PREPARING and DELIVERING TECHNICAL PRESENTATIONS

Kenneth G. Budinski

ASTM INTERNATIONAL
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Foreword

THIS PUBLICATION, *Preparing and Delivering Technical Presentations*, was sponsored by the ASTM International Committee on Publications. The author is Kenneth G. Budinski, Technical Director of Bud Labs in Rochester, NY. This is the first edition of Manual 54 in ASTM's manual series.

Contents

Preface

This manual guides students, technologists, engineers, and scientists through the process of making an oral presentation. It can be used as a personal reference or as a text to teach students or employees how to make oral technical presentations. It is a companion to a previous book dealing with technical writing. That book devotes one chapter to oral presentations. This book is completely about oral presentations.

It is almost certain, if you work in a technical field, that making oral presentations will be a job requirement. You may only do this once a year, month, or week, but whatever the frequency, your job success will be tied in some way to how well you make oral presentations. An oral technical presentation "sells" your technical work, as well as yourself.

The problem addressed by this book is poor technical presentations. I have worked in U.S. industry as an engineer for more than forty years, and I cannot begin to estimate the number of "poor" technical presentations that I have squirmed through, the number of unreadable slides I have attempted to decipher, and the number of talks that have wasted my time. Most of the time, the speakers had useable knowledge and information to communicate; they just "botched" the communication step. The audience received little return for their time investment, and the organization received little return from the speaker's preparation time.

This book is written by a still-practicing engineer, and the suggestions (called rules in the text) come from personal experiences (italicized anecdotes) in giving technical presentations. I have presented more than 100 papers at conferences and countless presentations in the workplace. Just about all of the problems that can occur have happened to me. My speaking situations range from the hallowed halls of Cambridge University to alongside an incredibly noisy factory floor tubing mill. The audiences that I have encountered range from one to one thousand. All of these experiences are distilled into a step-by-step procedure on how to make successful oral presentations—presentations that get your message across and achieve your objective successfully.

There are seven chapters in this manual, which begins with commitment and ends with the evaluation of your presentation. The book addresses formal and informal presentations, including common meeting situations. It starts with how to develop a presentation strategy that accommodates your message and offers something of value to the audience. It tells you how to research a subject, how to prepare a presentation, how to protect intellectual property, and then how to prepare and use visual aids. It ends with a chapter on delivering your message and speaking successfully in front of any size group. I fervently believe this book will help anyone who reads it to become a better communicator.

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1

Message Strategy

Goals:

- To understand how to develop a message strategy
- To understand how to use this strategy to develop a presentation

There are many situations that lead to an oral presentation, but once you commit to making a presentation, the first step that you need to take is to develop your presentation strategy. The presentation situation sometimes can serve as the foundation of your presentation strategy. For example, if you were asked by your supervisor to give a talk to the department on the proper use of material safety data sheets, you immediately know the objective (proper use of these sheets by department members), and you know the audience. All talks start with the five "Ws": what, who, why, where, when. The "what" is safety data sheets; the "who" is the department; the "why" is because the boss asked you; and the "where" and "when" can be arranged.

If the situation is that you agreed to make a presentation to a technical society in your field of expertise, the five "Ws" are quite different. You need to determine the "whom." You must ask the person who invited you to speak to estimate the size of the audience, their probable backgrounds (e.g., mostly engineers, mostly students, mostly government employees, mostly factory workers, etc.). You must know to whom you will be talking. You must decide what information you want to convey. You must have a goal for your talk to this group (why), and of course, you must learn the date, time, and location of the talk as well as the audio/visual (AV) facilities that are available.

On the other extreme is a talk to your work/school team. The who, where, and when are known, and you only need to develop what and why.

In summary, a strategy needs to be developed for a talk. It sets the scope and provides the focus. It is as necessary as the strategy of a general going into battle. This chapter will discuss the five "Ws" and other elements of strategy, such as expectations, scope, length, follow-up, acknowledgments, and other talk details that need to be addressed early in the development stage.

Who

Just as knowing the readership of a document determines how it is written, the intended audience determines what the talk will look and sound like. Audiences for talks fall into different categories.

Audience	Speaking Approach
General public	Only need to explain parochial terms
Peers	Explain all in simple terms
Co-workers	Do not need to explain most terms
Managers	Explain all in simple terms

If you are making a presentation to concerned citizens on a highway relocation, you need to define every technical term that you use and slant the talk to answer perceived concerns. A technical talk at a technical society meeting requires research to determine the background of the audience. If many attendees work in the steel industry, your talk should be a topic that will interest "steel people." If you are talking to co-workers, you will know what needs to be explained and what does not. Talking with managers is like talking to the general public. Many technical managers in the U.S. have no technical training. Human Resource (HR) or financial people head most hospitals in the U.S., and similarly, engineers no longer call the shots in manufacturing. You must explain everything in terms that even those without technical training will understand.

RULE:
Establish the "composition" of your audience.

Why

Some public speaking texts may have a different order for their "Ws," but I suggest you establish "why" very clearly, maybe even before "who." All of our actions have motivations. We eat to stay alive; we exercise to make our bodies attractive; we study to gain knowledge, and knowledge leads to wealth, at least theoretically.

Ask yourself why you agreed to give a talk. Will you get paid? Will it help your career in some way? Are you doing it to make sales contacts? Are you trying to mentor young engineers? Think about your motives—why you are giving a talk—and make sure that the talk addresses this motivation. [*I agreed to give a talk to a chapter of a technical society in a nearby city because it would help publicize my company in that city. I gave a talk at a European Community Conference in Portugal last month to assess market conditions for my company in Europe.*]

RULE:
Decide what you expect to happen as the result of your talk—this is the "why."

What

Now that you know to whom you are talking and why, you must decide on what you are going to say. I will have a later chapter on how to write a talk, but at this point you at least need to establish the subject and possibly the title. It is usually mutually beneficial to discuss subjects and titles with the person requiring a talk. You need to select a subject that will

be of interest to the people who are likely to attend your presentation.

When you are asked to give a status report to managers on your major program, the subject is essentially assigned. Similarly, the what is "assigned" in a talk to allay fears of the general public to a highway's relocation. Talks to co-workers are often assigned, but if, for example, you are asked to share what you are working on with your co-workers, you will have to think about what would produce the most value in sharing.

RULE:
What you say should reflect value to the audience.

You do not want to tell your co-workers or anybody else something that they already know. All audiences want new stuff. Re-runs will bore your audience and reflect negatively on you and your talk objective.

Where

There is nothing worse than having fifty people show up for a talk in a meeting room that holds twenty (except maybe showing up with a tray full of slides or CDs for a technical talk where the audience is at three tables in a huge restaurant hall containing fifty tables of couples eating out and groups celebrating occasions). Equally unnerving is giving a talk in a cavernous room that seats 500, with only six people showing up for the conference.

If you know where the talk will be, you can design it to fit the situation. If I had known that I would be giving a talk to three tables of people in a noisy public restaurant, I certainly would not have prepared slides. I would have given a talk without the use of visual aids. There is not much that you can do about inappropriate room sizes at a conference. They are already assigned, and size is based upon the organizers' perception of relative interest in a particular subject. However, you often can control "where" in your organization. Make sure that the room is adequate, and know what AV facilities will be available to you.

Most technical talks need visual aids. By their nature, they convey information, data, and ideas. Your talk strategy should include the type of visual aids that you will use.

RULE:
Know as much as possible about the location and AV capability of the talk location before you start talk preparation.

When

The time of a presentation is always a strategy factor. Sometimes you may be asked to give a lunchtime presentation. This means a short talk of limited scope. If you are talking to the general public about the highway relocation at a high school at 3:00 in the afternoon, the audience is likely to be much different than the audience at the same high school at 8:00 in the evening. Technical meetings on Monday night in the U.S. during football season need to be brief. Do not invest significant effort. You may be talking to a scant audience. Similarly, a colloquium to graduate students on a Monday after spring break is likely to be poorly attended. This does not mean that the talk can be sloppily prepared, but you may want to be less formal for a small group. A small group even opens the possibility of using demonstrations and samples that are difficult with big groups. [*I once gave a talk in a city that I had never visited before and was surprised to learn that this city had a festival that started the day of my talk. The festival drew over a million people, and all roads out of the downtown area where I was staying were closed to traffic for a parade. Needless to say, I had to stay over and change my travel plans.*]

RULE:
Consider all of the ramifications of when a talk is scheduled.

Expectations

We mentioned your "why." This is your expectation. You expect to get a "reward" in some fashion from your presentation, but there is another aspect to the expectations associated with a presentation. What do you expect your audience to get from your presentation? If your presentation is to a technical society, you may have an expectation that the audience walks away with the three key factors that control wear of steel metal forming tools. If you are talking to your company managers about a proposed research project, your expectation may be approval of $110,000 to fund the work. The expectation of a status report to team members may be that they realize that your part of the project is suffering because of procrastination on the part of other team members and you want them to "get on the stick" and develop a proactive role. Whatever the situation, you need to establish the expectation that you have for the audience as well as yourself.

RULE:
Establish your presentation expectations. What will they walk away with? What do you want to happen?

Presentation Length

All presentations need an end. The U.S. Congress is the only organization I know that allows speakers to talk until the audience disappears or forgets what they were about to vote on—a filibuster. Some very wise person, maybe many centuries ago, invented the bell to end a teacher's lecture. [*Thank you.*] Everyone has encountered teachers that would go on for an eternity if allowed. Lecture timelines stop filibusters in college. Even if you are the best speaker in the world and the ultimate authority on a subject, people can only absorb what the seat can endure. Oral presentations need to be concise. They are not intended to show how much you know about a subject or how much you did. They should be an abstract of what you know or did and be intended to give the audience some useful nuggets to walk away with. Some reasonable presentation lengths are:

Situation	Audience	Appropriate Length
Course lecture	Students	1 hour
Technical society dinner meeting	Other technical people	30 minutes plus 10 minutes for questions
Project proposal	Managers	20 minutes plus 10 minutes for questions
Status report	Team	10 minutes plus 5 minutes for questions
Safety talk	Co-workers	10 minutes including questions
Conference	Peers	Set by conference—usually 20 minutes plus 5 minutes for questions
Project public meeting	General public	30 minutes and time to answer all questions

Presentation length is a key part of the presentation strategy. One of the most common failures in public speaking is exceeding a reasonable or allotted time. If you exceed thirty minutes in a dinner meeting talk, the audience may leave or fall asleep. If you exceed your time limit at a conference, you will convey a negative impression of yourself. You know that you were given twenty minutes to speak; the audience wants you to keep to your allotted time because they often have concurrent sessions, and this only works if everybody observes the schedule. There is a negative effect of talking too long for all of the preceding situations.

Too short a presentation can also have a negative effect. We have all been in situations where a person did not adequately cover the advertised subject. We walk away mumbling that we did not learn anything.

RULE:
An oral presentation must have the right length for the situation: not too brief, not a tome.

Media

Usually, the situation of an oral presentation will determine what, if any, visual aids you can use. If you are giving a commencement speech, it is traditional to do it unaided. You probably can only use voice inflections, hand gestures, and body language to support your thesis—no graphs and tables. Most technical people [*myself included*] rely heavily on overhead and video projectors, chalkboards and the like in making oral presentations. Technical fields subsist on facts and data. It is natural and proper to use visual aids in a presentation. However, you need to make visual aids a consideration in your talk strategy.

- Can you use visual aids?
- Are there some that cannot be used?
- Will they be needed?

We mentioned that visual aids are not used for a commencement talk or award ceremony. They are usually not appropriate for a face-to-face presentation to the director of engineering. A prototype part would be appropriate, but not a slide talk. Some situations preclude the use of some visual aids. If the room where the presentation will be given does not have a video projector, and you do not have access to one, a computer-generated slide show would be eliminated for use in making visual aids. [*When I taught college evening courses, I knew that the only media available were a chalkboard and an overhead projector. All lectures were prepared with this in mind.*]

Finally, do you need visual aids? Do not use them unless they add value. That is the answer to the above questions. If you claim that seal failures on hydraulic assembly machines are the biggest cause of machine downs, you should have data to support this claim. Your audience will want to see a graph or another graphic that shows that seal failures are worse than all other problems. In this case, a visual aid gives credibility to your thesis. On the other hand, if you are talking with co-workers and they all know what the seals look like, it is a waste of their time to show them a slide of one or to pass one around.

RULE:
Determine whether it is possible to use visual aids.

RULE:
Decide on appropriate visual aids as part of a talk strategy.

RULE:
Do not use visual aids unless they add value.

Handouts

Some conferences require that you hand out a copy of your paper, abstract or even copies of your slides at a talk. [*Avoid handing out material before a talk because people tend to read the handout rather than pay attention to you.*] Evaluation forms are sometimes required after a talk. Some technical societies hand out question forms, and only written questions are fielded by the speaker. In any case, handouts should be a consideration in establishing a presentation strategy.

If you were making a presentation to management for project funding, an appropriate handout (after the talk) would be a copy of the written proposal. Of course, this means that you must have a written proposal on hand. If you do not, then the presentation strategy must include a way to distribute the appropriate handout.

RULE:
Make "handout or not" part of presentation strategy.

Summary

Before you get into any of the specific details of an oral presentation, you need to develop a presentation strategy. You need to ask the five "Ws": "Who," "Why," "What," "Where," "When." You need to establish the talk expectations for yourself and the audience, and you need to start thinking about details like talk length, visual aids, and handouts.

As an example, the following is a strategy on a talk that I want to present at an international conference that is held every few years at a university in England. I just received the call for papers, and I only know at this point that I would like to write a paper to lay to rest negative comments that I received on an abrasion test that I developed and proposed as an international standard. I have used the test for more than ten years on hundreds of abrasion problems, and I know that it works.

Who—The audience will be international researchers in friction and wear. Based upon two previous conferences that I attended, the makeup will be mostly European, between 100 and 200 people, with a significant student attendance, because it is held at a very large university with technical activity in subject areas.

Why—I want to establish the credibility of the test, get the standard approved, and possibly sell some test machines or do testing for others in this area. My primary motivation is test acceptance. The business aspects are secondary.

What—I do not know the title of the talk, but I want to answer the following questions: Is abrasion by less than virgin sandpaper still abrasion, or is it something else? I received negative votes on my test proposal from researchers who claimed that abrasion no longer exists once sandpaper is rubbed. This study will resolve the issue.

Where—A small college within the university will be the conference site. The lecture room, the last time that I attended, was a well-equipped amphitheater with tiered seats for about 300 people.

When—The conference is scheduled for October of next year with abstracts due in three months. This means that I have less than three months to obtain the test data.

Expectation—I expect to convince the international community that an abrasion test using sandpaper that is run over more than one time still abrades. The conference proceedings will be published and archived. Ultimately, I want the test standard to be approved.

Length—The last conference in this series limited the oral presentations to fifteen minutes, plus five minutes for questions. I will plan according to this.

Media—I will use a computer slide show. I will only need to carry a CD. I will also bring overheads in case there are computer compatibility glitches.

Handouts—I hope that they will not ask for one. If they do, I will give them an abstract or extended abstract.

General—Since I sent my abrasion test machine to another laboratory for evaluation, I may ask them to collaborate on this paper. I will send an e-mail and assess their feelings about collaboration.

This is the strategy that I developed for a yet-to-be written paper on yet-to-be completed work. This is my proposed way of developing a strategy for a message that I want to deliver to others.

2

Audience Accommodation

Goals:

- Tailoring a talk to various audiences
- How to obtain results from meetings

All written documents should be directed to a particular readership. This requirement is even more important in oral presentations; an audience is assembled to hear a talk that was advertised to address a specific subject. They usually assemble in a defined space, usually a room. They are captive. You must accommodate them by delivering facts and information on the advertised subject. Formal talks will have a specific title like:

Abrasion Resistance Testing with Abrasive Finishing Tape

Informal talks in industry may be simply announced as a line on a team or department meeting notice:

Review of P-10 friction tests—K. Budinski.

A proposal to management may include a one-sentence abstract on their meeting agenda:

Item on the agenda of the New Product Review Committee:

K. Budinski—Proposes a pocketsize silver-halide consumer camera with a new film format and unique optical imaging system.

An office celebration may be the least informal presentation that you may encounter:

You are invited to a celebration of John Down's twenty-five years with the company.
Conference Room 106
June 16, 2002 at 12:00 PM
Refreshments will be served
K. Budinski: Master of Ceremonies

If you are chairing a meeting, you must present an agenda that tells the audience what they will hear at a meeting and why they should come:

To: Metals Lab Personnel
From: K. Budinski (meeting chair)
Re: Monthly EWO project review

Purpose: To share what was accomplished on each project during the past month.
Objective: To keep EWO program on track and within budget.
Expectation: All people having EWO projects report on progress in five minutes.

Agenda:
1. Sharing of good news—All
2. Balling project—Ralph Swartz
3. Profilometry—Pete Smith
4. Emulsion can polishing—Ruth Lure
5. Backside friction—Mary Hope
6. Resource allocation—Diane Doron
7. Action items—Ken Budinski
8. Closing remarks—All

Of course, in this instance, the audience will expect to have the agenda items covered and to walk away knowing where the program stands.

The problem addressed in this chapter is that, far too often, presentations do not accommodate the audience. Attendees do not walk away with what is advertised. It is the purpose of this chapter to discuss audience accommodation for formal and informal presentations so that people get what is advertised from a talk. This chapter is aimed at making the audience the focus for preparation of a talk. I will discuss audience accommodation for formal and informal presentations and meetings, as well as how to conduct meetings.

Formal Presentations

The first step in audience accommodation is to determine the composition of your audience. As mentioned in the preceding chapter, various presentation situations will have certain types of people in the audience. A talk at a university will have a young student audience with a few professors who may be interested in your topic. This is a tough audience. You need to include significant background material to bring the students up to speed on your topic, while you need to include enough new information and theory to keep the professors interested. Both students and professors will have the expectation of learning something of value from you. So what do you do? You prepare a talk with "meat" for both.

If you are presenting on a technical subject to a group that is not in your field, you must do what you can to include material that you perceive interests them. You can usually deduce an appropriate topic from discussions with the person who requested the talk. Ask what they work on; ask where most audience members work; ask your host about what would interest the audience.

