# Cost Reduction and Optimization for Manufacturing and Industrial Companies

Joseph Berk


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# Dedication and Acknowledgments

I HAVE WORKED WITH great manufacturing leaders. This book is dedicated to Johnnie Crean, Chuck Sebastian, Ed Elko, Irv Barger, Greg Burns, and John Gozza. Thank you for all you have taught me.

PneuDraulics, Incorporated, a world-class developer and manufacturer of precision hydraulic aerospace components in Rancho Cucamonga, California, allowed access to their operation for many of the management concepts and photographs in this book. PneuDraulics is a great company, and I wish to thank their employees and the management team for their assistance.

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# Introduction

Every business can reduce its costs. The need for doing so is even more urgent in times of recession, but cost reduction is always important. It shouldn't take failing banks, tightened credit, and federal bailouts to make people realize that keeping costs down is important. However, in many cases when times are good, managers get sloppy. Sometimes the money is rolling in so fast that cost reduction seems to be irrelevant. The danger is that times don't stay good, and if an organization doesn't make cost reduction a priority in good times and bad, it will be left in the dust when times turn bad.

Every manufacturer and every industrial company wants to reduce costs, but knowing how to do so without adversely affecting quality or client satisfaction can be difficult. Cost reduction is not taught in business schools, engineering programs, or any other academic environment. Cost reduction is not an innate skill for most of us, but it can be learned. It's not that difficult.

I started focusing on how to reduce costs in a large manufacturing organization many years ago. I worked for a visionary leader who had accepted a quarter-billion dollar production contract at a projected loss. He wanted to turn that projected loss into a profit. That was my job. I was charged with reducing costs enough to turn a contract with a projected loss into one with a healthy profit.

I worked with brilliant and creative engineers, manufacturing managers, and purchasing specialists. We were successful in dropping costs in every area. After doing so, I analyzed and categorized what we did, and I realized two things:

- This isn't rocket science. For the most part, cost-reduction actions are commonsense endeavors.
- The previous statement notwithstanding, there is a technology here – a cost-reduction technology.

I grew that experience into a successful consulting practice helping other companies lower their costs and become more profitable. *Cost Reduction and*

*Optimization for Manufacturing and Industrial Companies* is based on practices developed in that first cost-reduction assignment and on refinements developed in the next twenty years of consulting engagements with hundreds of organizations.

I tell you these facts so that you know my background. It's probably not too different from yours, and I will tell you up front that I'm not any smarter than you are. What I bring to the table is that I have focused on this area for nearly a quarter of a century. That experience is here for you to use.

*Cost Reduction and Optimization for Manufacturing and Industrial Companies* is intended to be an easy book to read. I wrote it for supervisors, managers, and executives. It includes easy-to-understand and easy-to-implement cost-reduction concepts. The book has six general areas: labor, material, design, process, overhead, and measuring progress. The chapters are simple but direct. Each chapter:

- Dives into a cost-reduction area and starts with the bottom line first by summarizing key points.
- Asks a few questions to help you determine if the area presents an opportunity for your organization.
- Provides a road map for implementing recommended actions.
- Presents information that completely and succinctly explains the relevant concepts.
- Identifies who in the organization should do the work.
- Outlines risks and suggested risk-mitigation actions.

That last point is critical because cost reduction involves change, and wherever change is present, so are risks. You have to know what the risks are in order to manage them.

You can read this book from front to back in a day, or each chapter can be used in a stand-alone manner. The chapters are short. Each chapter provides proven tactics for cutting costs in a specific area. Some topics are covered in a few pages and others take longer, but the objective in each chapter is to get to the point without a lot of extraneous data. Where mathematics and other more complex tracking methodologies are needed, there are instructions on how to use Excel to make it easy. There are a lot of tables, graphs, and photos to show the concepts graphically because that makes them easier to understand.

