For many years a favorite topic at all safety conferences has been "Arousing Management's Interest". Presumably, the need for discussing this subject arose out of a communications problem between safety and management people. The question naturally asks itself: "Are safety people speaking the language of management?" Do safety people need to cease commiserating with each other about a lack of management interest and spend more effort in determining what management wants?

This article will discuss the relationship and measurement of the management process to accident prevention. First, we shall examine some of the tools and techniques used by management to see if they have any application to solving our problem. Books on management usually list the following steps as part of any problem solving process:

1. Define the problem precisely
2. Establish objectives
3. Get the facts
4. Weigh and decide
5. Take action
6. Evaluate the action

In a book entitled "Tough-Minded Management", the author states that quality controls should be required on all assignments, and each man should be held accountable for the end results of his efforts. It should be understood that a man does his job or he gets out of it. In the same text he writes, "... we can clearly see that the prime purpose of control is to determine not where we have been but where we are going".

In a way this is all rather academic for it has been my experience that the present means offered for safety measurement purposes do not provide the desired controls. In fact, frequency and severity only attempt to show the past performance, and even then present measurements fail to differentiate between a single day lost-time case and a fatality. Further, present measurements are not sensitive to the real problem of increasing costs, which are about 8% per year and have been for the past 10 years.

If accident prevention is to become more dynamic,

safety people must learn the language and needs of the manager. When speaking with management about accident prevention there is a need to reduce the complex to the simple, and in terms understood by management. In addition, a measurement capable of keeping pace with the times, and a management and accountability concept that has proven itself must be available.

Costing, budgeting and accountability

A reliable measure of safety performance, which we will discuss here, involves an analysis and evaluation of costing, budgeting and accountability. Costing is a fairly simple technique for reliably estimating workmen's compensation injuries, or the days involved, by a predetermined dollar average for such injuries. Our refinement is the establishing of two averages, based on costs per day, plus a table of estimated scheduled charges upon readily identifiable circumstances.

Through costing techniques the dollar cost of an injury can be charged directly to the place of occurrence. Work injuries are the result of production operations and should be charged directly and currently to the operation where they represent a loss. These losses should be budgeted and analyzed on a periodic basis for evaluating performance, the same as other operating expenses are budgeted. Remember, the hard-core injury cases represent at least 50% of any year's total dollar losses. It takes years by normal methods to determine precisely the final cost of the hard-core cases.

For example, experience rating provides for a deviation from the base rate, based on experience, but it is based on several years' prior experience. Experience rating, retrospective rating, and payrolls developed are used to compute premium so premium cannot be used for a comparison of losses on a current basis. And finally, compensation benefits vary from state to state so they cannot be used.

Determining the cost involved in a serious head or back injury may take several years. First, it is necessary for the

doctor to determine the healing ability of the individual and then the permanent effects of the injury.

Two-thirds by number of the smallest injury cases represent only 7% of the total dollar losses. Stated as loss control axioms, the "trivial many" represent 85% by number of the smallest-sized claims. They are called "trivial" because so many only produce 20% of the total dollar losses. The "vital few" represent 80% of the dollars from 15% of the number.

Many tests of the costing technique have been made. In each case where large totals were involved, the correlation was better than 90%.

One of the most important factors in the accurate estimation of the cost of occupational injuries is the technique used to compute averages. The extreme range in the size of injury costs indicates that it is desirable to classify injuries into distinct and recognizable groups so that the averaging technique can be better applied and defined.

Thus, injuries are classified into fatalities, permanent total and temporary total disabilities, and medical-only cases. Permanent total indicates that, as a result of an injury, the employee will never be gainfully employed again, permanent partial means that permanent physical damage has been inflicted, and temporary total means that the victim will have to stay off the job for awhile, but will have no permanent disability. Medical-only cases are cuts and scratches, etc. that do not keep the employee away from work.

Table 1. Per cent of total injuries and per cent of total cost for each type of injury.

Injury	% of Total injuries	% of Total Cost
Medical only.....	67	7
Temporary Total.....	25	30
Permanent Partial.....	6	50
Permanent Total.....	1/8 of 1	4
Fatality.....	1/8 of 1	7

NOTE: Figures do not total 100% due to rounding off.

Table 1, which shows the percent of total injuries and the per cent of total cost for each of these categories, indicates that more loss control attention should be directed to the "vital few" and away from the "trivial many". This table also indicates that the greatest problem area in determining final cost lies in the permanent partial disability cases since they represent half of the total cost of injuries, and precise information about the extent of disability may be difficult to determine or obtain.

The averages developed by Employers Insurance of Wausau are shown in Table 2. These charges were used to compute the costs of many closed claims, and their estimated totals were compared against the actual ones. In each series analyzed thus far, the estimates have always been within 10% deviation from the actual cost.

Averages based on costs per day

Earlier I noted we had developed two averages based

Table 2. Schedule of charges.