Sometimes you can glean the composition of your audience at a formal conference by simply scanning the names and affiliations of the other speakers. Many international conferences on the specific subjects in my field are attended by only hundreds of people, and there may be a hundred papers presented. The other speakers are potential members of your audience. Note whether they are academics or from the industry/business. If they are mostly academics, give them mostly theory and models. If they are mostly industrial people, try to give them some information that pertains to their industry.

Do similar things with presentations within your organization. Note what departments the invitees come from, and design your presentation to give them something that applies to their operation. If the invitees are mostly managers, give them background material and budget facts. Go slim on theory and models.

What I am suggesting is that for formal presentations you need to expend significant effort in deducing the composition of your audience so that you can meet their expectations.

RULE:
A presentation strategy must include the audience composition.

Here is my analysis of the composition of the audience that I will have if my paper on abrasive wear is accepted at the Erosion IV Conference:

- University professors, local—5
- University professors—other countries—20
- Local students—20
- Students from other countries—20
- Engineers from UK industries—15
- Engineers from European industries—20
- Engineers from U.S.A.—5
- Engineers from Asia, South Africa, and South America—10
- General interest/publishers—10

I scanned lists of attendees from two previous conferences, and as I recall, the composition was something like the above. Since about one-half of the audience is from academia, the paper should be on the scholarly side. The remainder of the audience is composed mostly of experienced engineers, so there is no need for tutorial material or significant background material in abrasion theory and processes. Computer slides would be the normal way of presenting visual aids to a group with this composition. Most will be computer literate and expect a computer generated data presentation. If the audience consists mostly of students, it may be necessary to define more terms and to review basics. This is the suggested way of dissecting the expected audience to give each attendee something of value.

Informal Presentations

The most common audience for informal presentations in U.S. industry is teams. Since about 1990, there has been a move to have major projects assigned to a team rather than an individual. Teams, allegedly, produce faster and better results than an individual. So teams meet on a regular basis, and each team member is expected to present any significant results obtained since the last team meeting. [*I have been on teams addressing a production crisis that met daily; most production related teams meet weekly or biweekly; research and development teams usually meet monthly.*]

Obviously, the audience for a team meeting is the team. You should still dissect the team to ensure accommodation. You need to tailor your presentation to the team. For example, if you are a metallurgist in a team comprised mostly of chemists, you should design your talk to avoid metallurgical jargon and to present data in a way that is relevant to chemists. Stress what you learned about chemical surface treatments, surface layer thickness, drying cycles, aging, etc.

RULE:
Team accommodation requires a presentation level tailored to the "mean" team composition.

Department meetings are another common presentation situation. Establishment of audience composition is still required. If you work in a materials laboratory, the composition may be:

- Three metallurgists
- Two plastics engineers
- Two tribologists
- One surface scientist
- Two analytical chemists
- Five laboratory technicians
- One manager
- One secretary

Seven of the eighteen department members may need background material when you are discussing the details of a technical subject. If you are talking about budgets, no background will be necessary. Your presentation should be at a level that all can understand. There is often a tendency in making a presentation to co-workers to be sloppy, to be careless in observing time limits, and to have an ill-prepared message with unreadable and careless visual aids. [*I worked under a number of department managers who regularly made overheads of ten or twelve point full-page typed documents as overheads. Of course, these are not visual aids. Nobody can see them, and using overheads like these insults the audience. It says that you do not feel that they are worth the effort to make a proper presentation.*]

RULE:
Never insult an audience with a sloppy presentation.

Handwritten overhead visual aids are absolutely acceptable, and they show that you respect your audience enough to prepare visual aids to assist them in understanding your message. Not using visual aids is also very proper for many types of presentations, so if you do not have time to prepare proper visual aids, it is acceptable to not use visual aids.

A presentation to managers, of course, requires speaking at a level that will be understood by each manager in attendance. Managers are always interested in promoting the success/value of their respective departments. Presenting a proposal to a group of managers requires a presentation design that offers something to each. If one of the managers in attendance is in charge of plastic injection molding, make sure that your proposal offers him or her some plastic molding benefit. The same is true for the packaging manager and the tool-engineering manager. When seeking approval or funding, you accommodate your audience of managers by presenting facts that show benefits to each. Beware not to exaggerate or make false claims. You could be drawn and quartered career-wise in the question and answer session.

RULE:
Never offer your audience something that you cannot deliver.

Conducting Meetings

Conducting a meeting is a special form of informal presentation. Some meetings are formal where who said what is documented and there is a formal agenda, protocol, and Roberts Rules of Order apply, but such meetings are few and far between. [*When I started in local politics, the town committee meetings were conducted in a very strict manner, but they have degraded to more of a social get-together. I participate in the development of international consensus standards in a standards organization and meetings on adopting standards and member balloting of these standards are carried out in a formal format with votes and discussions recorded.*] The meetings that most are likely to chair are team meetings or where you are put in charge of some function, item or activity and you must call meetings to accomplish your charge. The audience composition rule still applies. If you were assigned to the task of a safety audit of your work area, you probably need to start by calling a meeting to tell your co-workers what you expect them to do. If the department contains an office area and a machine shop, you need to make it clear what is to be done in each area and what the machinists are to do and what the office workers are to do.

All meetings should have a published agenda, and a format that works well for many meetings is:

Addressees:	Whom you want to attend	
From:	Your name	
Subject:	The title of your meeting	
Venue:	Date, time, place	
Purpose:	What the meeting is about	
Objective:	The end results	
Expectation:	What you want from this meeting	
Agenda:	The business items	The responsible person
	1. _____	J. Doe
	2. _____	J. Bronson
	3. _____	J. Smith

Supplying these data prior to a meeting accommodates your audience. It makes it clear why they need to attend and whether anything is required of them. Attendees will be more prone to attend if they know what is on the agenda prior to the meeting. A department cleanup meeting should have an expectation something like this:

> All employees should leave this meeting knowing exactly what cleanup tasks they need to do and by when.

RULE:
Always publish a detailed meeting agenda. If you do not have one, do not meet.

A final thought about meetings—very often, meetings can become dominated by a single person or by a few. If you chair a meeting, never allow this to happen. Be assertive, and tell the person or persons trying to dominate the discussion to let others speak. If you enforce your agenda and its time limits, the dominating problem should never arise.

RULE:
Limit times for people to speak at meetings, and enforce them.

Above all, allow all attendees to participate in team meetings. You are not really a team unless every person participates. Inclusion can be promoted by starting a meeting with each person sharing good news—some positive happening in their work or personal life. This can "break the ice" with audience members who may be shy or reticent. Asking each participant to state what he or she is going to work on between this meeting and the next meeting can be an appropriate conclusion of a team meeting.

RULE:
Do not let individuals dominate a meeting.

RULE:
Develop a system to allow each attendee to participate in team meetings.

Many organizations conduct meetings via phone and/or videoconference. If you do not have a face-to-face situation, definitely begin phone meetings by each person signing in and end with each signing out with an appropriate comment pertaining to what was discussed. This is audience participation.

Summary

Audience accommodation can take many forms, but basically, if you want your message to be accepted, you must tailor it to your audience and then do whatever is necessary to bring your audience "on board." They must feel sincerity on your part. When you chair a meeting, you must make every effort to allow all attendees to participate. You must—absolutely must—prevent individuals from dominating. You must hold to time allotments in your presentations, and you must enforce speaking limits when you are in charge of a meeting or other oral presentation. I will end my audience accommodation discussion by recounting the most effective way of enforcing speaker limits that I have encountered. [*Last week I attended an international conference on tribology research at a small New England college. There were about 130 attendees, including about 41 students who presented posters. The conference organizers went out of their way to encourage the students to mingle and talk with the senior researchers in attendance. As a way to introduce the students and their research to all, the conference chair asked each student to present a two-minute talk on why attendees should read his or her poster. Needless to say, with 40 posters, if each even talked for five minutes, it would be an unbearable sitting situation. So*

the chair allowed 13 speakers each day and enforced the two-minute time limit emphatically. Each student was allowed no more than two overhead visual aids. There was a large clock with a second hand viewable by the speaker, and when the two-minute time limit was reached, the conference chair swatted the speakers' overheads from the projector with a flyswatter. Concurrently, the vice-chair sounded a very loud moose call. Only two of the forty got swatted and moosed. It was the most effective enforcement of speaking limits (audience accommodation) that I have witnessed.]

3

Researching Your Subject

Goal:

- How much detail you should include
- How to gather facts

The problem addressed in this chapter is determining your message. Almost all technical presentations start with a request from a supervisor, customer, or peer, inside or outside organization, or as a response to an advertised "call for papers." The title follows next. Then you need to access resources to arrive at the data and supporting information for your message. It is the purpose of this chapter to suggest some research techniques and to discuss which information needs to be included in an oral presentation.

The ease of embedding graphics and tables into computer-generated slides has created a problem with people presenting too much in the time allotted. Concurrently, the almost universal availability of personal computers has created a tendency to let them be the sole source of reference information. Younger people, those who entered technical fields after 1983 when PCs were introduced to the masses, may tend to limit their research to information available on internet sites. Traditional books and journals are still preferred references.

The objective of this chapter is to reach an understanding of how to research a potential subject for a presentation and how to limit the scope and content of such a presentation. They are the things that need to be done before actually even writing your presentation outline. Specifically, we will discuss titling, research techniques, and presentation concision.

Titling

As in the case with written documents, the title of a presentation may be the most important words in the presentation. It is all-important when attendance at your presentation is optional. If you are presenting a paper at a conference, the attendees frequently only have your title as an indicator of what you will be talking about. It determines whether they decide to attend or not. The same thing is true in an industrial or other organization where you are presenting a talk for information sharing. Your title is your advertisement. Too long of a title may scare off attendees because they fear that you will be a windbag who goes on forever.

> ***Example***—"The use of acoustic impedance to measure the real-time running clearance of high speed rolling element bearings used in electric motors."

Too short of a title may not supply enough information for attendees to make the decision to attend.

> ***Example***—"Bearing clearance"

The right length is a title that includes what is a keyword from your presentation and hints at what is novel. Audiences want to learn something new.

> ***Example***—"Acoustic impedance to solve ball bearing problems."

The feature that you want to present is "acoustic impedance;" the "hook" is to solve ball bearing problems. People are busy. They do not want to commit an hour of their precious time unless there is some tangible return. If they can learn something that will help them in their job, they will come. If you have something to present that will help others, make it known in your title. Advertise!

RULE:
Your talk title is your most important advertisement. Chose it with due consideration.

Gathering Facts

You committed to make an oral presentation; you carefully selected a title—now you need to put your message together in your mind. Some common presentation situations are:

1. You committed to an information-sharing talk.
2. You are making a proposal to management.
3. You had an abstract and paper approved for a presentation at a conference. Now you must prepare your talk.
4. You are teaching a course.

In the first instance, the audience will be relying on you to provide useful information on the subject in your title. You must give the audience something that they do not already know. Give significant thought to what that might be. If you are talking about electroplating, mentally scan your knowledge of the subject to arrive at some topics or data that are new to you. If you work in the field, and the material is new to you, there is a good possibility that it will be new to your audience. However, do not simply parrot papers or claims of others. You are the expert; tell the audience what you know about these new subjects. For example, if you tried a new type of electroplating, and it was very prone to nodule formation, then present your facts in this area. Do not repeat supplier claims.

RULE:
If you are speaking as an expert, present new information that you believe to be fact.

If you have never used a particular plating process, you can cite test results of others and let the audience form their

own opinion, but it is best never to go down that road. Talk about what you know from your own work.

A proposal to managers requires supreme accuracy in figures. Most managers only respond to potential savings or profits. They want facts to back up claims. You need to gather facts from reliable sources and cite those sources. If you are proposing a new manufacturing process, you need to show the cost per piece of the present process compared to the cost per piece of the proposed process. You need details of the project cost, and you need to convince the managers that spending on your proposal will bring more savings than spending on another proposal. The believability of your data is a function of the reliability of your information sources. In the example of a new process, the industrial engineering department will have data on the current cost per piece, and they must agree with the new cost per piece that will result from your proposal. Production estimates should come from the production control department (in writing), and the capital cost should be a firm quotation from the equipment fabricator (also in writing). Labor costs should show a breakdown of hours and the hourly labor rate. In other words, have well documented facts from reliable sources.

RULE:
Proposals require hard facts from reliable sources (in writing).

The situation of gathering facts for a paper almost always requires a literature search. It is required by all technical societies that I know of, and all reviewers look closely at cited references and the validity of your references. Table 1 is a list of reference sources from library professionals. A secret of senior technical researchers is to get a reference or two on your subject and to scan their references for other pertinent references. Also, some books are very "bibliographic" in their referencing. Scan these for potential references that pertain to your subject. You must do whatever you can to determine whether the work that you are going to do or did has not been done before.

Some recommended U.S. websites:

General Reference:
http://www.google.com
http://www.atomica.com
http://www.amazon.com
http://www.nist.gov

Standards:
http://www.nssa.org
http://www.ansi.org
http://www.astm.org

Databases:
Safetydatasheets	*http://www.siri.uvm.edu/index.html*
ThomasRegister	*http://www.thomasregister.com*
Patents—U.S.	*http://www.uspto.gov*
Patents—Europe	*http://www.european_patent.office.org/espacenet/*

Bibliographic:
http://www.elibrary.com/s/edumark/
http://www.dialogweb.com
http://www.loc.gov/catalog (Library of Congress)

Searches:
http://www.SIPreports.com
http://www.his.com
http://www.scirus.com

You also must become conversant with the models and theories that pertain to your subject. You will have to correlate your research results with these theories and models.

RULE:
Formal technical papers require a thorough literature search.

In the example of my proposed paper on abrasion, I will begin my literature search with conference proceedings. I have attended almost all conferences that have been conducted on this subject during the past twenty years. They will contain papers from current researchers, and I can see what they are doing. Also, there will be a good supply of old papers on the subject. I will order copies of the most applicable. I usually read each and attach one or two paragraphs on applicability to my work on the cover page. I then design my experiment not to repeat the work of others, and I review the literature after running tests to see how the results of others compare with mine.

Other technical fields may require a completely different tactic, but preparation of a paper definitely requires knowing what has been done by others on your subject.

The final presentation situation on our list, teaching, usually requires a special type of fact gathering. Most students appreciate it if you teach the book that you are using for a course. They want a reference for what they are expected to learn. If you are using a teaching text, reread the material that you will be teaching, and do not stray far from the text unless you have references to give to the students on the material that is outside of the scope of the text. [*My teaching style has been to supplement the text material with personal experiences with whatever we are discussing. The only reference needed is a reasonable memory.*]

You can give students bibliographic information to supplement text material, but students seldom make the effort to obtain and read bibliographic references. If you really want them to know material outside of the course text, you may have to give it to them. You will need to do this with observation of copyright laws. So it may be desirable to review supplementary material yourself and teach what you want from this material using your own writings and visual aids.

RULE:
Teach from a text, or supply appropriate reference material to students.

The following summarize gathering of facts for a technical presentation:

- Establish the need for your work, and believe in it.
- Search for applicable theories and models.
- Make sure that your proposed work has not been done already.
- Ask opinions of others on your proposed work.
- Be current in your literature search without ignoring significant works in the past.
- Teach to a text.
- Use library and Internet sources.
- Document your data sources.
- Save references for discussion of results.

The Right Amount of Detail

Countless oral presentations fail because the speaker covers too much, covers too little, covers information inadequately, or "overdoses." How does one decide how much detail to include in a talk? I do not know of a formula, but I have heard rules-of-thumb, such as: plan on two minutes of discussion per slide. Thus, a thirty-minute talk could be handled with fifteen slides. What if you do not use slides? The correct answer to the right amount of detail is that it depends on the nature of the talk.

Situation	Right Amount of Detail
Formal talk/paper	• An introduction showing why the work was done • A procedure that can be repeated by others • Results, discussion, and concluding sections
Informal talk	• Abstract the body of work, and focus on the results • Announce the scope of your talk, and keep within the advertised scope of data that proves the thesis
Proposal	• Need for the work • Data that prove that the concept can work • Recommendations
Teaching	• State the theory/concept • Application of theory • What students need to know and remember to use the concept

Formal presentations almost always come with an assigned time limit. Your time allowance should be the basis for your presentation. All formal papers have the same basic elements.

		Time
Introduction	Background	3 minutes
Body	Procedure	3 minutes
	Results	8 minutes
	Discussion	4 minutes
Closure	Conclusions	1 minute
	Recommendations	1 minute

If you will have twenty minutes for your presentation, you can establish a time budget like the one suggested in the preceding table. Of course, you can vary this time budget as appropriate for the presentation, but all of these elements need to be present, and all need a time allowance. Some presentations by their nature do not need recommendations, so this element is optional, but only this one.

Formal presentations may or may not come with an assigned time allowance. If not, establish one yourself. Then you need to budget times for the elements of your presentation.

RULE:

Formal presentations require a time allowance for each required element (introduction—3 minutes; procedure—5 minutes, etc.).

Informal presentations need the same elements of a formal presentation, but some elements may not require a specific time allotment. For example, you are attending a team meeting, and you have been asked to present what you accomplished on the project since the last meeting a week ago. You know from the meeting agenda that five people will report on their work, and the meeting is scheduled for an hour with one-half hour allowed for reports. This suggests a time budget of six minutes for you. Since you will be talking with teammates, there is no need to present background information on the project, only on the work that you did since the last week: Why was it needed?—1 minute. You need to present the details of what you did: Procedure—1 minute. You need to present your results and discussion—3 minutes. End with your path forward—what do you plan to do next—one minute. This budget is probably too tight. There is not time for questions. Take a minute out of the procedure and introduction. Using the two-minutes/per slide rule-of-thumb, your five-minute talk can have no more than two data charts or graphs. Of course, use word slides for your introduction and closure.

So this is how you should approach an informal talk.

RULE:

Make a time budget for the elements of an informal talk.

Informal talks need the same logic as a formal presentation, but elements may be combined to suit the presentation situation.

Proposals also need a time allowance, and they must contain certain elements, but since "sales features" are most important, they need to be the focus. If you have twenty minutes for your presentation to managers, you may have a talk budget that looks like this:

- Why the project is needed—5 minutes
- The details of the project plan—2 minutes
- Feasibility of your plan: why you think it will work, supporting facts/data—3 minutes
- The proposed timeline—2 minutes
- Recommendation: specific, who do you want to do what—3 minutes
- Questions—5 minutes

Talks to managers need to include hard numbers and where you got them. Be specific in all statements, and do not waste your time allowance on meaningless statements.