As an added bonus, we are making an Excel file available to *Cost Reduction and Optimization for Manufacturing and Industrial Companies* readers for free (the file is available at www.ManufacturingTraining.com). You don't have to download the free Excel file to use this book (the concepts and the approach are explained fully in these pages), but it can save you a bit of time in areas where spreadsheets can accelerate the analysis, implementation, and management of each concept.

# 1

# Organizing a Cost-Reduction Program

## The Bottom Line

*You need a multidisciplinary team to attain significant cost reduction. Support from the top helps greatly. You will encounter resistance to the cost-reduction effort and there are risks associated with cost-reduction activities, but these issues can be overcome. The team needs to prioritize cost-reduction opportunities, assess the necessity of all costs, quantify projected savings, identify implementation costs and risks for each proposed action, meet at least once a week and maintain an action plan to create and sustain cost-reduction momentum.*

## Key Questions

*Do we have a cost-reduction effort in place?*

*Do we have cost-reduction targets?*

*How do we identify and eliminate unnecessary costs?*

*What obstacles will we encounter, and how will we get around them?*

## The Cost-Reduction Program Road Map

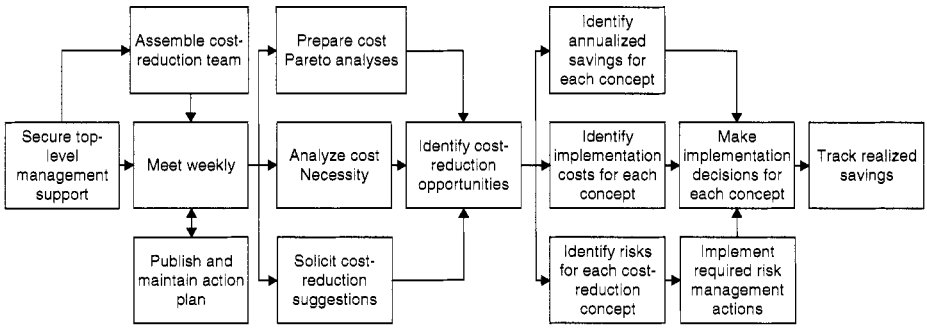


**Figure 1.1** The cost-reduction road map.

## Teamwork

If you want to reduce costs in your company, you can't do it by yourself. There are cost-reduction opportunities in every department. Identifying and implementing these cost reductions requires the enthusiastic cooperation of people in sales, finance, engineering, manufacturing, quality assurance, purchasing, facilities, and human resources. Even if you wish to limit cost reductions to a single area, you'll still need help from the people in that area and probably the finance organization. You can't mandate cost reduction. You have to have help from the people who will make it happen.

Senior management support will help to make the cost-reduction effort successful. If your interest in cost reduction is the result of a directive from the organization's chief executive, you already have the senior-level support you need. If your effort is self-initiated, support from the person at the top is a great asset. You need support from other cost-reduction team members, but if the chief executive is on board, others will be more enthusiastic about supporting the effort.

The best way to identify and implement cost reductions is to build a team with one or two people from each area who believe in the mission. This team should be made up of people who are already in the company. You don't need to hire more people for this (in fact, a recurring theme throughout this book will be to keep the headcount as low as possible).

## Resistance to Change

Most people are naturally resistant to change, and cost reduction will involve change (sometimes big change). Department managers and others may resist cost-reduction–related changes for any of several reasons:

- The idea was not theirs.
- The idea will involve effort on their part.
- They did not think of the idea first, and perhaps that is a source of embarrassment.
- The idea has implementation and operational risks.
- There may be turf issues, where the team is recommending eliminating or modifying a pet project, or the affected managers don't like the idea of someone else suggesting how their departments should operate.

All of these resistance-to-change factors are likely to be encountered as the cost-reduction effort proceeds. All of these arguments must be overcome if the cost-reduction effort is to succeed. It's a lot easier for people to accept change if the general manager or company president is visibly and consistently behind it. That's not the only requirement for overcoming resistance to change, but without top-level support, it will be harder to overcome.

