

Awareness

Project Safety

Responsibility

Accountability



Zero Injury Economics

.....

CII Special Publication 32-2

September 1993

Training

Commitment



Construction Industry Institute



Documents

Document Sharing Hub

The purpose of this publication is to make available to industry the results of research conducted by the Construction Industry Institute (CII). The publication does not necessarily represent the views of CII member companies, but is offered as a contribution to the industry.

CII was founded in 1983 to improve the cost effectiveness of the nation's largest industry. The members, who represent a broad cross-section of owners and contractors, believe that many of the problems that limit cost effectiveness are common ones, and that real improvements can be best accomplished in a cooperative environment with the benefits being shared by the construction industry at large.

CII uses the acronym TOPICS to describe the research effort. TOPICS signifies the six research thrust areas: Technology, Organization, People, Information, Controls, and Sigma (meaning others). The task forces for each area are listed below.

Technology

- Advanced Technological Systems
- Computer Integrated Design & Construction
- Design for Safety
- Environmental Remediation Technology
- Modularization
- Technology Strategy

Organization

- Partnering II
- Project Change Management
- Project Organization II
- Pre-Project Planning
- Project Team Building
- Project Team Communications

People

- ADA Impacts
- Continuing Supervisory Education
- Zero Accidents

Information

- 3D CAD Link
- International Construction
- Owner Engineering Organization

Controls

- Contracting, Phase II
- Dispute Prevention and Resolution
- International Standards
- Predictive Tools
- Quality Performance Measurement
- Schedule Reduction
- Total Quality Management

Sigma

- Barriers to Implementation
- Insurance
- Piping Function
- Retrofit Projects
- U.S. Navy Demonstration Project
- Utility Pilot Projects
- Workers Compensation Insurance

The Construction Industry Institute
The University of Texas at Austin
3208 Red River, Suite 300
Austin, Texas 78705-2650
(512) 471-4319
FAX (512) 499-8101

Not printed with state funds

Zero Injury Economics

**Prepared by
The Construction Industry Institute
Zero Accidents Task Force**

**Special Publication 32-2
September 1993**

© 1993 Construction Industry Institute™.

The University of Texas at Austin.

CII members may reproduce and distribute this work internally in any medium at no cost to internal recipients. CII members are permitted to revise and adapt this work for the internal use provided an informational copy is furnished to CII.

Available to non-members by purchase; however, no copies may be made or distributed and no modifications made without prior written permission from CII. Contact CII at <http://construction-institute.org/catalog.htm> to purchase copies. Volume discounts may be available.

All CII members, current students, and faculty at a college or university are eligible to purchase CII products at member prices. Faculty and students at a college or university may reproduce and distribute this work without modification for educational use.

Printed in the United States of America.

Contents

<i>Chapter</i>	<i>Page</i>
Executive Summary	v
1 Introduction	1
2 The Direct and Indirect Expense of Worker Injury	4
3 The Costs and the Savings	6
4 The Zero Injury Concept	14
5 Steps to Gain Control	17
6 Recommendations	19
Appendix A - The Variations of Experience Modification	21
Appendix B - Manual Rate Information	23
Appendix C - Injury Cost Calculations for U.S. Industry	27

Executive Summary

Worker injury imposes a significant inefficiency upon the U.S. engineering and construction industry. Despite the advent of the OSHA Act in 1972, construction has realized little improvement in safety. Estimates of the total cost of injury for the \$450 billion U.S. construction industry range from \$7 billion to as high as \$17 billion annually.

The moral and humane aspects are more than sufficient justification for doing all in one's power to eliminate worker injury. The problem of not knowing how to eliminate worker injury, however, has been pervasive until recent times. With the advent of increasing numbers of owners and contractors who are achieving zero lost workday injuries on construction projects, a new concept is emerging-zero injury. This new-found reality for some has become a sought-after possibility for others. The zero injury concept means that essentially all serious injury to workers can be successfully prevented.