> "This is the greatest coating, and it will completely eliminate corrosion problems on the decorative brass components on our faucets."

Superlatives like the above reek of snake oil sales and are a waste of your valuable time allowance. Present pertinent corrosion data on the coating from the literature or supplier, and show what specific problems the coating may prevent:

> "The coating has a hardness of 1500 HK, compared with a hardness of 120 for the uncoated brass. The coating could eliminate scratching in manufacture and use."

Teaching is a special oral presentation. Teaching requires the basic elements of a formal presentation. A teaching lecture has a time allowance. It also requires a budget. You need an introduction to tell the students what you are going to cover and why it is important. If you have one hour allotted, decide on an allowance for questions, probably ten minutes. Now you need to budget the remaining fifty minutes.

		Time
Introduction	• Subject, theory, importance	5 minutes
Body	• Derivation of theory	40 minutes
	• How it can be used in structural engineering	
	• Engineering mechanics applications	
Closure	• What you need to know and remember	5 minutes
	• Questions	10 minutes

Some teachers are masters of their craft and budget times automatically, but novices need to have a time budget, stick to it, and be sure to deliver a message of value to the students.

RULE:
Teach with a time budget.

Summary

I recommend that you use a time budget in all presentations and let this time budget determine the amount of material that you present. If your budget has five minutes for results, you cannot show the audience ten graphs of data. Presenting too much is the most common presentation problem. [*Last month I attended a research conference where all speakers were invited international experts. Just about all of them presented too much information. Most used computer slides and frequently they had two or more graphs on each result slide. I could not read most graphs, even though I moved closer to the screen each day. Also, most had to skip the summary of their work, their thesis, because they spent too much time going into the details on the graphs that the audience could not see. Many of these "experts" would have benefited from a refresher on presentation techniques.*]

Every presentation is different in content, but the methodology of "scooping" a presentation is the same. First, you must establish your message, then carefully title your presentation, then evaluate the audience and situation to decide on the level of detail to include. Proposals need hard numbers, facts, and few words. Formal presentations are abstracts of the written papers. Most conferences have a time budget, such as thirty minutes, for a paper. This will serve as the basis of your time budget. Decide on the portions allotted to introduction, procedure, results, discussion, and closure. Knowing that you have only five minutes for your introduction, list the factors/information that *must* be conveyed in this section, and make sure that it is only five minutes long. This kind of budgeting must be done for all presentations.

The data and facts for your presentation depend on the situation, but as I have mentioned, a formal paper is usually based upon a written report. The facts in the written reports are the ones used in the presentation. Visual aids such as graphs can come directly from the report. Informal talks to teams may be based upon work done since the last meeting. Your results are the facts that you need to prepare the presentation.

If you are teaching or giving a presentation not based upon completed work, the data and facts that you can use to develop your presentation can come from any source—from personal interviews to the Internet—but the facts must be referenced and verifiable. Refereed journals are the most reliable sources of technical information. Use them, but remember that concision is essential. Only present the information needed to support your message or thesis.

RULE:
Never create a tome.

4

Preparing an Oral Presentation

Goals:

- How and when to write a talk
- How to prepare aids

Hopefully I have made the case for a time budget for a presentation successfully; now I will address what goes into your time budget. How do you prepare what you will say in the introduction, the body, and all elements of your talk? Do you write every word that you are going to say in a talk? Do you prepare flash cards to keep you on track in your presentation? Sometimes, yes; sometimes, no. It is the purpose of this chapter to discuss a variety of speaking situations and how to prepare a talk for them. My objective is to have you, the speaker, adopt a system of preparing talks that works for you. The secrets to an effective presentation are sincerity, truth, and confidence. You must believe in your message, it must contain information that you believe to be correct, and you must have the confidence that you will deliver that message to your audience in a forceful manner. A well-prepared talk will supply the confidence component. This chapter will cover preparing an outline for a talk, writing a talk, and preparing delivery aids.

RULE:
Be sincere, truthful, and confident.

Outlining a Talk

Just as all technical documents need an outline, so do technical presentations. You need to know what you are going to say when you step in front of an audience, and what you say starts with an outline.

RULE:
Make an outline for all presentations; know what you are going to say.

Formal talks based upon a report or paper may be the easiest talks to prepare. You simply use the document as your outline. Glean introductory remarks from the introduction. Use section heads from the body as section heads for your talk, and the conclusions and recommendations can usually be used as they appear in the document. A very simple technique that has been used by audio/visual professionals for decades is to make slides or overheads by abstracting the document that you are presenting.

Oral presentations are abstracts of a longer work. You are giving a twenty-minute talk on your report on surface texture measurements using profilometry (an electronic stylus device that senses surface features such as roughness). The report is twenty pages long, and you know that many people whom you want to receive the information will not read your twenty-page report, but they may sit through a twenty-minute presentation. The way that this process works is to read the introduction and make visual aids in the form of slides using 3″ × 5″ cards. Number the cards, and put what you want to show to the audience in the left portion of the card:

Development of macroprofilometry	1
Title	

Of course, an introduction needs to show why the work was done and why it is important. Develop a slide to stress the points that you want to make in these areas.

Need: Conventional profilometry cannot quantify large wear profiles. Importance: We need to measure scoring to quantify engine lubrication effectiveness.	2

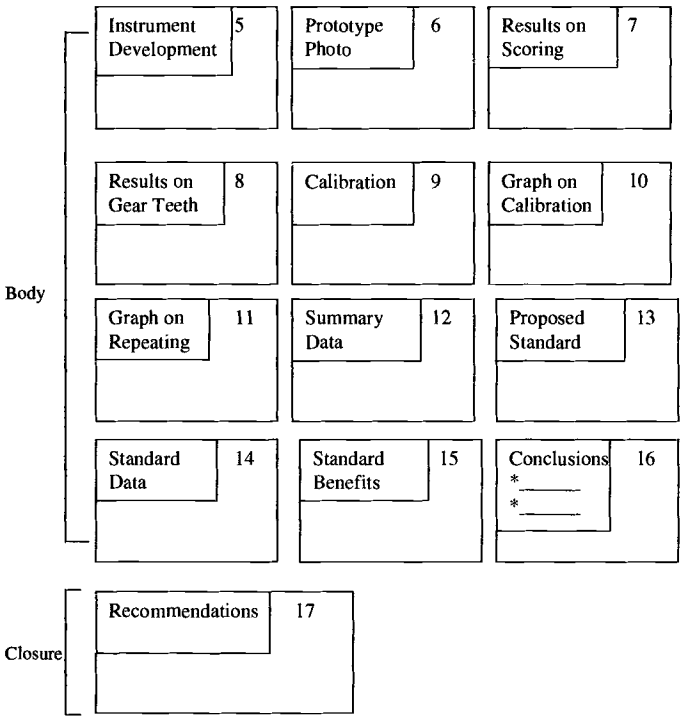
Another benefit of this technique is that it limits the number of words that you put on a slide. You simply cannot write a paragraph in the allotted space, and this is probably why this technique was invented. It forces concision. It makes you abstract paragraphs into a few words.

Next, make slides for your purpose in giving the talk and the objective of the body of work described.

Purpose: To show how to convert an electronic measuring gage into a profiler	3

Objective:	4
We hope to demonstrate to companies that develop profilometers that these devices can be used to measure macroscopic surface features.	

The format of the talk is simply the sections in the report and visual aids on details in each section.



The outline is complete, and so are the visual aids that you will use. You simply make the slides. The word slides can be made on a word processing program or a slide generation program. Data can be imported, but remember that if data are projected, they must be readable.

RULE:

Do not put anything on a visual aid that cannot be read by *all*. Project them and test readability.

Preparation of informal presentations depends on the presentation situation and what you have to work with. If you did a failure analysis for a production department and the department wants you to present your results at its regular production meeting, you can use your informal report to make overheads like the formal talk example.

If you are asked by the boss to present a talk at the research department meeting on a particular safety issue, you need to establish a strategy—research the topic, analyze your audience, and make a time budget for the talk. All the steps that I have been advocating are necessary, but they may take only minutes if you are very familiar with the assigned topic. These levels of talks should have visual aids, if for no reason but to focus the attention of the audience. Visual aids provide you, the speaker, with guidance as you present your message, and give the audience visual reminders of the points that you are making. They are more likely to accept your message if you use visual aids to complement your words. Assuming that your assigned topic is wearing safety glasses in the laboratory area, the talk preparation steps may look the following:

Title: Importance of wearing safety glasses in the laboratory

Message: People have been lax. On any day, one can see a dozen or so people from the department or outside the department not wearing safety glasses in areas where they are required. There is a very viable injury risk in not wearing glasses—state examples—and there is the possibility of a fine from regulatory inspectors. I will present some suggestions on how to improve conformance.

Audience: Twenty department co-workers, all whom know the safety glass policy.

Time Budget: (10 minutes)

1. Importance of safety glass use	1 minute
2. Seriousness of problem	2 minutes
3. Suggestions for improvement	2 minutes
4. Discussion and audience agreed-to action plan	5 minutes

Talk Overheads:

Title: Importance of wearing safety glasses in the laboratory	1	**Problem:** Statistics on violations	2
Purpose: Review Problem **Objective**: Get conformance	3	What can be done to improve conformance	4
Suggestions: 1._____ 2._____ 3._____	5	Give me your feedback:	6
Agreed-to action Plan (all)	7		

The talk is prepared when you think of suggestions for improvement and research fines and eye accident records to use to show the importance of wearing safety glasses to avoid eye injuries. The safety department can supply these data. You must also have data to show that there are frequent violations. Do your own audit of necessity. Go into the lab once an hour for three days, and record the number of incidents of people not wearing their safety glasses. The talk can be ended by hand writing an overhead with the actions that the audience agrees to put into action. If they are a part of the presentation, it is more likely that you will meet the presentation objective—no fines and no eye injuries.

Preparing a proposal is exactly like a formal talk. You start with your written proposal and abstract it into visual aids. The important thing to remember in preparing a technical proposal is that there will probably be managers in the audience who have no idea what inductively coupled plasma spectroscopy (ICP) is, so be very aware of jargon and technobabble. You must craft your message into a presentation that could be understood by any person in your organization. Your overheads or slides must be absolutely readable. A poor presentation can have a negative effect on your request.

RULE:

Proposals need extra care in preparation—sell with facts and few words.

When you teach, the outline is visually what you use to give the lecture. Figure 1 is an example of a lecture on a materials engineering subject. It comes from the textbook chapter on the subject. You read through the chapter. Use chapter subheadings as subheads for your presentation, and then make notes under each subhead showing important points under each.

[*When I taught engineering materials, I used to make an overhead of my lecture outline and show it to the students to show what we would be covering in the lecture. They seemed to appreciate knowing where I was going.*]

RULE:

When you teach, let the students know what you are going to cover in your lecture.

Lecture on: Diffusion Treatments

1. Processes: (Important points)
   - Gas – description, production suitability
   - Salt – description
   - Vacuum – description, advantages
   - Pack – description, solid to gas
2. Theoretical Consideration:
   - Ficks Law
   - Diffusion coefficients

Fig. 1—Outline for a teaching lecture.

Writing a Talk

As I will discuss under Presentation Techniques, talks should not be read, however, some presentation situations make it advisable. Almost all politicians speak from a prepared manuscript, and ad-libbed talk can produce some statements that later cause problems. The classic example is the time when a Vice President of the United States spelled "potato" wrong while telling a group of young people to be diligent in their studies. Ten years later, the public remembered this verbal slip. [*Once I had to give a 10-minute talk at a ceremony to give scholarships to engineering students. I selected a humorous (to me) theme: to show how engineering changed for the worse over the years. I poked fun at meetings and the computer hassles that are now common. The woman who types and edits my work told me she did not like my talk. She was right. My original talk would be inappropriate. So I started over with a different theme (focusing on engineering as a great profession), and the talk was a big success.*]

The point of this story is write important talks, but also to have them reviewed by a trusted person for appropriate content.

RULE:

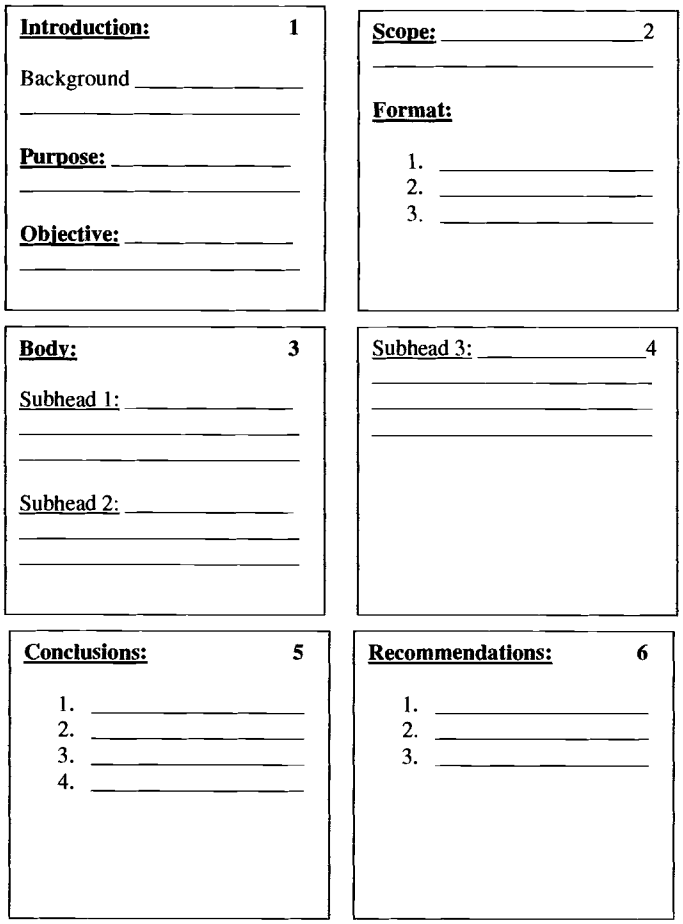
Have a trusted person review your important presentations.

Formal papers and technical presentations do not usually need to be written because they are based upon a written document that contains all details of what was done and the results of what was done. Probably the number one weakness in formal presentations is failure to tell the audience why the work was done. [*I have sat through countless technical papers where the speaker describes intricate experiments and extensive evolution of test results yet omits why he or she was doing all this work. Who needs a PVD thallium coating on gallium arsenide? I leave these talks with the impression of "So what? Who need this? How does it make a product or solve a problem?"*]

Audiences do not want to waste their time. If you do not show the need and importance of the work on which you are reporting, the audience will not be interested. You must try to link what you are talking about to the audience. This is done in the introduction. Introductions need to be written to at least include these elements:

Background—	The situation that prompted your work and why your work is important.
	Purpose of the talk—Why are you giving this talk?
Objective of work—	What is the long-term value of the work that you are reporting?
	Scope of work—Project/program boundaries.
	Format of talk—What aspects of the work are you going to talk about?

This part of your talk should be written, and an abstract of your message should be in each section of the body.



These few sheets of paper can serve as your "written" talk, and they can be your speaking aid if you get nervous or rattled when you are making your presentation.

Another part of "writing" a formal talk is acknowledgments. Funded research usually requires an acknowledgment of who did the work and where and who paid for it. This is the public relations aspect of getting money from others. The problem that exists is that people do their acknowledgments in various ways—some audience friendly, some not. [*I could crawl out of my skin, sitting through the acknowledgments from Academy Award winners. Some go through a litany that includes every studio employee from the CEO to the person at the studio parking lot gate.*] Audiences can accept a 30-second acknowledgment—no more.

Some speakers start their talks with acknowledgments. This is dead wrong. It distracts the audience before they even know if they want to hear what you are going to say. Acknowledgments belong at the end of a talk, and I recommend that you carefully write, edit, and review them. They can be presented in a word slide that you show to the audience for ten seconds after your talk is completed and you begin to take questions.

Acknowledgment

This work was conducted in the Materials Engineering Laboratory of Michigan Technological University, and the work was funded by the Tribology Initiative of the National Science Foundation. (Contract 61724 started 8/1/00 – completed 9/4/02)

You should avoid mentioning names of individuals because you will always omit someone and do harm, which is opposite to your intention. [*Last month, I saw a different type of acknowledgment that I would like to share. This person had a computer generated acknowledgment slide with a statement like the preceding, and under the statement, she had small color photos of the "Team" with their names under their photos. There were four, and the slide was quite attractive in its layout. I mention this because digital photography makes it easy to paste photos on a slide, and I found it interesting to see the faces of the behind-the-scene workers. She did not name them—we could all read them in the ten seconds that the slide was up. It was a nice acknowledgment.*]

RULE:
Acknowledge when appropriate, but make it concise and at the end of your talk.

Informal talks and teaching lectures may need portions written. If you want to say certain things without wandering and wasting the audience's time, you may want to write those portions. And then, do not read what you wrote. Only the Pope and politicians need to read a talk word for word. My suggestion is to write the introduction and closure to make sure that both of these key elements are done properly.

Preparing Presentation Aids

The 3″ × 5″ cards that I recommended for preparation of slides have been recommended as written presentation aids by public speaking teachers for decades. They used to recommend that you hold these in the palm of one hand or place them on the podium and flip through them as you progress through your talk. Some people are comfortable with this system of preparing and presenting a talk, but if the speaker fumbles with the cards, it can wreck the presentation. In nervousness, people can drop the cards or get them out of order, and then he or she becomes rattled and the talk can become a mess. I recommend writing portions of your talk as necessary, but give the presentation using only slides or overheads as your presentation aids. Effective speakers develop a system that they are comfortable with, and that is what should be used.

RULE:
Make presentation aids that feel right for you.

When you are giving a presentation without visual aids and you are not comfortable with 3″ × 5″ cards, I recommend a "crib sheet" in the pocket of your suit or possibly rolled up in your hand. This single sheet of paper (like the one that follows) will contain key words that guide you through the talk.