## The Cost-Reduction Team

If the chief executive asks you to head up a cost-reduction effort, you are in a good position. The most important thing you should ask for is that you get good people on the cost-reduction team. You don't necessarily want the head of each functional area, and you certainly don't want people who are less-valuable employees within their departments. You want people who:

- Are bright, curious, and "out of the box" thinkers.
- Have a high energy level.
- Make things happen.
- Meet their schedule commitments.

If you can assemble a team with people meeting these criteria, you are going to have a lot of fun and your company will realize great savings.

In the first meeting, the first assignments should be *identifying and ranking the organization's current costs, and assessing the necessity of each cost*. You won't be able to do all of this in the first meeting, but the team members should be able to have gathered this information by the next meeting. This will require support from the finance department (as will many cost-reduction activities, which is why it makes sense to have a finance person on the team).

The cost reduction team should meet weekly at a minimum, because if you meet less frequently the effort will lose momentum. Here's a suggested approach for how the cost-reduction meetings should be run:

- You (or someone else who writes well and is good at capturing details) should take notes and publish meeting minutes no later than one day after each meeting. The meeting minutes should be sent to the chief executive, the team members, and the heads of each department. Doing this keeps others in the loop, and it keeps the effort alive.
- The meeting minutes should include a "living" task list. We'll present a suggested format and say more about this in a bit. Team members should provide input regarding the status of each task in the meeting, and the person preparing the meeting minutes should update the task list to show current status.
- The team members should discuss cost-reduction ideas in a free-flowing manner. The ideas may come from the team members or from others in the company. All of the ideas should be captured on paper. After discussing all of the ideas, the team should decide if each idea should be pursued. If the team thinks an idea has merit, in most cases it will go to the affected department manager. We'll talk more about this later.

## Cost Pareto Analysis

Identifying and ranking all of the organization's current costs is best presented on a department-by-department basis, and by overhead cost categories for the entire company. We recommend presenting this in a Pareto[1] format. It's important to do this for each department and by overheard cost category to identify where the greatest opportunities exist. Within the manufacturing area, for example, labor and material costs are probably higher than other costs, and based on that, they probably have greater cost-reduction opportunities. Smaller cost categories will also offer opportunities (and there may be low-hanging fruit that the team wants to grab), but in general the larger cost categories offer greater opportunities when seeking cost reductions.

Let's assume the manufacturing department reviews its monthly operating costs when they receive them from the finance department, and they find the following:

1. Vilfredo Pareto (1848–1923) was an Italian economist who is credited with originating the 80-20 rule when he observed that 80 percent of Italy's wealth was concentrated in 20 percent of the population. This led to the creation of the 80-20 concept and Pareto charts, which show most-frequently-occurring to least-frequently-occurring items, or most costly to least costly expenses. The idea is that efforts should be focused on the most significant areas.

With this information in an Excel spreadsheet, it is a simple matter to sort the data (it's already been sorted in Table 1.1) and prepare the Pareto chart shown in Figure 1.2).

**Table 1.1** July Manufacturing Department Costs

| Cost Category | Cost |
|---|---|
| TB Steel | $227,950 |
| Labor | $188,160 |
| Paint | $66,560 |
| Supervision | $54,000 |
| Overtime | $50,400 |
| Maintenance | $18,992 |
| Tooling | $14,777 |
| Electricity | $13,562 |
| Weld gas | $7,285 |
| Supervisor car leases | $7,012 |
| Fuel | $6,783 |
| Weld Rod | $5,934 |
| Travel | $4,254 |
| Coffee | $3,760 |
| Training | $3,250 |