Techniques on how to achieve zero injury in construction can be found in CII Publication 32-1, *Zero Injury Techniques*. The practical economies of achieving and sustaining zero lost workday cases are revealed in this companion publication.

The workers' compensation premium per construction worker ranges from \$1,500 per employee per year in the "lower cost" states and trades to \$70,000 per employee per year in the "higher cost" states and trades. The additional indirect costs, which can be substantial in some instances, must be included to understand the total costs of worker injury. Some companies are finding that the workers' compensation premium alone exceeds their profit margin by 100 to 300 percent.

The individual employer Experience Modification Rate (EMR) is one control mechanism. EMRs can range from as low as 0.20 for very safe large employers (a low of 0.80 for small employers) to as high as 3.00 for the least safe employers. Some of the workers' compensation premium, for example at 0.20 EMR (or 0.80 for small contractors), can be classed as a necessary expense. Beyond this level, one can justifiably say that all expense that is caused by the injury of a worker is "unnecessary."

In this publication, worksheets and required information are provided for both owners and contractors who wish to calculate their own cost of injury. Specific procedures are given on how to eliminate the unnecessary expenses.

Eliminating injury and successfully managing the workers' compensation insurance coverage can reduce premiums up to 80 percent. Six action steps are provided to help lower a high EMR situation. Recommendations and key implementation needs also are provided to help in achieving a new concept in the construction industry: zero injury.

Introduction

The Moral Issue

This document is about the cost of injury. All will agree that humanitarian factors alone are more than enough to justify the effort required to eliminate worker injury. Some are offended by taking into account the cost of injury. It is recognized that to use cost alone as a driving force to avoid injury is wrong. The significant cost of worker injury, however, cries out for exposure to those who worry about the cost of safety programs. Thus, those who are concerned about the cost of effective safety programs will clearly see that eliminating injury makes good business sense.

Construction Industry Cost

The national waste stemming from "at work" injuries is estimated by the National Safety Council at over \$60 billion per year for all business. The construction industry has one of the highest worker injury rates. The number of disabling injuries in the construction industry recorded by OSHA and the Bureau of Labor Statistics (BLS) in 1991 was 6.1 per 100 workers. With 5.9 million construction workers this extends to 360,000 disabling injuries in 1991. Using the average cost per disabling injury of \$26,000 calculated by the National Safety Council, the 360,000 injuries cost the U.S. construction consumer over \$9 billion.

The CII Zero Accidents Task Force estimates that when both the direct and indirect costs of injury are included, the cost of injury in construction in the U.S. runs as high as \$17 billion dollars annually (see Appendix C). The task force believes that even these numbers fall well below the true cost of construction worker injury.

This CII publication explains the profit drain caused by the high expense of worker injury. Also illustrated is the monetary importance of working to reduce injury frequencies and severity.

Profit and the Expense of Injury: Looking at the Pieces

An employer's expense caused by worker injury is paid out of potential "profit."

This potential "profit" is spent on workers' compensation insurance premiums or "claims losses," depending on the size of the employer and the nature of their insurance coverage. Also draining the profit are the indirect costs of worker injury. Indirects include such items as lost productivity, disrupted schedules, and administrative time required to deal with an injury.

In any enterprise, safety expense can be viewed in two parts:

1. The Necessary: those expenses that must be expended to complete the work with sound safety practice and in compliance with applicable safety laws and standards.
2. The Unnecessary: those expenses that are created by worker injury or are caused by less than efficient safety practices or by safety inadequacies in the execution of the work to completion.

The task force believes that all expenses that result from the injury of a worker should be classified in the latter category.

A large amount of unnecessary injury expenses may prevent a firm from attaining a competitive position and also dangerously erode profit. Thus, it is management's job to protect the "potential profit pool" from the drain created by worker injury.

Further Defining Unnecessary Expense

Most employers obtain workers' compensation (WC) insurance from an insurance company. For this employer, the *unnecessary* expense is that portion of the workers' compensation insurance premium that is above the absolute minimum premium achieved when all injury is eliminated. Of course, all indirect expenses that arise when an injury occurs also are part of the unnecessary category.