Title: Degradation of Fixed Abrasives in Use

Introduction:

Background – negative votes on ASTM test ballot
Purpose – show that there is substantive abrasivity after significant use
Objective – get ASTM standard approved
Scope – did tests with loop abrasion machine
Format – loop tests, results, discussion, conclusion

Body:

Loop tests:
1. describe machine
2. SEMs of abrasive
3. profilometry before and after

Results:
1. abrasion versus number of passes
2. SEMs after use
3. tool steel wear data

Discussion:
1. Samuel's model
2. Archard equation
3. correlation plan

Closure

Conclusions
1. abrasivity not lost
2. abrasivity decreases as square root of distance

Recommendation
1. approve test
2. advertise in Standardization news

We recommend that you practice a talk to see if you meet the time budget that you planned. If you use this "crib sheet" a few times for your practice sessions, you will not need this sheet during your presentation, but it is there in your pocket for assurance if you start to get rattled.

RULE:
Effective speakers have an "aid" available if needed.

This is part of presentation preparation and well-prepared talks has the best chance for success.

Summary

Formal talks based upon a written document are easy to prepare. The document headings serve as the outline. The data and facts come from the document. Visual aids can be prepared from the outline, and I recommend the use of 3″ × 5″ cards to "storyboard" a talk, even if they will end up being prepared in final form on a computer slide-generation program. The cards force concision; the computer does the opposite. You can import six graphs onto a single slide.

Informal talks require an outline, and the 3″ × 5″ card system can be used from the outline. All presentations need a rigid time budget, and each talk element deserves its own time allowance.

Sometimes it is advisable to write out an entire talk. This is especially true for occasions where you may be quoted in the press or for press releases or policy statements. Such a talk does not have to be read. It can be given by "scan and talk to the audience" technique, it can be memorized, or if you have the facility, a teleprompter can be used.

Finally, always have a presentation aid that will help you present your message as planned. Sometimes it is only a single sheet of paper, but it gives you protection in case of a nervous mental lapse. It can save your presentation.

5

Intellectual Property Considerations

Goals:

- An understanding of intellectual property
- An intellectual property strategy
- An understanding of copyrights

The term "intellectual property" came into common use in U.S. industry in the 1990s. It probably was invented by a business consultant, and thus it is not defined in most dictionaries. What it encompasses in U.S. industry are the technologies, processes, patents, products, secrets, and personnel that provide a competitive edge to your company. It is what gives you differentiation in the market. Significant intellectual property is usually necessary for business success. The problem addressed in this chapter is that a technical presentation, even within a company, can have a negative effect on your organization's intellectual property. Secondly, presentations can violate the intellectual property of others, and this can produce liability. I will discuss intellectual property and copyrights as they apply to oral presentations with the objective of giving a speaker sufficient information to deal with intellectual property, such that it can help rather than hurt your company's intellectual property.

We will discuss the elements that constitute intellectual property, how to maintain your organization's intellectual property, and suggestions on how to respect the intellectual property of others.

What is Intellectual Property?

Probably the simplest example of intellectual property is a restaurant with the best chili, hot sauce, salad dressing—the best anything. The chef, owner, or somebody in the organization has a recipe that produces a food item that 90 out of 100 people will like and prefer to competition foods. A restaurant that "owns" one of these recipes or employs a chef with special knowledge considers this their intellectual property. They can offer customers something that the competition cannot. Usually, restaurants and chefs opt to keep their intellectual property through secrecy. Many times, a chef refuses to even sell recipes on special dishes. It is worth more to him or her as a secret. Unfortunately, some intellectual properties can be stolen easily, so they need to be protected. For example, one of the problems found by all companies who sell hard, thin, coatings is measuring the substrate adhesion of these coatings. Once, I visited a coating supplier, and they showed me their adhesion test. It was so simple and effective that it could be used on any part, at insignificant cost. However, it was so simple that anybody could copy it after seeing it. If this process was discussed in a conference paper, it could become the industry standard, and the originator would lose its competitive edge in testing the adhesion of all coated parts.

Patents are intellectual property, and they can either protect an idea or divulge an idea to the competition. U.S. patent laws give the originator of an idea exclusive use for twenty years or some other term depending on the type of patent. However, competitors can easily bypass a patent by "improving" on a claim. If you want to protect patentable information, do not discuss that idea in an oral presentation.

RULE:

Patents can almost always be "copied" by others. Consider this when talking about new ideas in public.

The U.S. copyright laws are designed to protect intellectual properties, and they protect literary works, software, music, art, tradenames, some names and slogans, even recipes if they are put in the form of a collection with supporting text. If you are granted a copyright, you can bring a civil suit in U.S. Federal Court if your copyrighted material is used by another. There are more details than the ordinary person wants to know about copyrights on the U.S. government copyright website (*http://www.UScopyright.Gov*) but, essentially, a copyright lasts for a long time—up to 120 years.

U.S. copyrights are obtained by submitting your work to the U.S. Copyright Office with a filled-in application form and a filing fee ($30.00 for a short form in 2005). A certificate acknowledging the copyright will be issued within several months. Copyrights can be used to protect slides and overheads used in presentations. For example, if you give a talk that is videotaped or sent to various locations by computer and related equipment, this talk could be put on 10,000 computers and used at will unless it is copyrighted. [*I had this happen to me. I was asked to give a talk to a group of forty or so researchers at a large company's central research facility. My slides were on CD, and I used a computer controlled video projector for the talk. Unknown to me when I agreed to give the talk, it was projected to various company sights around the U.S., and it was videotaped. I asked if they (the company) retained any copies of my slides or the typed presentation. They said that they did not retain any, but I suspect that my data have been made available to all 46,000 PCs in the corporation.*]

RULE:

Copyright everything that you consider to be yours or your company's intellectual property, and make it known to your audience that this is not to be shared in any form.

Most successful organizations consider key staff to be part of the company's intellectual property and should be protected. Key staff are protected by making their work life and compensation appealing enough that they do not want

to work elsewhere. During the "e-com" years of the 1990s, many software companies gave key employees every perk from gourmet lunches to free Corvettes to keep them happy. Not everybody can write saleable software or draw greeting cards for which customers will pay $2.95. Staff who produce product concepts, staff with marketing brilliance, and staff with manufacturing acumen are the intellectual property of their employer. Companies with common sense recognize this and respond accordingly.

Developing an Intellectual Property Strategy

We mentioned how intellectual property that gets into a computer can quickly become everybody's property. So what should a person planning an oral presentation do about this risk? Now that I have been burned by corporate networking, I have a firm policy to use only computer slides that exist only on my laptop, and I will not give a talk that is video-shared. This may prevent unauthorized PC sharing of your work.

RULE:
Never let intellectual property leave your PC without a copyright.

Net meetings are very common in U.S. industry, and they also can be used to pirate your work. [*In a weak moment, I also agreed to make a technical presentation to a large company over the phone. I sent them a copy of the visual aids that I used, but this time I had them copyrighted. However, after my presentation, it occurred to me that they could have taped my oral presentation (on the phone), and I would never know. There were net-meeting participants in various parts of the country, and one participant could simply have been using a speaker phone with a recorder next to it.*] There may not be a good way to protect recording net-meeting presentations without getting some sort of legal agreement signed by participants. Thus, the risk of theft of your presentation is very real, and if you have a presentation that you do not want to share with the world, you should avoid video talks, net meetings, and other forms of electronic sharing.

RULE:
Consider the risk of electronic theft of your intellectual property.

There is another aspect of intellectual property besides protecting theft. Some people advocate defensive intellectual property. For example, some companies patent technologies that they are really not interested in developing just to throw off the competition. All progressive companies continually review the patents of their competitors. If they see many patents on oxide ceramics, they may deduce that you have a hot product in the works that uses this technology, but you may only be patenting these as a decoy-defensive patenting strategy.

The U.S. patent laws are written such that if a company shows prior use, they can still use a patented process or product. [*My former employer had a policy not to patent tests—any kind of test, but other companies patent tests. So a number of times I presented and published papers on tests that I developed so that I could still use them if they were patented by others.*] Many companies try to keep their ideas secret as their intellectual property defense. This can also bite you. The competition can patent a process that you have been using for many years but never divulged. You will no longer be able to use the process that you developed without paying royalties to the patent holder. [*I witnessed this happen on a product line that I worked on. For years we had been using carbon fiber reinforced plastics to make X-ray cassettes, but a competitor patented the use of carbon fibers anywhere in radiography. This is like patenting the law of gravity, but it happened.*]

RULE:
Be very cautious in selecting secrecy to protect intellectual property.

Our computer-dominated universe has prompted another way to protect intellectual property. You copyright a work and submit it to companies who put this work on the Internet (for a fee) to let all know that it belongs to you. This also establishes prior use in case there are patent problems. You announced to the whole world that you used this process or product.

In summary, every time that you make an oral presentation, you should do so with an intellectual property strategy. Do you want to advertise the use of a process or technology or do you want to protect some intellectual property? If it is the latter, you must consider the ways that the work could be stolen and develop a defensive strategy. Computers make protecting intellectual property a significant challenge (as the music industry has found out).

Respecting Copyrights/Intellectual Property of Others

Many oral presentations include data, quotes, graphics, etc. from others. We often use material from literature and other sources to make points concerning our message. If the works of others that you cite are copyrighted, you may need to get permission for their use from the copyright holder. In some countries, like England, you must get permission from the copyright holder, as well as the author (the author is not always the copyright holder). Permission is definitely needed if you simply copy a chart or graph from the literature and make it into a visual aid. Publishing professionals know the nuances of fair use, but most experienced researchers consider it "fair use" if you, for example, replot another's data on your graph to show how your data correlate. You must label those data, showing the author. Similarly, experienced speakers will quote a person. Put the quoted material in parenthesis, and show a proper literature citation:

> "The only way to keep from being miserable is to never have enough time to wonder whether or not you are happy."
>
> George Bernard Shaw

[*I wrote this quotation and its owner as I remembered it, but I did not see it in print in original form. I only remember it*

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5 OCTOBER 2005

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____

Fig. 5-1—Typical permission request form.

from being published in a magazine with just the author's name for attribution. Most people consider this fair use, but it would take many hours of research to find the copyright holder.]

There are many legal issues that arise when you use copyrighted material. Essentially, most copyrights are good for 20 years after the author's death, so most work from people who lived in the last century is covered by a copyright. [*I read somewhere that the copyright on the song "Happy Birthday to You" was still in effect in the year 2002, and a royalty must be paid whenever it is sung on radio or TV. I do not know that this is true, but such a scenario is quite possible.*] Because of the problems that arise in using copyrighted material, it is best to avoid using it in a presentation.

RULE:
Avoid the use of copyrighted material.

RULE:
If you feel that use of copyrighted material will add great value to your presentation, then use it with a proper citation, and get permission for its use.

Figure 5-1 is an example of a permission request. It is signed in triplicate, and the copyright holder keeps a copy, the publisher keeps one, and you should keep one. The permission form is sent to the copyright holder, usually the publisher of the book or journal, not the author. In fact, if you publish a paper in a journal and want to use a graph from that paper in a talk that you are giving, you must get permission from the journal. Permission requests are normally sent to "Permissions Editor" when you do not know the appropriate person to whom it should be sent.

Besides respecting copyrights, as a speaker, you need to respect the intellectual property of others, especially colleagues. In the 1990s, U.S. industry started to promote teams instead of individual work. Team meetings usually require presentations from individual team members. The ethical approach to presentations at these meetings is to never espouse the ideas of another as your own. There is no copyright law to protect your ideas in this situation. One way to try to prevent idea theft is to make a slide or overhead of your idea and to present it to the group before even discussing it with teammates. [*This may seem "un-team like," but I was on a team that contained a pathological idea thief. He stole one from me, then from another teammate, then another. The team leader was clueless about technical issues and accepted that they belonged to the thief. One of the team persons quit the team because of this person, but he is probably still stealing the work of others as I write this.*]

RULE:
Respect the intellectual property of others, and protect your own.

Summary

We conclude this discussion of intellectual property with an admonition to make it part of your presentation strategy. Decide whether you want to copyright your presentation. Make sure that your presentation is not giving away valuable organization secrets. Make sure that your presentation does not penalize your organization in any way. In fact, all presentations should have a positive effect on you and your organization. If one does not, you may want to reconsider making the presentation. Finally, respect the ideas and work of others in your presentations. Stealing from others eventually involves retribution. Make respect of the intellectual property of others a fundamental element of your presentation and part of your personal ethics.

6

Selecting and Preparing Visual Aids

Goals:

- When to use visual aids
- Effective visual aids
- Audience acceptance of your message

Visual aids that do not work are without a doubt the biggest problem with technical presentations. Audience feedback is not what it should be in most presentation situations, and most of the time the speakers do not realize that most of the audience could not see his or her graphs or read the data tables. Most times, people put too much on a visual aid; sometimes there are just too many. Sometimes they are unnecessary; sometimes they are just sloppy. Most oral presentations are not edited, and the audience becomes the testing ground for visual aids. When they do not add value to a presentation, they usually produce a negative audience effect.

It is the purpose of this chapter to present guidelines on how to design, construct, and use various types of visual aids. The objective is to create visuals that complement a presentation and can be seen and understood by everyone in the audience.

We will discuss when to use visual aids, types of visual aids, general preparation of visual aids, preparation of line, tables, demos, and how to merge visual aids into a presentation.

When to Use Visual Aids

Our definition of visual aids is: materials or demonstrations presented to an audience in an oral presentation to support or enhance a verbal message. I will discuss the various types available in the next section, but mostly people employ projection of transparencies and slides—either conventional film or digital. In this section, I will discuss whether or not it is even appropriate to use them in your presentation. Poorly prepared visual aids can have a very negative effect on your presentation; sometimes they are unnecessary, and sometimes they are the factor that makes a presentation a success.

It is likely that all of us have been in the audience of a presentation where the speaker uses a transparency of a full page of printed text as a "visual aid." The audience response is usually negative, and whatever the message the speaker had dissipates to the ambient atmosphere. The audience is offended. The speaker did not care enough about his or her audience to take the time to abstract the information on the page of text into bullet statements that could be seen and read by the audience. The only thing worse is to use a full page of text, cover all but a line, and proceed to lower the cover while reading the text. This speaker is saying that the audience is comprised of unintelligent people who cannot comprehend a fully visible slide.

Obviously, from my tone, this is a pet peeve of mine. I am personally insulted when a speaker uses the window shade approach as well as a page of twelve-point text as a visual aid.

RULE:

Never use normal 12-point printed text as a visual aid.

RULE:

Never partially cover an overhead slide and uncover more as you talk.

Computer-generated word slides can have bullet statements fade in as you cover points. This is acceptable since the slide is always fully visible as you add bullet statements. This is very effective since the audience reads at the same pace as the speech without the annoyance of the dark room created by partial covering of the projected image.

Another way that a visual aid can have a negative effect on your presentation is to use a visual aid that contains an error that will be picked up by some or most of the audience. [*I shall never forget my first project proposal as a green engineer to the plant general manager and her staff. My title slide read "Develope a new casting process for Corvair Throttle Bodies." I went through my talk as planned, but afterwards my boss told me that the general manager wanted me to have my material proofread in the future. She probably never heard my proposal. All that she remembered is that I did not know how to spell "develop." My boss made a "first big presentation" excuse to the general manager, and I got my funding, by my reputation was undoubtedly besmirched.*]

RULE:

Proofread visual aids to be absolutely sure that they are error-free.

Sometimes you simply do not need visual aids. Here are some of those situations:

1. Your talk is at a site with no facilities (an open area restaurant, etc.).
2. It is not the accepted way to present to this type of audience (a candidate's "few words" at a political rally, award ceremony, commencement speech, etc.).
3. Your message contains no facts or data for the audience to retain (you are interpreting a novel to a literature class, master of ceremonies at a gala).

4. Visual aids may distract from your message (motivational speech, sermon, etc.).

There are many other situations where visual aids are not needed, but basically, there are presentation situations where they simply do not add value.

RULE:
Only use visual aids if they add value to a presentation.

If you cannot decide whether they add value, rehearse the talk with a trusted person or work group and get his or her opinion. [*Many times I would "dry-run" a formal paper for an international conference with my work group. Invariably, they would find some visual aids helpful, others not, and I could alter the presentation accordingly.*]

RULE:
Rehearse presentations with trusted people to determine the value (and need) of individual visual aids.

Finally, most technical presentations almost always are enhanced by the use of visual aids. [*I have probably attended thousands of technical talks in my many years in the business, and I cannot recall a single speaker who did not use visual aids to present his or her thesis—except me. One time I was the first speaker for the morning at a large international technical conference. I had about fifty slides for my talk, and I checked to see that the projector worked properly at 7:50 AM for my 8:00 AM presentation. I was on my third slide when the projector started to smoke, and the projectionist asked me to stop while he hooked up the spare projector. I proceeded to slide number six, and that projector failed. The projectionist said that he would go to the audiovisual office at the hotel to get yet another. I stood in front of several hundred people for what seemed like an eternity. After five minutes, I stated that I had better proceed without slides or the talk schedule for the day will be messed up.*

I ended up drawing trend slides in the air with my fingers and describing complicated test results in words. Fortunately, I rehearsed this talk enough that I could remember all the parts and the conclusions. The audience was very understanding and gave me a big applause when I finished, but this experience really demonstrated to me the need for visual aids in a technical presentation.]

RULE:
Use visual aides with supporting data whenever you are "selling" a concept.

In summary, visual aids are inappropriate for some speaking situations; some visual aids do not add value and are unnecessary. Visual aids or poorly presented visual aids will have a negative effect on your message, but most technical presentations absolutely need them.

Types of Visual Aids

The original visual aid was probably a stick in the hand of a Neanderthal tribal leader. He drew images in the sand to propose a hunting plan. Some speakers use body language as visual aids, some use hand gestures, some pound the podium, and some do things to free-standing microphones. Motivational speakers pace back and forth on the stage and point their finger at the audience. All of these are done to enhance audience absorption of the speaker's message. Theatrics do not usually work well in technical presentations. The spectrum of visuals that can be used to support a thesis can be broken into four basic categories. Each has advantages and disadvantages.