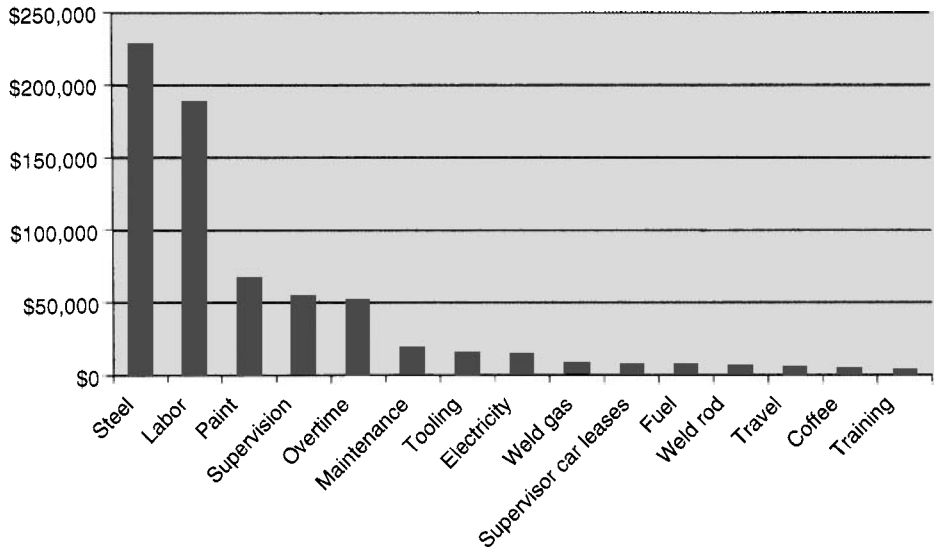


**Figure 1.2** July manufacturing costs Pareto chart.

Based on the information presented in Figure 1.2, it is obvious that material and labor are the largest cost categories. Logic dictates that seeking cost-reduction opportunities in these areas offers the best potential. In addition to steel and labor costs, overtime (a frequently abused area) pops out as a relatively large cost, so it should also become a cost-reduction target.

Once the analysis has been completed for each department and for the company's overhead costs, the team can then brainstorm reduction activities in these areas. The team can also apply the techniques to be reviewed in detail throughout this book.

As mentioned earlier, the team's activities should not be limited to just the largest cost categories. We're only suggesting that because of their size, these "big hitters" probably contain greater cost-reduction opportunities. There will be opportunities in the lower cost areas that come from other people's suggestions as well as the cost-reduction team members. The team should consider these as well.

## Assessing Necessity

The next action is identifying the magnitude and evaluating the necessity of each cost item. This is best done on a department-by-department[2] basis and for overhead costs. Table 1.2 shows this for the manufacturing area.

The idea here is to identify each cost as necessary, unnecessary, or nice-to-have. The team may wish to use different necessity descriptors, but the concept is to identify unnecessary costs and nice-to-have items as potential candidates for elimination. Necessary items should not be eliminated, but they may be candidates for further analysis using the techniques described in the rest of this book.

The first part of this task is relatively easy (identifying the cost items). The second part (evaluating the necessity of each) is much more subjective. Resistance to cost reductions in some of these areas will almost certainly emerge. Sometimes when costs are presented this way, the frivolity of the unnecessary costs becomes obvious and no resistance occurs.

Table 1.2 shows a recommended approach for accomplishing this.

2. One can argue that the department managers and supervisors should be making these assessments as an ongoing part of their jobs. Although this is true, it frequently does not occur. The exercise described here lends rigor to the effort.