Some employers are self-insured for workers' compensation. For this type employer, the *unnecessary* expense is equal to the sum of all claims costs paid on behalf of the injured employees to medical providers, plus all attorney fees and any indemnity payments to the injured. Some employers use service organizations to administer workers' compensation payments (medical and indemnity) resulting from injury. The service organization charges a fee, which adds to the burden, plus all indirect expenses caused by an injury.

Without effective attention to reducing injuries, part of the expense of poor safety (excess workers' compensation insurance premiums or claims losses plus insurance carrier overhead) can be so large as to drain all the potential profit, thus forcing a business to close its doors. Contractor and owner management at last realize this. Nationwide, the increasing company operating expense that flows to workers' compensation insurance premiums seems out of control. Those concerned feel powerless to stop the profit drain. Another state crisis in workers' compensation is reported almost weekly. In a number of states, workers' compensation premiums have doubled in the past five years. The range of workers' compensation insurance premium expense in construction from the lowest to the highest states is amazing. In most states, the workers' compensation premium charged for the construction classification codes is higher than any other type work in the state.

Workers' Compensation Premium Illustrated

Average base workers' compensation insurance premiums in the construction industry exceed 20 percent of direct labor in 18 states. In some states in the higher risk trades, the premium can be over 100 percent of direct labor.

The base workers' compensation premium cost illustration given in Table 1 is for a crew of 100 people working 2,000 hours per year in the following formula:

$$\text{Average Base Premium} = (\text{Direct Wages}/100) \times \text{Average Manual Rate}$$

Manual rates are the premium rate charges per \$100 direct wage. In other words, the rate is a percentage. Rates vary by trade in each state and are unique to each trade in each state. In the remainder of this publication, manual rates will be converted to percentage of direct payroll.

Table 1 reflects the extreme range of the annual base workers' compensation premium by comparing a low-cost state, a high-cost state, and an extremely costly trade, i.e., iron workers in Illinois.

Profit Compared to Premium

It is not uncommon for a construction contractor's workers' compensation premium to range from one to three times the corporate annual gross profit as illustrated below. Of course, premiums similar to the larger of those illustrated will dramatically affect the final cost of the job.

Table 1. Comparing Premiums across the States

Low-Cost State - Premium per 100 Workers per Year			
Wage	Manual Rate	Base	Premium per Employee
\$15.00	5%	\$150,000	\$1,500
\$20.00	5%	\$200,000	\$2,000
\$25.00	5%	\$350,000	\$3,500
High-Cost State - Premium per 100 Workers per Year			
Wage	Manual Rate	Base	Premium per Employee
\$15.00	30%	\$ 900,000	\$ 9,000
\$20.00	30%	\$1,200,000	\$12,000
\$25.00	30%	\$1,500,000	\$15,000
Illinois Iron Workers - Premium per 100 Workers per Year			
Wage	Manual Rate	Base	Premium per Employee
\$15.00	100%	\$3,000,000	\$30,000
\$20.00	100%	\$4,000,000	\$40,000
\$25.00	100%	\$5,000,000	\$50,000

Table 2. Profit Compared to Premium

Work Volume	Labor as % of Work Volume	Manual Rate	Profit	Premium
\$10,000,000	20	15	\$500,000	\$300,000
	30			\$ 450,000
	40			\$ 600,000
	50			\$ 750,000
\$10,000,000	20	30	\$500,000	\$ 600,000
	30			\$ 900,000
	40			\$1,200,000
	50			\$1,500,000

With the illustrated premium in Table 2, one can see that, at all management levels, an understanding of the costs caused by worker injury is desirable. A sound workers' compensation knowledge base is mandatory to operate a construction company in a viable way in the U.S. today.