Categories of Visual Aids

Text	Photo	Line Art	Table	Demo
Word slides Flip charts Blackboard Mathematics Formulae	Digital Slide Video Movie VCR	Schematic Circuit Organization Line graph Histogram Pie chart Bar graph	Word Number Code	Skit Demonstration Experiment

Visual Aid	Advantages	Disadvantages
Text	Easy and fast to make (low cost)	Can be uninteresting
Photos	One photo can equal many words	Need special equipment, take time to process/present
Line art	Easy to prepare, clarifies concepts	Difficult to do on ordinary computer (need CAD software)
Tables	Good way to collect information	Boring to audiences, may need interpretation
Demos	Audience remembers them	Difficult to execute in many facilities

Posters

Posters are very commonly used in technical conferences, department tours, and many other types of technical gatherings. I did not make "posters" a category since invariably they are "boards" containing elements from the categories that I have listed. They usually contain text, graphs, photos, formulae, and tables. The advantage of a poster is that the author does not have to make a formal presentation to an audience. A big disadvantage is that the author may have to present an informal talk on the work twenty times (if the posters are "manned"). [*I personally avoid the use of posters, since it is very difficult to make one that can stand alone (does not need you to interpret it for the viewer), and the work is not archived. It can be lost forever since posters are not published.*] Posters are most appropriate where they serve to replace an

oral presentation. A well-prepared poster next to a piece of laboratory equipment can answer questions on what the instrument does and why this is of value to the organization. Such visual aids are extremely useful when taking groups on a tour of a facility.

Text

The use of word slides, text, as visual aids needs no explanation. The Egyptian monument builders used text in stone to tell all who viewed the monuments what they were for and what was happening when they were built. Most of us old people grew up with chalkboards as the visual aid of choice used by our teachers. Electronic "chalkboards" and whiteboards with felt tipped pens are replacing chalkboards in new teaching facilities. Teachers do not like the mess of chalk.

Photos

Photos are usually the best visual aids for describing a complex object. They really are worth a thousand words. The enormity of the World Trade Center disaster was fixed in the minds of most of the world's population by the photos and movies of the planes hitting the towers. People will never forget those photos. Your talk may not contain a memorable dialogue, but if you show the audience a memorable photo, your audience will remember it and at least some of your message. Computer-controlled video projectors allow a speaker to easily interject a two-minute movie into a slide talk. These short movies are extremely effective in showing motion of interrelated parts, showing assembly, showing failure modes, etc. They are great!

RULE:
Consider photos and videos to clarify complex processes and objects.

Line Art

Line art is an image that is generated with lines. Drawing with a pen, pencil, or computer program creates line art. What can be drawn? Just about anything, but in technical presentations line art is almost mandatory. Graphs are needed to show trends, pie charts are used to illustrate relative parts of a whole, and histograms and other statistics aids are often manifested by line art.

Line art can be created by hand, using an artist, or using computer software. Computer-generated line art can be elegant and detailed, or it can be so crude that it might be left out. Many technical papers contain test equipment schematics made using the relatively rudimentary drawing capabilities on "standard" workplace software. Often, they come out so crude that the audience cannot figure out how the device works.

RULE:
Use line art to explain the complex.

Line art is my personal favorite for visual aids. I tend to sketch concepts for people as I speak to them on a technical subject. I usually do this on any scrap of paper nearby. Often, it is a napkin or a paper towel. Many times, these sketches become visual aids for a talk. I only have to draw them a bit neater and make transparencies or scan them into a computer.]

Overall, line art is probably the most helpful visual aid tool for explaining test procedures (schematics) and test results (graphs).

Tables

Tables are inherently boring and uninteresting to most audiences. I personally try to avoid them at all costs. I consider them to be a last resort. If you cannot find another way to present information, then use a table.

The available real estate on a slide makes them difficult to use unless your table only contains a few items.

Month	Inches of Rain in 2002	Average Rainfall
May	4	7.6
June	1	3.8
July	0.8	2.7
August	0.6	2.1

An audience can quickly interpret this table to show that this has been a dry summer, but line art in the form of a bar graph would probably be a lot more convincing and easier for the audience to grasp.

RULE:
Avoid tables that require significant interpretation by the audience.

Demos

My "demos" category includes any animations by the speaker to explain a concept or message. A teacher performing saponification in front of his or her class is a "demo" or demonstration. A speaker may perform a skit to convey a message. This is also a demo. Passing samples to the audience is another demo technique, however, it is one of the riskiest. Frequently, the speaker loses the audience as well as the samples that he or she passed around. Passing around one "sample" may work, but passing three or four samples to an audience of 30 to 100 can create a mess. When a person is looking at a sample, he or she is not listening to the speaker. Concurrently, the "passing about" distracts much of the audience and they stop listening to the message.

RULE:
Passing samples should be avoided as a visual aid.

Skits and live demonstrations are very effective visual aids, but they are very difficult to do right. [*I almost always try to use experiments to keep the interest of young people whom I am trying to interest in materials engineering, but I have had my share of disasters—experiments that did not work, equipment that did not work, injuries, and even a fire or two. One time, a sales person demonstrated his $100,000 laser velocimeter to our team. It did everything that we wanted. It gave us a real time graph of particle velocity and flux. The*

only problem was that someone in the audience blocked the laser light source with a 3" × 5" card, and the computer continued to emit particle velocity and flux data. The salesperson could not explain how the PC could continue to put out velocity and mass flow rate data when the laser was essentially shut down. This demo cost a sale. We probably would have bought this equipment if it were not demonstrated.]

RULE:
Demos are risky—use them with due caution.

Preparing Visual Aids

This is undoubtedly the most important section in this guide. The most common reason for the "failure" of an oral presentation is poorly prepared or misguided visual aids. Poorly prepared means that they may not contain usable information, they may contain errors, they may be unreadable by the audience, or they may "fail" for some similar preparation error. Misguided visual aids may contain no errors, they may have big letters, they may have bold colors, and the author may have spent a lot of time on them, but they do not work, and they do not enhance the speaker's message. They were prepared to guidelines that are just wrong. [*I once took a course in PowerPoint®*[1] *on slide making, and the person who was teaching the course was fascinated with the "technical" capabilities of the software, the colors, the shading, the fade-in and fade-out capability, animation, etc. The teacher's recommendations for making slides were dead wrong in my opinion. She promoted the bells and whistles that only serve to distract the audience. She had the audience marveling at the slide and ignoring the message in the slide. In my opinion, she was promoting misguided visual aids.*]

RULE:
Design visual aides in a way that does not distract the audience from the message.

This section will discuss the most important visual aids and present my recommendations on how to prepare them so they work—they support your thesis and reinforce your message.

Text

All presentations should contain some visual aids on what you are going to talk about. Sometimes, that visual aid is only the title of your talk. The title is the abstract of your talk, and it announces what you are going to say and tells the audience why they should attend. Thus, the title that you choose for a presentation is of great importance.

RULE:
Titles must be concise but still accurately reflect your message.

I recommend spending considerable thought on your title and then having it reviewed by others. Ask a trusted person "What do you expect to learn from this talk?" If the reply is different from your intended message, you need another iteration.

If you are using a chalk or white board or flip charts as visual aids, I recommend enough text in visual aids to at least outline your presentation:

Title: Text slide presentation
Purpose: Review accepted protocols
Objective: Slides that support your message
Format:
1. Word limits
2. Font type and size
3. Background
4. Additional guidelines

This outline could be penned on a whiteboard in about a minute, and it could serve as the only visual aid for your talk. This sort of text visual aid is normally the minimum that you should present to your audience. On the other end of the scale, a formal talk on text slide preparation will have word slides announcing each of the four elements of the body, as well as text slides guiding the audience through each.

RULE:
Use text visual aides to guide your audience through your presentation.

Now let us use the preceding format to discuss the other important aspects of text visual aids:

Word Limits—We already made the point (probably to excess) that the worst thing that a speaker can do to wreck a presentation is to project a full page of 12-point typed text. So what is the maximum number of words allowed on a visual aid? The answer is: the number and size that is needed to make a point and be readable by *every* person in the audience. [*When I used to attend weekly team meetings, I would make quick overhead visual aids by taking my 12-point typed report and copier-enlarge them so that, for example, my three conclusion sentences would fill they projection screen.*] Thus, it depends on the size of the room, but the purpose of a visual aid is not to let the audience read a report in text snippets. You must abstract every thought or point and express the substance in a few words in the visual aid.

RULE:
Design text visual aids to be readable by all in the audience.

A visual aid on word limits for text slides may be as simple as the rule just presented.

For those who want hard numbers, the professionals recommend only about eight lines with no more than ten words per line. You can do more words per line if the audience is ten people in a 20-foot square conference room with a 6-foot square projection screen. However, the limit on lines or bullets remains. Try not to exceed this. Needless to say, you will not be arrested by U.S. government visual aid

[1] PowerPoint® a registered trademark of Microsoft Corporation, Seattle, WA, USA.

police if you exceed these guidelines, but they should serve as a goal.

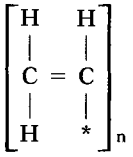
The final point that I want to make concerning text slides is the proper way to make word slides containing formulas and mathematics. Very simply, a formula visual aid is not an aid if all symbols in the formula are not defined on the same slide as the formula.

$$W = \frac{KDL}{3H}$$

Where:

W = volume wear of a sliding couple (m^3)
K = unitless wear coefficient
L = normal force on the sliding assembly (N)
D = total sliding distance (m)
H = absolute hardness (MPa)

Of course, it is not necessary to tell the audience in a talk on polymers that the symbol "C" stands for carbon and "H" stands for hydrogen—all members of the audience will be familiar with polymer structures, but you need to identify the non-standard symbols and acronyms:



* = metal ion

Fonts

In the "old days" in corporate America, big companies would have an audio/visual (AV) department that would make visual aids for employees who needed some for a presentation, internal or public. They knew that letters had to look a certain way and be of sufficient size in order for an audience to be able to read them. Most AV departments have gone the way of the one-hour paid lunch—there are not many in-house AV experts to provide guidance on selecting fonts for text on visual aids. We now have to prepare our own presentation visual aids.

Compounding the problem, the PCs that we all have to make visual aids have too many font types and sizes available, and it is too easy to change them. All people are different, so each will probably have a different opinion on what font type they like the best. However, many of the fonts offered on PCs are essentially unreadable when used as visual aids. [*Last year I received a notice for a 40-year class reunion. The font on the notice was some type of old Sanskrit or medieval lettering, and the notice was very difficult to even decipher. It may have been a joke, but I was so annoyed by the notice that I did not attend. An inappropriate font can have negative effects beyond readability.*]

RULE:
Visual aids with strange fonts can have negative effects on an audience. Avoid them.

So what type of font should be used for visual aids containing text? The only fonts that are acceptable are those used in newspapers, journals, and legal documents. Some of the acceptable fonts are:

- Times New Roman
- Geneva
- Helvetica

Occasionally, italics are appropriate, but you must have a reason for using them. Script fonts are extremely difficult to read, as are the decorative fonts, such as Old English, which are intended for wedding invitations and similar applications.

Font size is of utmost importance in putting text on visual aids. Hand lettering of overhead slides with an overhead-marking pen automatically creates an appropriate font size. The pens produce a line width in excess of one millimeter, and for letters to be readable, they must be about 8 mm high. Thus, the size of the marking pen tip forces a font size and a word limit when you make a visual aid. In fact, if you want to be safe in preparing text visual aids, make overheads with an overhead marker. [*I frequently used hand-printed text slides for informal presentations, and I took flack from some co-workers for using my "down-home" overheads, but they never failed to get my message across, and I only spent minutes making them. If I did not have to include graphs or schematics, I would make text overheads on a word processing program using a minimum of 30-point font size. They also work fine, and it is less time consuming (by a factor of 10) than using slide-making software.*]

RULE:
Hand-drawn overheads or slides are perfectly acceptable if they are not sloppy or written in script. Print neatly.

The optimum font size for text on visual aids depends on the size of the audience. You must pick a size that can be read by all. This means testing a size at the distance that you expect in an audience. If you are giving a talk within your organization, you know the approximate size of conference rooms. So, use a font size that is readable at 30 feet, and this will accommodate 99% of all conference rooms. If you are giving a talk to 3,000 people in an auditorium, the font must be visible at 300 feet. [*I hope that the CEO of my last employer reads this guide. He used to call one or two "town meetings" a year to talk to us factory floor workers in the 3,000-seat auditorium. Invariably, what he was showing on a video projector or on an overhead could only be seen by the people within 40 feet or so of the screen. Of course, all of these up-front seats were filled with low-level bosses seeking higher levels of bossdom. I used to sit 200 or 250 feet back, so I worked on reports when he discussed the visual aids that I could not see.*]

RULE:
Use a font size that will be readable to all in the audience.

When I prepare visual aids for papers at large conferences, I plan for a worst case scenario and try not to use fonts less than 30 points for anything. [*Normally, the papers that I give are attended by 30 to 50 people in a hotel conference*

room that seats about 60 people. This is what I have come to expect. One time, I had a paper accepted at an overseas conference; I assumed that I would be giving my talk in a 50-person room, which is typical. I prepared overheads for a 30 to 50-person conference room. Well, they had those kinds of rooms, but my session was held in a 3,000-seat auditorium complete with stage. The projection screen was so large that all of my overheads were readable, but severely truncated. They did not look pretty.]

RULE:

Prepare visual aids for "worst case" when presenting talks in unfamiliar facilities.

In summary, use standard fonts and a font size that will be audience readable wherever you give your talk.

Photos

Hopefully, I have made my case for the value of photos and related visual aids. Now I will address how to prepare them.

Conventional Film—Of course, conventional movies can be used as a visual aid in a technical presentation, but their use has almost disappeared [*in my experience*], probably because of the paraphernalia needed to project a movie to an audience. Conventional photographs make great visual aids, and they can be made as slides that can be projected as is, or slides can be made from prints, or overheads can be made from prints on a copier. It is also possible to scan prints and convert them to overhead transparencies or computer slides. My only recommendation is to make sure that they add value to the presentation and that they are good enough to be seen and understood by everyone in the audience. A too-dark print or too-small print will not help your cause.

Digital Photos—Digital cameras allow the creation of photo visual aids without the processing steps needed for conventional silver halide film images. The risk in using digital images is that you may not have sufficient resolution with your camera to create a projection-worthy visual aid. I recommend 3 × 3 megapixels for a minimum image capture capability for most projected images. [*So far my 2.3 × 2.3 megapixel seems borderline; that is why I am recommending 3 minimum. Silver halide can be the equivalent of about 25 × 25 megapixels—so film researchers tell me.*]

Some PC software allows generation of movies from sequential digital images. These are wonderful visual aids for demonstrating how objects move with respect to each other, or how they change when stressed. I heartily recommend their use when they add value. The risk in their use is that sometimes they overwhelm your message. All that the audience remembers is your movie. That is fine if your movie is your message. If it is about a test device or some ancillary aspect of your message, you may not achieve your presentation objective.

RULE:

Use movies judiciously; they can distract if they are not core to your message.

Another significant concern with the use of digital photos is that they typically take up lots of computer memory and can overload your system. In fact, the higher the image resolution, the more memory it takes. If this is a factor, you may want to forget the 3MB recommendation and use the lower resolution images to save memory. An ordinary photo uses about 600 kilobytes of memory. [*I gave a presentation using a significant number of photos, and the only way that the talk could be forced into my laptop was to put it on CD and use part of the computer memory that was supposed to be reserved for servicing the system.*] A one-hour computer slide talk with photos can sometimes overwhelm the ordinary computer system.

RULE:

Be sure that your computer has sufficient memory to handle photos combined with other slides.

VCRs—Video cassette recorders, and more increasingly DVD players, are as common as microwave ovens in the U.S., and they can be used to record a visual aid for a talk. Most times, they fail if they are not professionally prepared. Amateurs move the camera jerkily. They do not dwell long enough on key components/subjects, and the narration is halting and not well prepared in wording. [*One of my coworkers made a proposal for funding by self-recording and narrating the use of a sophisticated measuring device that he developed. He held the camera and talked as he operated the device. It came out as very well intentioned, but hilarious, to most of us in the audience. He ran into glitches in getting the machine operating and, of course, the image wandered erratically as he flipped switches and adjusted dials while talking and holding the camera. He got his funding, but mostly because of his sincerity rather than his video visual aid.*]

RULE:

Preparation of videos is best left to professionals.

A second risk in using videos is audience annoyance when you fidget with the VCR equipment. All of us have probably witnessed a fifteen-minute fumble session while the speaker gets the TV and VCR working together or sometimes the speaker rewinds to find a part of a video that he or she wants to show. If you are going to use a video on a VCR as a visual aid, you must test it ahead to make sure it can simply be switched on and off like a light switch and it will work. Fumbling with equipment will ruin your presentation. [*I personally avoid their use unless they are professionally prepared and are an adjunct to teaching a subject. I have never made a video, and in all my years in the business, I have only seen fewer than five videos well done by amateurs.*]

RULE:

If you are going to use a video for a visual aide, make sure it is not "jerky," that it will work without fumbling, and that all in the audience can see it.

Preparation of Line Art

Graphs

Graphs are usually the most effective means of convincing an audience of a trend or correlation of variables. They are

as much a part of engineering and the sciences as mathematics. They essentially are a visual display of a mathematical relationship/concept/formula. Graphs can be made into visual aids by hand drawing, by computer drawing software, by special graphing software, or by the general "business" software that is "standard" on most PCs. All graphs require essential elements and should be prepared to accepted guidelines.

1. The axes must be clearly identified.
2. The axes must have appropriate graduations or tick marks.
3. The units of what is plotted on various axes must be clearly shown as well as any magnification factors.
4. The graph must have a caption that tells the viewer what the graph is intended to show.
5. The line width must be sufficient for readability.
6. The graph must be enclosed with a line.
7. The graph should be uncluttered.
8. The graph must clarify rather than confuse.
9. The data points should show statistics if used for scientific purposes.
10. A key is required to identify multiple variables.
11. The background must enhance readability.

The following are the top five "problems" that occur when graphs are used in technical presentations:

1. Too small to read
2. Too cluttered (too many things plotted)
3. Too complex
4. No caption
5. Axes not well identified or improperly labeled

Computer-generated slide shows make it easy to import a graph into a slide that has very little available real estate. In fact, it is so easy that some people put in several graphs. [*At a recent conference that I attended, one speaker had a text title and footer as well as six graphs on the same slide. Needless to say, this slide was only for the speaker's viewing.*] In almost all cases, putting multiple graphs in one visual aid is too much from the aspect of readability and understandability.

RULE:
Only put one graph on a visual aid.