**Table 1.2** Cost Necessity Assessment

| Cost Driver | Annualized Cost | Classification | Risks | Decision |
|---|---|---|---|---|
| Steel | $2,358,992 | Necessary | None | Keep, but reduce cost |
| Labor | $2,257,920 | Necessary | None | Keep, but reduce cost |
| Paint | $851,400 | Necessary | None | Keep, but reduce cost |
| Supervision | $648,000 | Necessary | None | Keep |
| Overtime | $645,000 | Necessary | Morale impact | Keep, but reduce cost |
| Maintenance | $265,888 | Necessary | None | Keep, but explore outsourcing |
| Tooling | $192,101 | Necessary | None | Keep, but reduce cost |
| Electricity | $135,620 | Necessary | None | Keep, but reduce cost |
| Weld gas | $88,149 | Necessary | None | Keep |
| Supervisor car leases | $84,144 | Nice to have | Morale impact | Evaluate other options |
| Fuel | $81,396 | Necessary | None | Keep, but reduce cost |
| Weld rod | $77,142 | Necessary | None | Keep |
| Travel | $55,302 | Necessary | None | Keep |
| Coffee | $45,120 | Unnecessary | Morale impact | Eliminate |
| Training | $32,500 | Nice to have | None | Keep, but reduce cost |
| Department party | $6,300 | Unnecessary | Morale impact | Keep |
| Supervisor golf club memberships | $5,000 | Unnecessary | Morale impact | Eliminate |

## Cost-Reduction Action Plans

Maintaining and updating an action item list is critical. It assures that each cost-reduction concept is captured on paper and retained until it has been objectively evaluated, and either discarded or implemented. It's also important because it identifies who needs to do what, by when they need to do it, and current status.

**Table 1.3** Recommended Cost-Reduction Team Task Action Plan Format

| Concept Number | Concept | Required Actions | Assignee | Required Completion Date | Implementation Cost | Estimated Annualized Savings | Risks | Status |
|---|---|---|---|---|---|---|---|---|
| 1 | Reduce steel costs | Determine if steel drop-off can be reduced | Smith | 15 Sep | $8,000 | $225,000 | None | In work |
| | | Introduce supplier competition | Gonzales | 30 Oct | $4,000 | $50,000 | Offending current supplier | Not started yet |
| 2 | Reduce labor costs | Develop and implement labor standards | Nguyen | 30 Nov | $20,000 | $125,000 | None | In work |
| | | Develop and implement efficiency measurement system | Nguyen | 30 Dec | $5,000 | $125,000 | Morale; inaccurate standards | Not started yet |
| | | Flowchart production process to identify cost-reduction opportunities | Jackson | 15 Aug | $1,000 | TBD | None | Complete |
| 3 | Reduce paint costs | Develop and implement paint application methods training | Aker | 10 Aug | TBD, considered to be low | $160,000 | None | In work; behind schedule |
| | | Consult paint suppliers to identify paint usage–reduction techniques | Aker | 30 Aug | $10,000. | $100,000 | None | Complete |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 4 | Reduce overtime | Identify overtime causes | Thomson | 15 Sep | $1,000 | See below | None | Complete |
| | | Develop and implement overtime budget | Dept Heads | 20 Sep | $0 | $15,000 | Morale; making sure work is complete | Not started yet |
| | | Develop and implement overtime request form | Thomson | 20 Sep | $0 | $8,000 | Department manager's acceptance | Not started yet |
| 5 | Eliminate free coffee | Secure approval from chief executive | Spitler | 15 Aug | $0 | See below | See below | Complete |
| | | Notify all personnel and implement | Dept Heads | 15 Aug | $0 | $45,120 | Morale | Implemented |
| 6 | Eliminate golf club memberships | Discuss issue with chief executive and department heads | Jones | 15 Aug | $0 | See below | None | Not done yet; behind schedule |
| | | If decision is to proceed, notify supervisors | Dept Heads | 30 Aug | $0 | $5,000 | Morale, industry perceptions | See above |
| 7 | Reduce maintenance costs | Identify dominant maintenance cost contributors | Balicki | 30 Sep | $500 | TBD | None | In work |
| | | Determine if more preventive maintenance would lower costs | Balicki | 30 Sep | $500 | TBD | None | Not started yet |
| | | Explore outsourcing maintenance function and make recommendation | Balicki | 30 Sep | $500 | TBD | Existing maintenance staff morale | Not started yet |

*Notes:*
Gray-shaded row indicates action complete.
Red-shaded row indicates action behind schedule.

The action item list becomes the cost-reduction plan, and maintaining and circulating it lets everyone know how the team is doing.