Injury with Medical Cost only	\$25
Temporary Total Disability	For each calendar day of hospitalization..... \$50 For each calendar day of convalescence..... \$15
Permanent Partial Disability	Healing period as in "Temporary Total" cases plus the estimated scheduled charge from Table II for the disability.
Permanent Total Disability	\$32,000
Fatality	\$15,000

on costs per day. In the first of these, applied in lost-time cases, each day in the hospital represents \$50 (this cost is probably higher now). In addition, during the healing

Table 3. Estimated scheduled charges for permanent disability cases.

(in dollars)

A. For Loss of Member — Traumatic or Surgical

Amputation involving all or part of bone	Fingers, Thumb, and Hand				
	Thumb	Index	Middle	Ring	Little
Distal Phalange.....	1,500	500	375	300	250
Middle Phalange.....		1,000	750	600	500
Proximal Phalange...	3,000	2,000	1,500	1,200	1,000
Metacarpal.....	4,500	3,000	2,500	2,250	2,000
Hand at Wrist.....	15,000				

Amputation involving all or part of bone	Toe, Foot, and Ankle		
	Great Toe	Each of Other Toes	Foot
Distal Phalange.....	700		175
Middle Phalange.....			375
Proximal Phalange.....	1,500		750
Metatarsal.....	3,000		1,750
Foot at Ankle.....	12,000		

Arm

Any point above elbow, including shoulder joint	22,500
Any point above wrist and at or below elbow	18,000

Leg

Any point above knee	22,500
Any point above ankle and at or below knee	15,000

B. Impairment of Function (Traumatic)

One Eye (loss of sight), whether or not there is sight in the other eye	9,000
Both Eyes (loss of sight), in one accident	32,000
One Ear (complete indust. loss of hearing), whether or not there is hearing in the other ear	3,000
Both Ears (complete indust. loss of hearing), in one accident (traumatic)	10,000
Unrepaired Hernia	250

Impairment of Function from Noise

One Ear	1,200
Both Ears	3,500

period there is an average cost of \$15 per day which combines the workmen's compensation cost with the medical expenses involved. Permanent partial cases are computed in a fashion similar to the temporary total during the healing period, except that there is an additional charge for the permanent partial disability portion based on the doctor's estimate of the per cent of disability. This per cent of disability is applied to a dollar figure taken from a table of estimated schedule dollar charges from permanent disability. The scheduled charges-in-weeks are taken from the Z-16 code and translated into dollars.

Here is how a temporary total disability case would be computed: Assume that a man suffers a broken arm. The doctor estimates that he will be hospitalized for one week and, in addition, will require a convalescence of about five weeks. Using the charges in Table 1, you multiply \$50 by 7 days and get a hospitalization cost of \$350. In addition, you multiply \$15 by 35 days (5 weeks) to get a convalescence cost of \$525. The total cost of the temporary total disability is \$875. This is the computation for the costs during the healing period based only on previous information.

Now assume that this man is unfortunate enough to have a 10% loss of motion of the shoulder, according to the doctor's estimate. The case then becomes a permanent partial disability. Now we can use the estimated scheduled dollar charges, Table 3, to get the cost in dollars for the

loss of an arm at the shoulder and apply the 10% figure to it. Table 3 indicates a charge of \$22,500 for the total loss of an arm at any point above the elbow including the shoulder. Remember, the doctor reported a 10% loss and the schedule of charges indicates a cost of \$22,500, so we take only 10% of that figure, or \$2,250. The healing period cost obtained earlier is added to the scheduled permanent partial cost for the full total cost of \$3,125.

This case is presented merely to show the steps involved in an individual case. In actual practice, all cases for a single plant or unit are listed and then computed on a combined basis as this is much simpler. Figure 1 illustrates a computation for a three month period for one plant. The medical-only cases are listed at the top, multiplied by \$25 (see Table 2) and the product entered in the extreme right hand box. The names of persons with lost-time injuries are entered below, as are the number of days each lost, the number of days spent in the hospital, the number of convalescence days other than hospital, the permanent partial disability cost taken from the chart, the per cent of disability, and the chargeable cost of the permanent partial disability.

Each column is then totaled. Hospital days are multiplied by \$50, convalescent days by \$15, and permanent partial injury costs totaled. If there were any permanent total disabilities, the names of the injured would be entered, the number of such cases would be multiplied by \$32,000 and the amount entered at the extreme right.

As mentioned, a reliable measure of safety performance depends upon an accurate analysis and evaluation of budgeting and accountability as well as of costing. Budgeting for future losses can be accomplished through the development of a cost rate or cost standard. The rate can be computed by dividing several prior years' losses by the corresponding number of employees, or the number of man-hours worked, Table 4. If you go back several years some trends may be apparent, and you can usually determine the immediate future rate. If you wish to budget on a periodic basis, you simply divide the annual rate by 12 or 4 to obtain the monthly or quarterly rates.