Cluttered graphs are also mostly due to computer software programs that allow plotting an infinite number of curves on the same graph. Sometimes speakers will plot a dozen different graphs on the same axis and use colors to discriminate between lines or points. First of all, not many people have good enough eyesight to discern multiple color plots on the same graph. To make things worse, some speakers use a colored background, such as dark blue, and have light blue, green, and red curves on the dark blue background. Needless to say, most people in the audience cannot discern one line from the other. Secondly, a significant percentage of the population is colorblind and they cannot discern certain color combinations regardless of the background color.

RULE:
Use a very light background (white, light yellow, powder blue) for all graphs and line art visual aids.

Many AV professionals advocate dark blue for slide backgrounds. I believe dark blue backgrounds to be inappropriate for any visual aid. Besides making it hard to see what is written on a slide, the dark background makes the room dark so that the audience cannot see the speaker and is inclined to nap. There may be instances where a dark background enhances a visual aid, but they probably are only known to those who advocate dark blue backgrounds. [*When I worked at large companies that had AV specialists on staff, I used to have to fight them to prevent the dark blue backgrounds. I have given 35-mm slide talks using such slides that were professionally prepared, and I felt like I was talking in a darkened closet. I could not see the audience and vice versa. I could not tell if my message was coming across or if they were all sound asleep.*]

Graphs are intended to simplify lots of data into trends that can lead to conclusions and solving of problems. Often, speakers will graph complex relationships such as:

$$\text{X axis} = \text{Beta factor} \quad \left(\frac{YS^2 - YS{\cdot}E}{\sqrt{E}}\right)$$

$$\text{Y axis} = \log \quad \frac{YS\ comp.}{E}$$

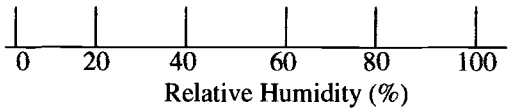
Most of us mortals can understand single variables on various axes, but when an axis content is identified as a formula, it is very difficult for the ordinary audience to visualize what will happen when, for example, (E) in the preceding formulas change. Such graphs usually only perplex your audience, and they turn off your message.

RULE:
Only graph simple expressions or variables.

Our number four graph problem is "no caption or an improper caption." Again, computer-graphing software is the root cause of many improper captions. Some programs always put a title on graphs. A title is unnecessary and inappropriate for publication, and often computer software puts this title at the top of the graph or within the graph. This distracts from the graph. Graphs should look like those in published scientific textbooks. The caption is horizontal below the horizontal axis identification, and it contains a word description of what is shown on the graph.

Fig. 1—Effect of relative humidity of ASTM G 99 solid particle erosion rate of A2 tool steel.

The independent variable, the relative humidity, is plotted on the X axis.



The dependent variable, erosion, is plotted on the vertical axis.

Erosion rate (m^3/s)

Some graphing software places the axis labels in strange

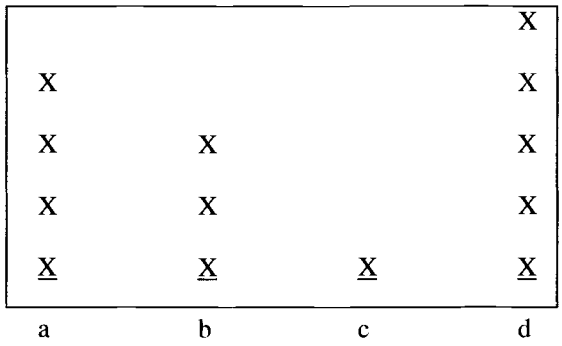
places. The vertical axis should have vertical text parallel to the vertical axis, and the horizontal axis or axes should have horizontal text below the axis numbering. Figure 6-1 illustrates the proper way to format a simple XY graph. More complex graphs still need this type of formatting.

RULE:
Graphs should only use a traditional format.

Sometimes it is appropriate to just show data points on a graph; most times it is appropriate to use a line to join data points. For scientific work it is most appropriate to join data points with a line, and the data points should be means with error bars reflecting the statistics applied to the means. [*I recommend error bars coinciding with plus and minus two times the standard deviation. This means that more than 98 % of the data falls within this range. This system is used on bar graphs to test for significant differences.*]

Other forms of line art that need consideration in preparation are complex graphs, histograms, pie charts, bar graphs, 3-D flow charts, process charts, and schematics. I recommend judicious use of complex graphs, such as 3-D spider graphs, unless they pass the person on the street test. Show your graph to a person who may typify your audience, and see if he or she understands the graph and feels that it helps to understand your thesis. If it passes, it may be okay to use, but there is still risk that it may not help your message. If you use complex graphs, what I said about labeling axes and captions is doubly important.

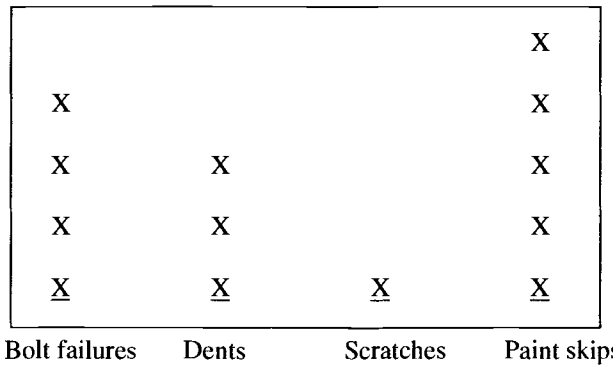
Histograms are very useful for pinpointing issues, trends, important problems, and the like. I recommend their use but caution that they be prepared with care. Often speakers use acronyms to label columns, and this can confuse the audience. This same thing is true for bar charts. Computer software often cannot deal with labeling vertical data. This problem can be dealt with by assigning a code to a column and using a key to explain the code.



Key:

X = 100 incidents
a = bolt failures
b = dents
c = scratches
d = paint skips

Horizontal lettering is preferred for columns because this is the natural form in English:



This is the way that columns should be labeled if there is room and, of course, a proper caption is also needed:

Causes of assembly rejections on August 28, 2002.

Computers like to make pie charts, and most do an adequate job, with similar problems with identifying pieces of the pie and captioning. I recommend manual editing if the computer cannot do a proper job.

RULE:
Use manual editing of computer generated graphs if the software does not allow a proper visual aid.

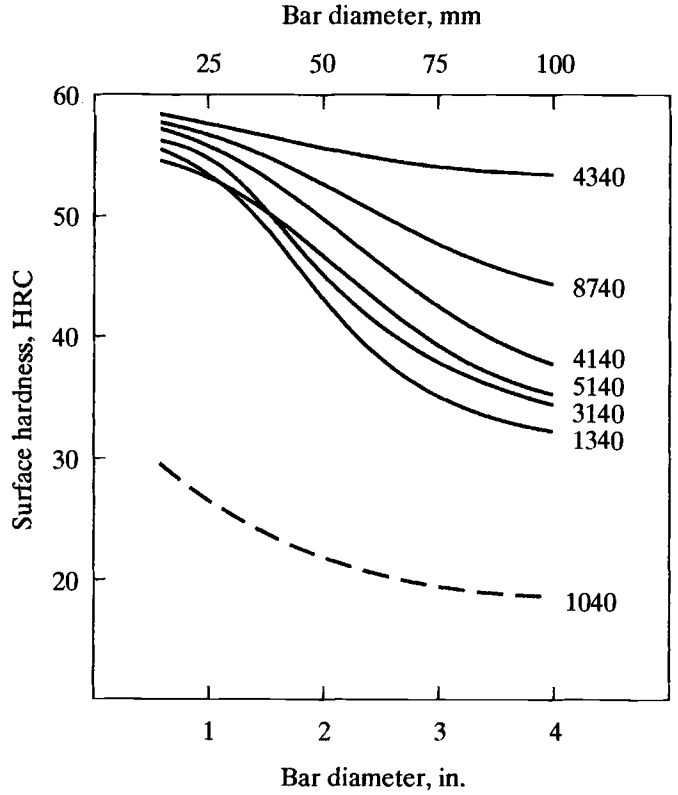


Fig. 6-1—A properly executed graph of experimental data (including a proper caption).

Circuit diagrams, finite element models, and CAD drawings often make effective visual aids, but you still need to edit them to get rid of acronyms, too small lettering, and colors that may not be seen by some of the audience. Another caution is to make sure that they are not too large to put on the real estate available on a slide or overhead. Many times, speakers use organization charts to show where responsibility lies. If the organization chart contains more than three rows, chances are they are too busy for one visual aid. Flow diagrams and process charts are another area where "too much" is a problem. A process to manufacture a drill bit may have twenty steps, so the speaker makes a box for each and shows the flow between boxes. Twenty is too much. These kinds of information require editing so that visual aids can be seen by all in the audience.

RULE:
Visual aids containing "too much" are not effective; edit them until all of the audience can see them and immediately grasp them.

In summary, line art visual aids are usually the "gold standard" of visual aids if they are properly prepared. Nothing is more convincing than graphical data; few things are more effective than a well-drawn schematic in explaining how something works, and flow charts really help show what is going on. Line art visual aids will "help" most presentations, but they must be done right; they must be simple, well labeled, captioned, and done in a size that is readable to all.

Tables

Tables can be made from numbers or words and combinations of words, numbers, symbols, and punctuation marks as in listing the code for computer programs. Tables make poor visual aids if the audience has to interpret the data to "discover" the point of the table. Visual aids are supposed to be that. If they add interpretation work for the audience, they are not aids; they often become a distraction. The audience is trying to scan the table to ascertain what the data mean, and they almost invariably stop listening to what you are saying. A graph is the proper way to interpret numerical data from a table.

There is no other way to present some type of information. If, for example, you were giving a talk on a study conducted on four metals, the audience will want to know the differences between the test materials. You must present a table with the appropriate description.

Test Material	Nominal Chemical Composition (Weight%)					
	Fe	C	Cr	Ni	Mo	Others min.
Havalloy	85	0.05	14			0.5Cu
Iridum	80	0.08	19	0.8		
Bartim	77	0.1	12	5	3	2.1Cu
Mochar	75	0.05	22	1	1.5	0.4N

This table explains these metals to metallurgists and it is an aid. If the audience is not composed of metallurgists, it may be presented in a different way.

Test Material	Description
Havalloy	A ferritic stainless steel
Iridum	A ferritic stainless steel with increased chromium
Bartim	A martensitic stainless steel in the annealed condition
Mochar	A nitrogen-strengthened austenitic stainless steel

The point is that tables, if they are used, should be designed to simplify your message to the audience.

RULE:
Design tables to make your point obvious at a glance.

Another important point regarding tables is that they need proper captions. Computer programs decide on the font, size, and location of the table "title." Tables do not normally need a title. A caption does the job better:

TABLE 3—Description of the metal alloys used in the erosion/corrosion experiments.

Test Material	Description
Havalloy	A ferritic stainless steel
Iridum	A ferritic stainless steel with increased chromium
Bartim	A martensitic stainless steel in the annealed condition
Mochar	A nitrogen-strengthened austenitic stainless steel

RULE:
Tables should be made with a caption that describes the information contained in the table.

In summary, tables are an essential part of visual aids, but they need to be carefully designed so that they do not distract the audience from your message.

Demos

We already mentioned some of the problems that exist when using demonstrations in a presentation. Preparation of a demo that produces the desired result should involve thoughtful design and significant rehearsal. A demonstration of a science-type principle will fail if the demo is too com-

plicated. The audience could get lost. Similarly, if it requires a lot of equipment, Murphy's Law dictates that one or more pieces may not work as intended. Safety can be a concern for some experiments. [*I almost always used a demo of the formation of isocyanurate foam from liquid chemicals when I spoke to young people about materials engineering. I would bring two small vials of clear liquid (about 20 ml each) and mix them for about thirty seconds in a large "popcorn" container. Within about two minutes, I would have about a cubic foot of rigid foam spilling out of the popcorn container. The students would be amazed; the demo never failed because it only required two little vials that could be carried in my pocket and an empty popcorn container. After doing this demo for about five years, I learned that the chemicals that I was mixing together are carcinogenic, and their use now requires a full respirator. There was a safety hazard (to me and the audience) that I was not aware of.*]

RULE:
Demos require design, rehearsal, and review before they are included in a presentation.

In summary, I do not recommend the use of demonstrations, passing samples, skits, and these types of visual aids unless they are thoughtfully designed and tested. A demo that does not work can have very negative results. A demo that puts you or the audience at risk is also not a good idea.

RULE:
Try to avoid demos in presentations.

Putting Visual Aids into a Presentation

We discussed when to use visual aids and how to prepare them. Now I will address how to put visual aids into a presentation. If you are giving a presentation that will only have two visual aids in a twenty-minute talk, you should have a very specific time to introduce these visual aids. This should be noted on the outline from which you are speaking.

Most presentations that warrant the use of visual aids need to be "story-boarded." This is the term that the AV professionals use when they are compiling the slides for a presentation. In the old days, we would gather all the talk slides, line art, and photos on a large frosted-glass light box with lights behind and we would put together the presentation. This was done by putting all of the visual aids that were professionally drawn or photographed from the 3″ × 5″ file cards used in preparing the talk. We would lay out all of the slides on the light box and start to put them into rows coinciding with the basic parts of the talk: Introduction, Body (procedure, results, discussion), and Closure (conclusions, recommendations). We would review the slides that were part of the introduction and make sure all were needed and determine if they adequately introduced the work. If something was not right, someone would add or delete slides to solve the problem. This procedure was repeated for each part of the talk. When everything appeared to be needed and in the right order, the slides were numbered in the top right corner and collected in order, just as they would be put into the projector slide tray.

RULE:
Storyboard your presentation to merge data and word slides.

The computer "slide" generating programs that I am aware of allow storyboarding. All of the slides in a slideshow can be seen on one screen, and that screen can be printed out. The talk can be checked for basic elements, omissions, and unnecessary slides, just like the old-time light box storyboarding. The important point to keep in mind is that the talk must contain the basic elements of any talk: Introduction, Body, Closure. [*I typically print out computer slides and storyboard them on a large table in an empty conference room. This technique is even nicer than the light box, because each slide has the size of a sheet of paper, and there is no eyestrain. This technique often brings out talk defects such as too many slides in a particular area.*]

Summary

This chapter may be the most important of all chapters in this guide since most talks use visual aids. Almost all PCs come equipped with slide-making software, and it is an easy matter to make slides. Sometimes they really are not needed. They do not add value; they do not help the audience understand your message. When visual aids are deemed absolutely necessary, they should be prepared using the guidelines presented (Figure 6-2), and they should be incorporated into the talk by storyboarding the talk. If all of these steps are carefully exercised, the end product should be a talk that effectively delivers your intended message.

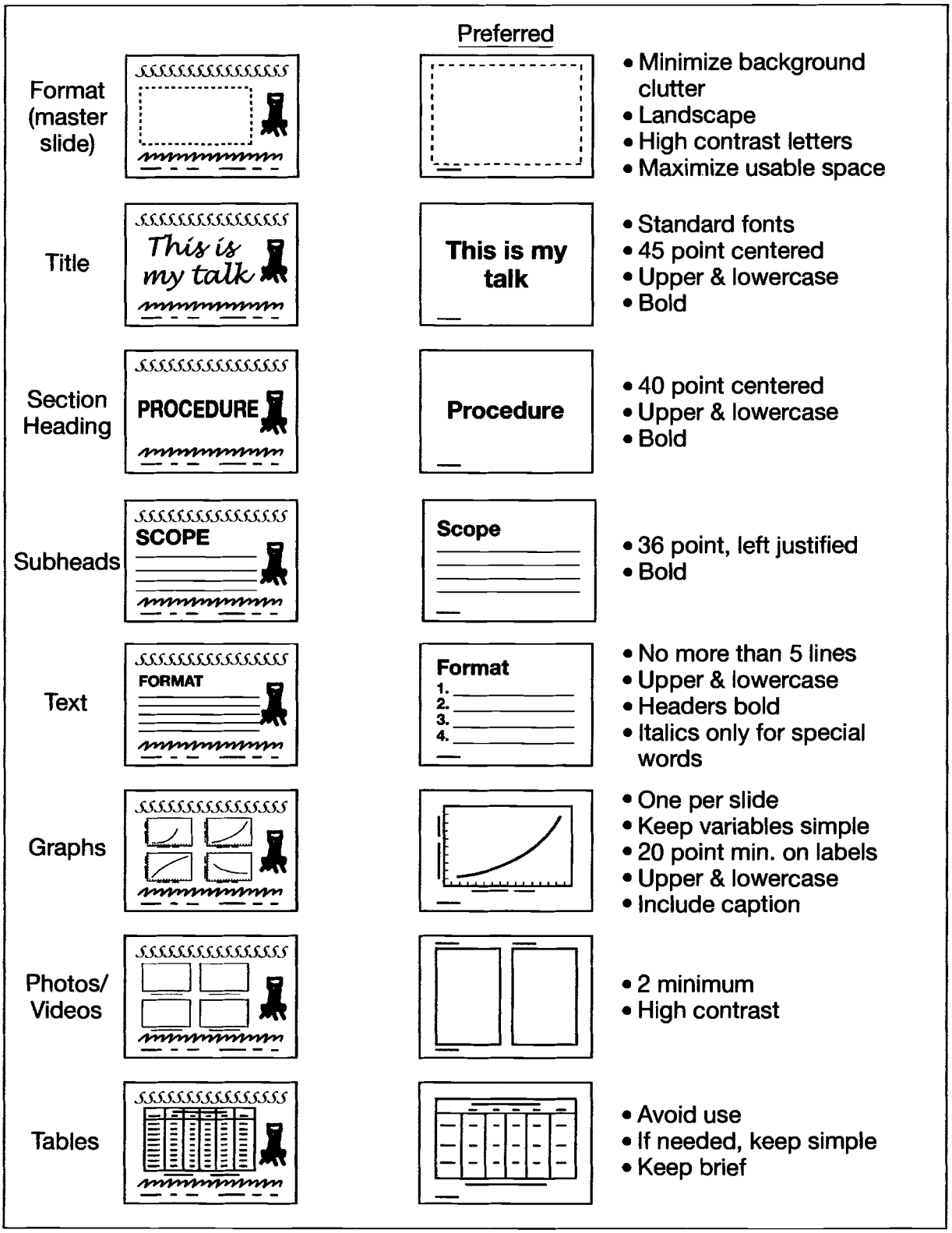


Fig. 6-2—Slide preparation suggestions.