Table 1.3 shows a format that works well. As the table indicates, completed actions are shaded in gray and actions that are behind schedule are shaded in red. This gives the team and everyone who reviews the plan a quick look at how things are progressing. Nearly every assigned action will require the efforts of more than one person, but it's always a good idea to list only one name for each action in the plan. The chances of the action being completed on schedule are higher if it has a single owner.

Table 1.3 shows the plan for only one area in the organization, and the example shown here is not intended to be complete. The action plan needs to address all areas.

## Quantifying Estimated Savings and Implementation Costs

The actions the team identifies in its plan are all intended to produce a cost savings, but before making any changes, the team should objectively estimate what the savings will be. Great care in maintaining objectivity is required here. It is very easy to overestimate planned savings.

Most cost-reduction concepts require implementation actions, and there is usually a cost associated with these actions. Sometimes there are no costs (for example, if an unnecessary step is eliminated), but most of the time there are costs associated with changes. For example:

- Engineers may need to redesign products.
- Manufacturing engineers may need to redesign processes.
- The purchasing department may need to obtain prices from alternative suppliers.
- New production equipment may be required.
- Facilities engineers may need to modify the building.
- New designs may require testing to confirm requirements compliance.
- There may be disruptions as the change is implemented.

These actions all involve cost, and it is important to accurately predict what these costs will be. The obvious reason for doing this is that it makes no sense to implement a cost-reduction change if the implementation cost exceeds the savings.

Our experience indicates that it is best to quantify the savings on an annualized basis, and to consider the implementation costs in the first year. Sometimes

in job-shop production environments with production runs lasting less than a year it is best to quantify savings on a contract basis. This is another area where the finance department can help.

## Who Should Do This Work

The cost-reduction team can't do everything. In fact, by itself the team won't be able to evaluate or implement most of the ideas. The team is a catalyst. It has to work with others in the organization to gain support, evaluate ideas, and where appropriate, implement cost-reduction actions.

## Risks

Risk has to be a key part of the decision process when evaluating every cost-reduction concept. In assessing risk, there are three questions to consider:

- Have we done this before?
- What can go wrong if we do this?
- What are the things we need to do to prevent bad things from happening?

If the concept being considered has been implemented elsewhere, or if it consists of smaller actions that have been done before, the risk is probably minimal. If neither condition exists, the organization needs to aggressively and objectively identify all potential consequences (not just the planned savings) and take steps to manage the risks. Risks may include customer reaction, product performance, supplier reliability, morale, process yield, safety, and other factors. Specific risks in different areas are identified in each chapter throughout the rest of this book. The important thing to recognize is that cost reduction involves change, change carries associated risk, and prudent people identify and manage risk.

## References

W.J. Stevenson, Production/Operations Management, New York, McGraw-Hill, 2000.

R.W. Bradford, *Simplified Strategic Planning: The No-Nonsense Guide for Busy People Who Want Results Fast*, Worcester, Chandler House Press, 2000.

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# Part I

# Labor

Labor optimization is a key part of any cost-reduction effort. It's not the only part, but is an important part, so we will address it as the first of our six major areas. This section focuses on:

- Defining an appropriate headcount and controlling staff growth.
- Developing and implementing time standards.
- Measuring and using efficiency to improve performance.
- Assessing machine utilization and improving it.
- Controlling overtime.
- Making multiple shifts productive.
- Finding and reducing lost time.
- Using the learning curve to drive costs down.

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# 2

# Defining Headcount and Controlling Staff Growth

## The Bottom Line

*Headcount should be based on the organization's required output, the work content, the time required for the work, and reasonable efficiency estimates. The organization can use this objective, quantitative method for determining headcount in both direct labor and overhead areas. Headcount tends to grow if not aggressively managed; the organization should add staff only if the need can be justified after considering all other alternatives.*

## Key Questions

*How many people do we have?*
*How many people do we need?*
*How do we determine how many people we need?*
*Who approves staff additions?*
*Are there alternatives to hiring more people?*