The Direct and Indirect Expense of Worker Injury

The Direct Expense

Workers' compensation insurance purchased by the employer usually is the principal device used to cover the direct expense of injury. These include:

- Medical treatment
- Hospitalization where required
- Prescription drugs
- A weekly wage replacement sum (indemnity)
- Insurance company administrative costs and profit

Larger employers self-insure in many instances. When self-insurance is combined with safety excellence, the savings are always quite large, especially in the high-cost states.

The Indirect Expense

Researchers have found that indirect expenses are often more detrimental in the overall expense picture than direct expenses. The CII Safety Task Force found in an earlier study that the indirect expense of injury ranged from 2 to 20 times the direct expense (see CII Source Document 67, The Indirect Costs of Construction Accidents).

Excluding third-party lawsuits, the indirects versus the directs were found to average 2 to 1. Including third-party lawsuits, a factor of 20 to 1 can be reached. Another study done by a CII owner member firm in 1987 found that the average owner cost to handle a third-party lawsuit (one where an injured contractor employee sued the owner) was at least \$100,000 not including court awards or settlements.

In the CII research the indirect costs were found to average \$21,000 (including legal expense) for a lost workday case and \$1,100 for a recordable.

Many people overlook the fact that the total expense of worker injury includes this indirect component in addition to the direct expenses. The total overall expense of injury to an employee includes the indirect expense items shown in Table 3.

Table 3. Indirect Expense

• Lost work contribution or production resulting from the loss of the injured's work effort. • Training of replacement worker. • Administrative time to investigate the cause of the injury and preparing reports. • Time lost by fellow employees as they learn & talk about the injury through formal or informal gatherings.	THESE ARE NOT COVERED BY INSURANCE. THESE EXPENSES SERVE TO REDUCE THE EMPLOYER'S "PROFIT" MARGIN.
• Repair or replacement of any damaged material, equipment or facility. • Any required cleanup of the accident scene.	THESE ARE NOT LIKELY COVERED BY INSURANCE. EXPENSES ARE BORNE BY EMPLOYER.
• Handling any resulting lawsuits against third parties, i.e., client.	THESE EXPENSES MAY BE BORNE DIRECTLY BY THE CONTRACTOR IN HOLD HARMLESS CONTRACT CLAUSES OR BY THE OWNER IN THIRD PARTY CASES.

For those companies not successful in eliminating injury, the indirect expenses add alarmingly to the business overhead. This is part of the unnecessary expense drain from potential profit mentioned earlier, and thus such expenses increase the final cost of the product or service.

The Costs and the Savings

The High Cost of Injury

Premiums for workers' compensation insurance can be extremely high-even though injury frequency is very low, especially with smaller employers. Most but not all CEOs, who sign the workers' compensation insurance premium check, must recognize (1) the high cost of workers' compensation insurance and (2) the extraordinary cost of worker injury.

Calculating the Costs and Savings

No standardized methods are available to determine the total expense of worker injury. The total costs include the following expenses:

- Necessary
- Unnecessary
- Direct
- Indirect

The following paragraphs explain some of the important features of the total cost calculation. For direct expenses, the parts of the calculation are direct wages, manual rates (for classification codes worked), and the Experience Modification Rate (EMR).

Direct Wages

Workers' compensation premium is calculated using only the direct portion of wage expense. This excludes the cost of fringe benefits and generally the overtime portion of an overtime wage (all hours are at a straight time wage for purposes of workers' compensation premiums). Direct wage is usually the employees gross pay less any overtime premium.

Experience Modification Rate (EMR)

The final modified workers' compensation premium is determined by multiplying the base premium by the employer's EMR. EMRs can range as low as 0.20 for the very safe large employer to as great as 3.00 for the most unsafe employers. The smaller employer EMR is limited on the down side by the calculation formula to about 0.80.

In recent times some owners and contractors have adopted the policy of limiting bidders to those who have an EMR below a certain threshold level. Caution is advised in doing this. There are at least 25 different adaptations of the EMR calculation (see Appendix A). One uninformed in the intricacies of EMR determination can easily exclude a safer contractor using such a screening process. (See Appendix A for more on this aspect of EMR.)