7

Delivering Your Message

Goals:

- How to check out facilities
- Effective public speaking
- How to handle questions
- How to assess presentation results

This chapter is about delivering your product, your presentation. Hopefully, by now I have given you the tools and methodology to prepare a presentation; now, how do you deliver it? I have mentioned a number of facility problems that can arise in giving a presentation, but I have not discussed how to deal with the vagaries of meeting rooms and places where you may have to give your presentation. Occurrences, such as no projection screen for your slide talk, can stress a well-prepared talk.

A presentation can also fail if you make nervous mistakes in your delivery. For example, improper eye contact can lose an audience. Successful public speaking requires confidence on your part as well as consideration of the many factors that can get in the way of conveying your message to the audience. How you handle questions after a talk can also affect the results achieved by your presentation. A poor response to a question can sour an audience on an otherwise stellar presentation. It is the purpose of this chapter to discuss the details of making an oral presentation and to point out areas that need a speaker's consideration—things that you need to know and address. The objective of this chapter is a successful presentation that produces the intended results. We will discuss only informal and formal technical presentation, but my recommendations will apply to most oral presentations.

Speaking Facilities

Making an oral presentation in anything but a one-on-one situation requires consideration of the facilities available for your presentation. [*Many times I would present "tutorials" on technical subjects to as few as one technician. I would make these presentations in a conference room with an overhead projector, chalkboard, flip chart, and a door that closes. The former gave me the tools to teach; the latter prevented interruptions that could ruin the presentation. You owe it to the audience, even an audience of one, to not waste their time. You need to produce the intended result, and having appropriate facilities makes results more likely.*] Informal presentations to teams also require that you learn what facilities are available where you will talk, and you must make sure that the venue is appropriate. The following are facility checklists for informal and formal talks:

Informal	Formal
Can audience see speaker?	Can audience see speaker from every seat?
Are there facilities for the use of visual aids?	Visual aids facilities ( ) slide projector ( ) white board ( ) overhead projector ( ) video projector ( ) movie projector ( ) VCR & TV ( ) flip chart ( ) projection screen
Adequate seating?	Desired room seating arrangement? ( ) theater ( ) classroom ( ) U-table setup ( ) closed box seating ( ) conference table
Is the room too bright to show overheads?	Lighting situation? ( ) lights can be dimmed ( ) light controls at podium ( ) no light controls ( ) lighting controlled by assistant
Can audience hear speaker?	Public address (PA) situation? ( ) microphone at podium ( ) lavaliere microphone ( ) no PA system ( ) no podium ( ) speaking in noisy public area
Do you need a pointer?	Pointers available? ( ) laser ( ) stick ( ) flashlight ( ) none
Do you need a handout?	Handout requirements? ( ) none ( ) need xx copies by xxx to xxx ( ) give to assistant ( ) put in back of room
Do you need a tie?	Dress requirements? ( ) black tie ( ) suit and tie ( ) business casual
Is follow up required?	Talk evaluation ( ) none ( ) form available ( ) do your own

There are probably other facilities concerns, but my message is that a successful presentation requires attention to details regarding the presentation situation. [*One of the worst facility problems that I have encountered happened at a talk to an engineering society chapter meeting. The meeting was held in a restaurant—like most technical society meetings. I have attended countless technical society meetings, and they always have a screen and overhead projector available through the society. I committed the cardinal sin of not asking if projector facilities were available. Before the dinner that preceded my talk, I asked if I could test the overhead projector and PA system. My host said, "What overhead projection system? What PA system?" In this instant, I learned that my sixty overhead slides were useless, and my talk on surface engineering would be a big failure without visual aids. My host scrambled to take some action. He ended up sending a society member to his company and borrowing an overhead projector from a conference room (and missing dinner). We had to project on a pair of white drapes because there were no white walls in the room, and the speaking facilities were not what they should have been. It was my fault for not checking well ahead of my scheduled talk.*]

RULE:
Check facilities and presentation equipment before preparing your presentation. Make your talk suit the situation.

Delivery

A well-prepared talk will ensure successful delivery. Public speaking can bring fear to a 300-pound NFL fullback, but if you know what you are going to say, if you believe what you are going to say, and you really want to get your message across, your fears about public speaking will disappear after your opening sentence.

RULE:
Be prepared, honest, and sincere for any public speaking event.

Confidence is the secret to speaking in front of a group, and knowing your subject to the n^{th} degree is the mainstay of confidence. When you stand in front of a group and speak, you cannot hide your persona. A "quiet" person may tend to speak too softly with few words; a boastful person may tend to go the "windbag" route. A dishonest or insincere person may tend to talk in superlatives and make statements that cannot be true (if you think about it). So an audience will not believe unsubstantiated claims; they tend to make the entire presentation unbelievable.

RULE:
If you want an audience to accept a fact, show them the basis or calculations.

If you have personality traits that run counter to public speaking, you can overcome them with sincerity and subject knowledge, which in turn produces the confidence to speak to the world. [*My wife is a reticent public speaker; she tells me to keep my mouth shut at public meetings that we attend together. However, I have seen her speak out forcefully in front of hundreds of people when she feels that she must speak out against an evil. Passion for her cause overwhelms her meek personality, and she becomes an effective public speaker.*]

RULE:
Have passion for your message.

Passion will negate personality traits that may inhibit your ability to speak in front of others.

Dealing with Nervousness

I suspect that nervousness and apprehension are part of public speaking. Even seasoned public speakers, professional actors, and news commentators have some apprehension before they come in front of an audience. You want to do well, and so you rerun in your mind what you are going to say, where you will stand, how you want the talk to go. This nervousness/apprehension is probably your body's way of putting all systems on "readiness." [*I swam competitively in high school and college, and I was always nervous before a meet; so were my teammates. When I stepped on the starting platform, I used to un-tense my arm, leg, and neck muscles by going limp and shaking my legs and arms and moving my neck around. This lowered the nervous tension and set me up to go all out at the sound of the gun. Nervousness before an event is natural. All that you need to do is to find a way to deal with it that suits you.*]

RULE:
Develop a system to address pre-presentation nervousness.

As I mentioned previously, effective public speaking is an acquired skill. It takes practice. Each time that you make a presentation, you will see nervousness decrease. When you are a seasoned speaker, the nervousness will simply be part of readiness. [*When I have to make a formal presentation at a significant technical conference, I practice my talk each night for a week before the conference. The night before my presentation, I go through the overheads/slides again, and then I forget about the talk. I listen to the talks preceding mine, and when it is my turn, I simply get up and give my talk.*

Not worrying about the talk prior to the talk seems to convert nervousness to readiness for me. Another factor that helps set your mind at ease is to be familiar with the meeting room facilities. Technical conferences have a "speakers' breakfast" where you can meet the other speakers on the program and learn what you need to know about the delivery facilities: lighting, PA system, projector, questions, etc. Knowing your speaking situation in detail will also help to turn nervousness into readiness.]

RULE:
Test the presentation facilities prior to your talk.

The biggest problem with nervousness before and during a presentation is annoying your audience with nervous tics:

- Saying "OK" often
- Saying "like" often
- Saying "you know" often
- Saying "Ahhh" often
- Touching your nose often
- Touching your ear often
- Blinking often
- Sniffing often
- Shuffling notes
- Jingling change in your pocket
- Fidgeting with the pointer, etc.

There are probably as many forms of nervous mannerisms as there are speakers. The legendary U.S. TV personality, Johnny Carson, would put his finger aside his nose whenever he was apprehensive about what he was saying or something that a guest on his show was saying. So, even the greatest speakers do these things. However, they annoy the audience and detract from your message. So you need to find ways to mitigate these potential distractions.

RULE:
Learn to recognize your nervous tics, and work on them.

Of course the first step in dealing with nervous tics is to find yours. You can rehearse to a trusted person and have him or her identify them. You can videotape a talk or a rehearsal and evaluate yourself. Nervous tics that involve the use of meaningless words and phrases (OK, like, I mean, you know, ahhh) are your subconscious ways of producing a pause so that your brain can come up with some more words. Practice saying nothing when you need a pause to think of a word. This works well.

RULE:
Use a pause to replace nervous words, but keep pauses short and few.

Touching and fidgeting is a habit, and habits can be broken. It takes twenty-one days to create a habit and twenty-one to break one. So if you tend to place your finger alongside your nose when you become nervous in speaking, it will take some effort to break this habit. You must work at it. It takes time. Sometimes rehearsing to a full-length mirror can force you to stop a nervous tic. You see it in the mirror. It could go unnoticed if you rehearse without the mirror or taping yourself.

RULE:
Practice to reduce your nervous gestures.

Rate of Delivery

Sometimes a presentation can fail because you talk too fast or too slow. [*I presented a one-hour talk for a satellite course that was beamed around the U.S. when I gave it, but it was also taped, and the conference administrators gave me a copy of the VCR tape. I had never seen myself talk on a videotape before, and I thought that I talked too fast. I had about sixty slides, and getting that many slides into an hour talk made me talk too fast.*]

RULE:
Do not talk too fast.

On the other end of the spectrum, some speakers talk so slowly that the audience tends to think of the words that are coming. The audience is distracted. However, there are some occasions where slowing, but not halting, is best. English is the official language for most international technical conferences, I suspect because it is taught in so many countries. In any case, you may be talking to an audience where English may be a second language for more than half of the audience. Talking more slowly, not louder, will help them significantly. [*I studied French for four years in high school, and in the third year the exams mostly consisted of the teacher reading something in French and the students translating it to English. If she talked slowly and clearly, I would do well. If some of your audience does not have English as the first language, they are more apt to get your message if you talk slowly and clearly like my third-year French teacher. P.S.: Late in my career, I had projects that involved working at my company's plant in France. I had a hard time understanding conversations because conversations tend to have a fast pace.*]

RULE:
Talk slowly but clearly when some of the audience may have a different first language.

Tone

I mentioned in the previous discussion to speak more clearly, not louder, when talking to people with another first language. I have witnessed that when people visit a country that speaks another language, they try to make what they are saying to the person with another language clearer by talking louder, but just as fast as ever. [*I found myself doing this a number of times in foreign countries. I had to make a conscious effort to control this tendency.*] Talking with normal tone, but slowly and clearly, helps.

RULE:
When speaking to an audience with another first language, do not confuse louder for clearer.

Of course, making a presentation in a monotone is an almost certain way to put an audience to sleep. If you darken the room for your visual aids, there is a very strong possibility that eight percent of your audience will be in dreamland. If you talk with excitement, your audience will catch some of your enthusiasm and pay attention to your message. Talking softly has almost the same effect as a monotone. You must talk loudly enough for people to hear you.

If you have an ax to grind on a particular subject, you may come across as "angry" to your audience. Technical

presentations must always be objective. You should never show anger or apprehension in what you are discussing. An angry, flippant, or apprehensive tone will have a negative effect on your credibility.

RULE:
Speak in a neutral tone with enthusiasm for your subject.

Speech Characteristics

If you have some type of accent or speech impairment, just deal with it, but do not apologize to your audience. This will call their attention to it, and then it could become distracting. For example, I have seen many speakers who have a first language other than English start their talk in English by saying, "Please excuse my poor English" and proceed with their talk. This sensitizes the audience.

RULE:
Do not excuse speech or language deficiencies. Just do your best.

Audiences are very understanding about language difficulties, accents, and even speech impediments. [*I have a good friend who occasionally stutters. He is a frequent speaker at technical conferences, and many times I have witnessed him spend several seconds trying to sound a "C" or some other letter at the start of a word, and I have never seen any adverse audience effect. In fact, I have never heard anybody even mention that he stutters. He deals with it by not letting it inhibit his public speaking.*]

Colloquialisms

Your presentation should also consider colloquialisms. Most languages have words and sayings that mean something in one country that may not have the same meaning in another country. In English the word "holiday" means a vacation in Europe and many former colonial countries, but in the U.S.A. it means a day designated by a company or the government as a no-work day. There are many words and phrases in every language that do not have universal meanings to all "users" of that language. Needless to say, these words and phrases should be avoided in making presentations.

RULE:
Avoid colloquialisms.

Colloquialisms can confuse your audience and have a negative effect on your message. Pronunciations are a similar factor. The English word "roof" can be pronounced a dozen different ways in the U.S., depending on what part of the country you come from. Pronunciation differences can be dealt with by avoiding such controversial words.

Some technical words have different meanings in different countries. For example, the word "friction" means resistance to motion when one attempts to slide or roll one body on another. In Russia and the former U.S.S.R. countries, they use the English word "friction" synonymously with sliding wear. "Scoring" is another word that means something different in different countries.

RULE:
Avoid controversial or ill-defined words.

Speaking to the Audience

If you use visual aids, it is an absolutely poor practice to look away from the audience and talk to the projection screen, whiteboard, or flip chart.

RULE:
If there is no eye contact, there is no communication.

You can sit at a bistro table with another person and talk, but if you do not make eye contact with the person sitting across from you, he or she will think that you are talking to somebody else. The same is true for an audience. If you do not talk to them, they will think that you are talking to yourself, and they will go on with their business. Making eye contact with people when you talk also demonstrates sincerity, and an audience is more apt to accept a speaker's message if it feels that the speaker is sincere.

Another aspect of eye contact is that some speakers make eye contact with a particular person in the audience and seemingly give their entire presentation to that person. The remainder of the audience feels ignored and will stop listening. I suspect that this practice may have come from some public speaking course. Somebody may have recommended picking out a person in the audience and talking to that person to ease nervousness or some such thing. I recommend scanning the audience. Look at people to the left, center, right, first row, middle row, and last row. [*Sometimes I look at the facial expressions of people in the audience. If I see a person who looks puzzled, I will make eye contact for a minute or two with that person—hoping that his or her puzzlement disappears. Sometimes I will make eye contact with those who seem to be agreeing with a yes head gesture or those who seem to be disagreeing. Sometimes I add an anecdote to get the nay-sayers to nod in agreement.*]

RULE:
Make eye contact with everyone in the audience, not just a few.

Finally, there are speakers who look at the floor, their notes, the ceiling, or out into space or who read their talk. All of these preclude eye contact and conveying your message. If you are making a sensitive presentation, such as a press release, and you do not want to say even one wrong word, you may need to read your presentation, but eye contact is still necessary. Many U.S. politicians become very adept at reading and making eye contact. Some can maintain a ratio of three parts eye contact to one reading; some only do one part eye contact to one part reading, but this still is very acceptable. This is done by reading a sentence or

two, quickly memorizing it and speaking it to the audience. This system works. You have a precise presentation, and the eye contact that you used between readings suggests sincerity in your message.

Appearance

In U.S. industry it is common for employees of big companies to come to work in business casual garb. As I mentioned in my strategy discussion, you need to dissect your presentation situation and plan your talk to fit your audience and the facility. If you are making a proposal to a group of company executives whom you know dress in golf clothes, then golf clothes may be appropriate dress for your presentation. If you are giving a formal paper at a conference, a suit is the only safe way to make sure that your apparel is appropriate.

RULE:
Dress appropriately to the presentation situation.

Neatness is the other important aspect of appearance. If you look sloppy, your message may be construed as sloppy and unimportant. There is a U.S. comedian who talks fast and adjusts his tie the whole time that he does his routine. It has become his trademark. However, he ends up looking like a slob because his tie and shirt end up disheveled, and nobody would take anything he says as serious. A sloppy appearance may have the same effect—people will not give you respect, like this comedian.

RULE:
Be well groomed and neat when you make a presentation.

Talking Too Long

We already discussed this in presentation planning, but it is so important it can stand repeating. Talking longer than your allotted time is one of the worst public speaking problems. We have all experienced speakers who should be "hooked" from the stage. Speaking over your time allotment displays a lack of planning and, worst of all, lack of consideration for your audience. [*For several years, I participated in a project team where we had to make weekly presentations to the team. I knew that if the team leader scheduled my presentation after a particular team member, I knew that person would consume the whole meeting with their "report," and others and I would never get a chance to present our work. Some people completely ignore agendas and the right of others to be heard.*]

RULE:
Keep to your allotted presentation time.

In formal presentations, time budget violators usually just keep speaking until the session chair somehow silences the over-budget speaker. Talking too long at conferences can also disrupt the schedule for the entire program.

Getting Rattled

Sometimes a speaker can get rattled by some incident or by someone in the audience and his or her presentation suffers. [*I used to bring paperwork to company informational meetings and do it during department talks. I was still listening but I would usually be writing throughout the presentation. This used to really annoy my last supervisor. He would get all confused if he saw me reading or writing when he was talking to the group. He asked me to stop, and I did, but it sure reduced my productivity.*]

When audience members do something or some other event occurs that draws your attention, you should not get rattled and disrupt your presentation.

RULE:
Stuff happens during a presentation—do not get rattled.

Summary—Delivery

There are many things that happen during a presentation, and many things that we do that can be a distraction to us or to the audience. Effective public speaking requires that you deal with these things. If it is something that you are doing that distracts the audience, stop it. If it is something that annoys you, learn to hide your annoyance. Focus on delivering your message.

On formal talks to groups that you may not be familiar with, talk with the audience before your presentation to learn what they are interested in. Try to match their interest. Make sure that all can see and hear you. Make eye contact with the entire audience. Show enthusiasm for your subject, and try to get the audience's interest with a crisp and illustrative delivery. Use hand gestures, and avoid reading part of your talk. If the situation is such, you can interface with the audience with questions such as: "How many of you have used this technique?" Then do it. Personal anecdotes can be effective in making a presentation more interesting. If your talk seems to be languishing, change your content or delivery. If it seems like the audience is more interested in thermal spray processes than plating, then emphasize the former. You can change a talk in progress by how much you elucidate on each topic. Tailor the talk to the audience.

I conclude this discussion of an effective public speaker with the following list of suggestions that pertain to effective public speaking.

- Come prepared.
- Use effective visual aids.
- Speak to the whole audience, not one person, not the projection screen.
- Make eye contact with all of the audience.
- Speak at the right pace.
- Speak clearly with the right tone and volume.
- Work visual aids into your talk.
- Control nervous tics.
- Never chew gum.
- Be neat, appropriately dressed, and groomed.
- Control pauses (ahhh!) and meaningless words (like OK).
- Effectively use visual aids.
- Do not insult the audience by partially covering overheads.
- Learn the PA system ahead, and do not "swallow" a hand mic.