We have found that an all-industry average approximates \$35 per employee per year, or about \$3 per employee per month, or \$0.02 per man-hour. These

CURRENT COSTING OF OCCUPATIONAL INJURIES -- REPORT

MONTH: APRIL, MAY & JUNE YEAR: 1967 DATE: 4/17/67

FROM: BLANIC CORP. LOCATION: ANYTOWN, STATE

MEDICAL ONLY - NO LOST TIME

NUMBER OF CASES: 16 * \$25.00 / CASE \$ 400.00

LOST TIME INJURIES NAMES OF EMPLOYEES WHO LOST ONE OR MORE DAYS DUE TO WORKING	A CALENDAR DAYS LOST	B HOSPITAL DAYS	C CONVALESCENCE DAYS (A - B)	D SCHEDULED DOLLARS (FROM CHART)	E PERCENT DISABILITY	F CHARGEABLE DOLLARS TO X 1'
JOE BROWN 4/9	3	0	3			
PETE SMITH 4/12	7	2	5			
HM ADAMS 5/26	14	3	11	4500	50	2250.00
GEO. GATE 5/28	2	0	2			
HARRY DAHM 6/4	0	0	0	250	75	187.50
DON GEORGE 6/18	4	1	3			
ART LEHN 6/25	42	10	32	18,000	10	1800.00
TOTAL DAYS	72	16	56 * \$15 PER DAY =			\$ 840.00
			* \$50 PER DAY =			\$ 800.00
						\$ 5877.50

PERMANENT TOTAL DISABILITY - NAMES

NUMBER OF CASES: 0 * \$32,000 / CASE \$

FATALITIES - NAMES

3/25 JOHN JAMES

NUMBER OF CASES: 1 * \$15,000 / CASE \$ 15,000.00

TOTAL ACCIDENT COST THIS MONTH \$ 20,877.50

ACCUMULATIVE REPORT

TOTAL COSTS REPORTED FOR YEAR PRIOR TO THIS 1/4 \$ 6822.00

NOTE: MULTIPLY TOTALS BY 1.1 IN 1968, 1.2 IN 1969. \$ 27,699.50

EMPLOYERS INSURANCE OF WAUSAU YEAR TO DATE COSTS
HOME OFFICE: WAUSAU, WISCONSIN

Table 4. Cost rate computations.

Location	Cost	Man-Hours	Cost per Man-Hour
A	\$10,000	1,000,000	\$0.010
B	36,000	2,000,000	0.018
C	52,000	1,500,000	0.035*
D	9,750	750,000	0.013
Totals	\$108,250	5,250,000	\$0.021

A, B, D Subtotals
 Cost..... 55,750
 Man-Hours.... 3,750,000
 Cost per
 Man-Hour.... \$0.015

*Note out-of-step amounts

Figure 1. Occupational injuries report form.

Table 5. Computing budgeted cost.

Location	Cost per Man-Hour	Quarter Expected Man-Hours	Budget
A	\$0.010	250,000	\$ 2,500
B	0.018	500,000	9,000
C	0.035	375,000	13,125
D	0.013	787,000	2,440
Totals		1,312,500	27,065

figures are not recommended for budgeting purposes, however, but only as a checkpoint for your comparison.

Accident cost rates or a cost standard should be determined according to your major product or the services you provide. It is of no value to compare costs rates for another industry that has the same operations. Once you have determined the cost rate, you are ready to establish a budget or cost-control. All that is necessary is to multiply the exposure (in terms of employees or man-hours) by the appropriate rate and you have the budgeted cost for that period of time, Table 5. By comparing budgeted costs against the amounts indicated by the costing technique, one can see how good a job is being done.

Costing provides the needed measurement or comparison between budgeting and accountability. Under the costing technique, safety engineers have a means of holding management and themselves accountable for loss control in their plant. The concept of management accountability is only possible by using a technique like costing. In this way they know immediately how they stand when measured against expected performance.

Some large firms with as many as 160 locations are now using a costing technique with great success. One large firm with many dry goods stores placed the

Table 6. Distribution of workmen's compensation premium.

	Annual Accident Cost	% of Total	% of Workmen's Compensation Premium
Plant A	\$40,000	40	40
Plant B	35,000	35	35
Plant C	25,000	25	25
Totals	100,000	100	

responsibility for loss control on their managers. They measured their effectiveness through the costing technique. They reduced their cost $\frac{1}{3}$ during the following year below the past 5 year average, and, most surprisingly, each large location lowered their costs uniformly. This trend is still continuing.

One advantage of the costing technique is that it allows trends to be pinpointed as they occur so that remedial action can be started immediately. Another way in which it can be used is in the allocation of the workmen's compensation premium to management units based on a prorata proportion of current loss estimated, as shown in Table 6. As illustrated in this table, the plant with 25% of the losses is charged with 25% of the current compensation premium.

In conclusion

In short, the current costing procedures discussed here provides a reasonable solution based on averages and a satisfactory measurement for management that is equitable for all locations. It also adds a new dimension to the plant's accident report by expressing losses from injuries in current dollars.