- Stay within your allotted time.
- Show enthusiasm, use gestures, walk around.
- Do not over analyze a visual aid.
- Finish with your message.

Taking Questions

Almost all oral presentations prompt questions from the audience. How you answer these questions can also have an effect on the success of the entire presentation. Each situation is different, but there are certain rules that apply to all.

RULE:
Repeat the question to make sure that all of the audience heard it.

RULE:
Answer the question, or admit, "I don't know."

RULE:
If there is a moderator present, let him or her control the questioning session.

RULE:
Do not invite questions during your presentation. It disrupts.

RULE:
Turn the lights on for questions.

RULE:
Do not lose control and allow haranguing questions.

RULE:
Do not resurrect a visual aide to answer a question.

RULE:
Answer briefly, and only take brief questions.

RULE:
Be friendly; do not argue.

Some speakers double-talk their way around a question when they have no answer. The audience senses that you are doing this and thinks less of you for it. Be direct, and admit that you do not know the answer. This does not annoy the audience. They know that you do not know everything.

Some question periods get out of control and can be too long or can be taken over by a clique. Your host or moderator can serve as an appropriate intermediate to see that questioning stays in control. If there is no moderator, as in an informal talk, you should take control and set the ground rules.

"I'll take three questions, and then we must move on."

Often speakers do not know where the light controls are in a facility, and he or she takes questions in the dark. This is an ineffective questioning session because the speaker or moderator cannot see raised hands, and the speaker cannot see the audience. When you prepare for a talk, check out the facilities, and make sure that the room will be lit for the questioning period.

Some speakers seem to have to have a slide to answer all questions. A person might ask: "In your slide on the erosion rate of WC/Co, you showed the maximum erosion rate to occur at 45°. Why is that?" The speaker then fumbles through a disorganized pile of overheads, dropping several, then after three attempts, finds the right overhead, points at the data, and answers the question. It was not necessary to resurrect the visual aid. In fact, it is almost always inappropriate to bring back a visual aid in the questioning session because it takes too long. If you are making a proposal to the general manager, and she has a question about your production data, you may want to retrieve these data. Do not fumble or get rattled. If you have an orderly system for controlling your visual aids (as in with computer slide shows), retrieving can be done without the "dropped overhead" disaster.

My final rule on questions is to be brief in your answers to questions and to prohibit audience members from making political statements posed as a questions. Sometimes people ask "questions" just to make advertising-type statements about their work or university or research proclivities. [*I used to regularly attend conferences on welding research that were always attended by a pompous Ph.D. from a welding company. He invariably had a "question" for every speaker, and all of his "questions" tended to refute the speaker's position. This questioner was trying to demonstrate that he knew more than any of the speakers. I suspect that he no longer did research and had nothing to write papers about, so he quenched his need to pontificate to lesser individuals by asking "questions." These kinds of people need to be dealt with by not taking their questions or by responding with a curt response that suggests that his question was not sincere.*]

RULE:
Be polite, but cut short comments from hostile questioners.

A retort such as: "Thank you for your comment. I will take your suggestion under advisement," may be appropriate for a hostile questioner.

I will conclude this discussion on questioning with a comment on a new type of questioning that I recently ran into at an international tribology research conference. As many as ten out of thirty speakers, all from Europe, ended their oral presentations with a slide titled "open questions," where they essentially listed additional research that needs to be done on the speakers' topics. Some speakers even omitted conclusions and recommendations. Needless to say, I do not recommend omission of conclusions and ending the presentation with a list of unanswered questions. It does not seem to be appropriate for a formal presentation at a conference. A paper should be presented to share a learning that adds to the body of knowledge. Questions do not add to the body of knowledge, and they do not belong in a summary slide—my opinion. I recommend traditional closures.

Assessing Results

A technical career involves many oral presentation opportunities, so it is a good idea to try to find out how effective you are in making oral presentations. Do you get your message across? Do you enhance or diminish your "company position" by your presentation techniques? You need to know how you are doing. This can be done with a survey after a formal presentation. Some technical conferences require it. Sometimes it is appropriate to make your own survey, but respect your audience by making it brief.

	Mark 1 to 5 with 5 as best
1. Did this presentation share new information?	_____
2. Was the delivery appropriate?	_____
3. Was the talk completed within its allotted time?	_____
4. Were you given ample opportunity to ask questions?	_____
5. Overall, how valuable was this talk to you?	_____

Sometimes talk questionnaires are two pages long with thirty questions. Your audience just sat for an hour listening to you. They want to get up and move about. They do not want to sit for another 15 minutes to fill out a survey form.

RULE:
Keep audience evaluations simple.

It is a courtesy on your part to plan to stay for some time after a presentation to interface with the audience. Some of the audience may have had questions that were too long or complicated for the questions session. Some may want your opinion on a particular problem at his or her company/organization. Do not consider even "brain picking" types of questions as an imposition. One-to-one audience interface can be mutually beneficial. Very often you will learn things that you can use in your job while you are trying to help an audience member with his or her problem. These after-talk audience interfaces are probably the best way to learn whether you met your presentation objective. You will learn whether they understood and accepted your message.

RULE:
Interface with the audience.

Evaluation of informal presentations is usually most effective by simply discussing your topic one-on-one to selected attendees. You will probably have to initiate the discussion, but a question like: "Do you agree with what I said?" will probably prompt discussion that will let you know if your message got across. I recommend that you take time to do this. You must know how you are doing if you are to improve.

The desired result of some presentations, especially proposals, is action on the part of attendees. Did you get what you asked for? If so, your presentation was effective. Sometimes this part of your presentation takes time. [*I once made a presentation in June, and I received feedback in December.*] Sometimes feedback takes time. Be patient, but do not forget to find out how you did.

My final suggestion on assessing results is to take action when your "real-time assessment" suggests that your message is not getting across. If the audience is inattentive and some are asleep, you can be assured that your message is not getting across. You must take action. Stop! Turn on the lights, drop a book, do something to refocus the audience, and then change your pace or add anecdotes to get the audience back on board. [*I have lost audiences, and you can usually bring them back by personalizing your presentation. If you know that there are heat treaters in the audience, bring heat-treating into whatever you were talking about. Or add a story about how a heat treater used what you are talking about. You must do something. You must try to get them back.*]

Assessing results needs to happen during your talk as well as after it. But it must be done, and you must use this results feedback to continually improve your presentation techniques.

Summary

This book is an attempt to put into print presentation techniques learned over thirty-five years of making presentations in industry and to technical organizations. My "rules," of course, are only suggestions. There are no presentation police to accost you if you break a "rule." They are mentor-like suggestions based upon personal experiences and suggestions from expert speakers.

The most important message that I can leave you with is to work at your presentation techniques. Giving presentations is a skill, and skills require practice and continual improvement. Keep in mind that skilled lawyers win cases. They convince juries regardless of guilt. A proper presentation can sway an audience similarly. If you do all the things that I discussed correctly, you will get your message across; you will get what you want from a presentation.

Appendix I: Guide for Preparation of Slides

1.0 Introduction

1.1 Purpose

Many PCs come loaded with a version of Microsoft Office®, which usually includes PowerPoint®. This software is intended for making slides that can be projected before audiences on a video projector or for a slideshow on a laptop or PC to small audiences. You can also use other means of preparing slides, but follow these general recommendations. All figures mentioned in this appendix can be found in Appendix II.

1.2 Scope

This appendix will only discuss how to make a classic, unanimated slide with a simple affiliation footnote. This is our recommended slide format for business and technical presentations. We will assume familiarity with word processing software.

1.3 Format

1. Making a slide template
2. Creating a word slide
   - Title
   - Section head
   - Summary slides, conclusions, recommendations, acknowledgments
3. Creating a table slide
4. Creating a photo slide
5. General recommendations

2.0 Creating a Slide Template

Professionally-generated slides usually include the author's affiliation, department, the company logo, etc. in addition to the information on the slide (Fig. 1). These are usually in headers or footers, and the slide background may have a texture or color. Of course, many slide preparation packages have the capability to include animation, pop art, photos, etc., but usually these features detract from your message and are not recommended by AV professionals.

2.1 Selecting a Color

Choose a color that has high contrast to the text.

3.0 General Comments

Word slides are used for titles to show the elements of a presentation, to delineate sections of the presentations ("test results," "conclusions," etc.), to make statements, and to present ideas, actions, etc. The words need to have font sizes in the range of 30 to 45 points to be seen by the audience, and they also need to be surrounded by sufficient "white space" to allow the eye to be drawn to the words. A "full slide" should not contain more than 70 characters of 45-point font or 120 characters of 30-point font. Assuming an average of 5 characters per word, this means only 24 words for 30-point font and 14 words for 45-point font. Text of any size should not exceed eight lines. Slides using font less than 30 points should be projected for readability in the anticipated venue. Thus, a proper slide should contain well chosen, limited words. Only ideas—only summaries.

3.1 Titles

A title is an abstract of your presentation. It must be brief. It is usually centered on the slide, and it should have the largest font size that you will use in the entire presentation (Fig. 2).

3.2 Background/Introduction

If you are to achieve your goal in making a presentation, you need to make that goal known to the audience—why are you giving this presentation, and what are your expectations of the audience. A "problem" statement is often appropriate (Fig. 3), followed by your purpose, objective, scope, and format (Figs. 4, 5, 6, and 7). Many times, photos and data can be used to fortify the "problem statement." However, keep introductory material to a minimum. The "meat" of the presentation should be in the body, not the introduction.

3.3 Section Heads

Most formal presentations need word slides to let the audience know what part of the presentation you are in. You presented the format in the introduction, now you need to just "flash" a word slide to say "now I will talk about "test procedure," or "test results," or "field studies," etc. (Figs. 8 and 9)." Let your audience know what you are talking about at all times, and keep discussions to the announced header.

4.0 Creating a Table Slide

There is always a temptation to copy and paste a big fat table that exists on your files on a slide. If it really is "big and fat," nobody will be able to read it. It will be meaningless. Try to avoid the use of tables because they usually require audience study and interpretation. If you must use a table, edit it so that it fits our font size and number of words guidelines (Fig. 10).

5.0 Creating a Graph

Most times a graph that is to be included in a presentation exists as a file. Import the file from an Excel® or a document file. The important part of making a graph slide is that it be large enough with fonts large enough to be seen by the au-

dience (Fig. 11). Never put more than one graph on a slide; avoid plotting multiple variables on a graph, and avoid colors that may be troublesome for color-blind people (red, green, yellow, etc.).

6.0 Creating a Photo Slide

Photos are useful for describing machines, techniques, sites, and all sorts of useful information (Fig. 12). They are imported into the slide, and the cautions for their use are the same as for graphs—usually only one per slide is advisable.

7.0 Creating a Line Art Slide

Most technical talks describe equipment or techniques that may be difficult to describe with words. Schematics (Fig. 13) are an excellent aid for helping the audience understand a test or device. These can be imported into your presentation from CAD drawings or other files.

7.1 Conclusions

Conclusions need to be succinct, usually bulleted statements deduced from your work (Fig. 14). Always ask yourself whether it is a "result" or a "conclusion." Never restate results as conclusions. The result of a corrosion study is that the test material corroded. The conclusion is that "cobalt based cemented carbides cannot withstand continuous exposure to saturated steam if the cobalt exceeds six percent." Conclusions are global statements derived from test results.

7.2 Recommendations

Some presentations warrant recommendations—some do not. A presentation to an "information only" audience probably does not warrant them, but a presentation to your management probably does. They need to be very brief statements of action words. They should be bulleted or numbered if there are more than one (Fig. 15).

7.3 Acknowledgments

Like recommendations, sometimes acknowledgments are appropriate—sometimes they are not. Usually they are only appropriate for presentations of work that involved collaboration of multiple organizations or were funded by some governmental or institutional organization that wants their findings publicized (Fig. 16).

8.0 Summary

Keep word slides concise. Never use paragraphs. Never fill the field with words. Make word slides first, because they will be the bulk of your presentation, then do graphics and photos. Save the word slides (possibly in a separate file) in case your computer crashes in creating graphics or photo slides, which are more challenging.

Appendix II: Sample Presentation

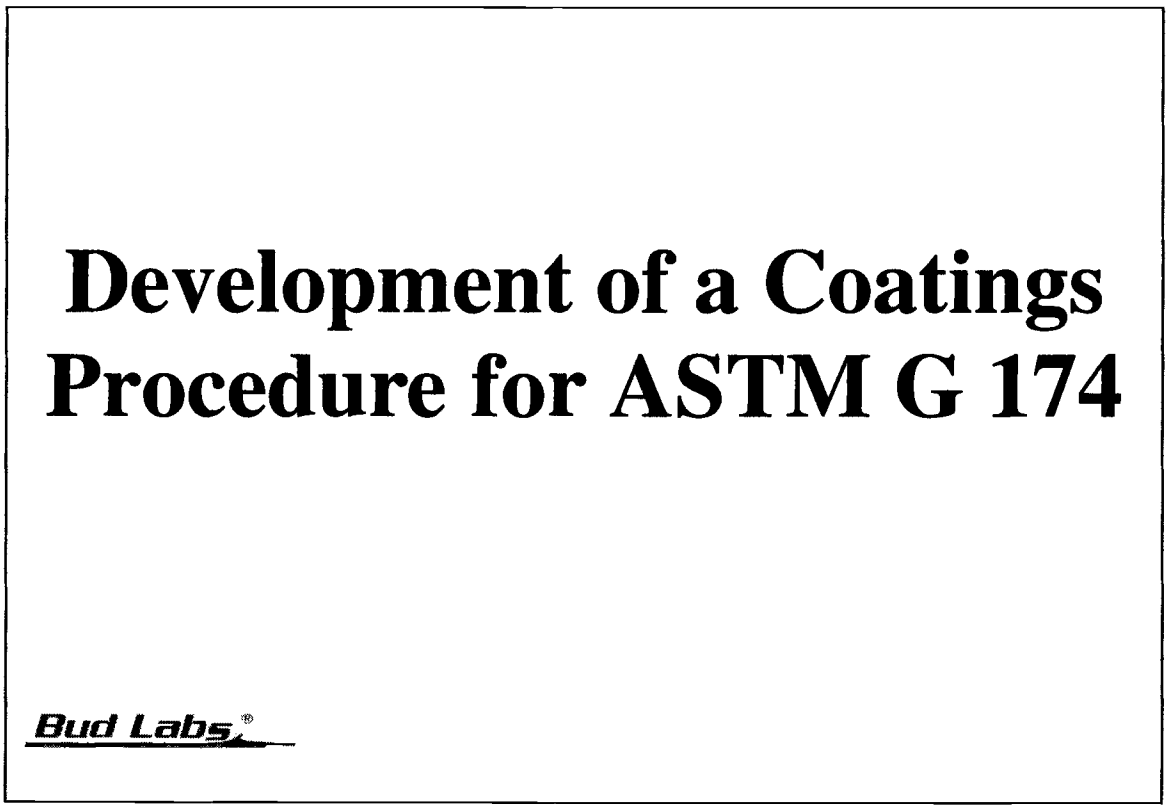


Fig. 1—Slide format with company logo.

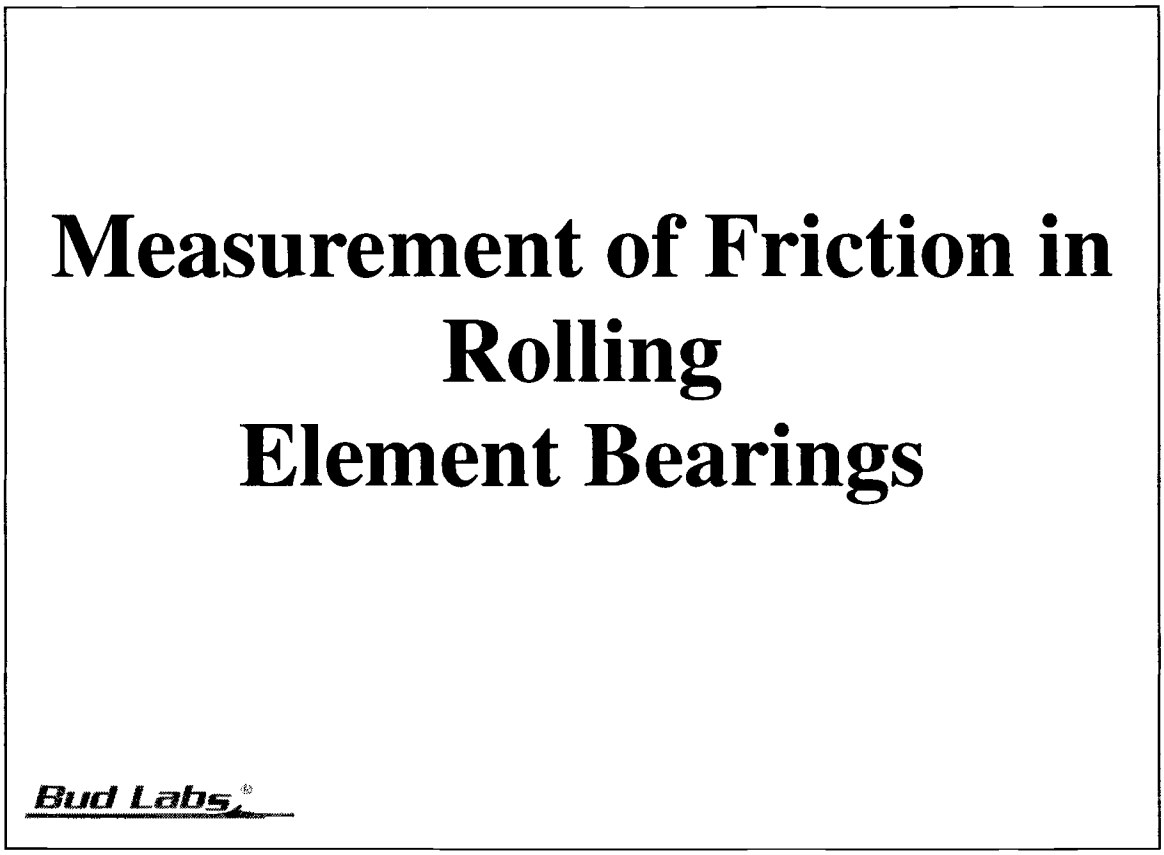


Fig. 2—Sample title slide.

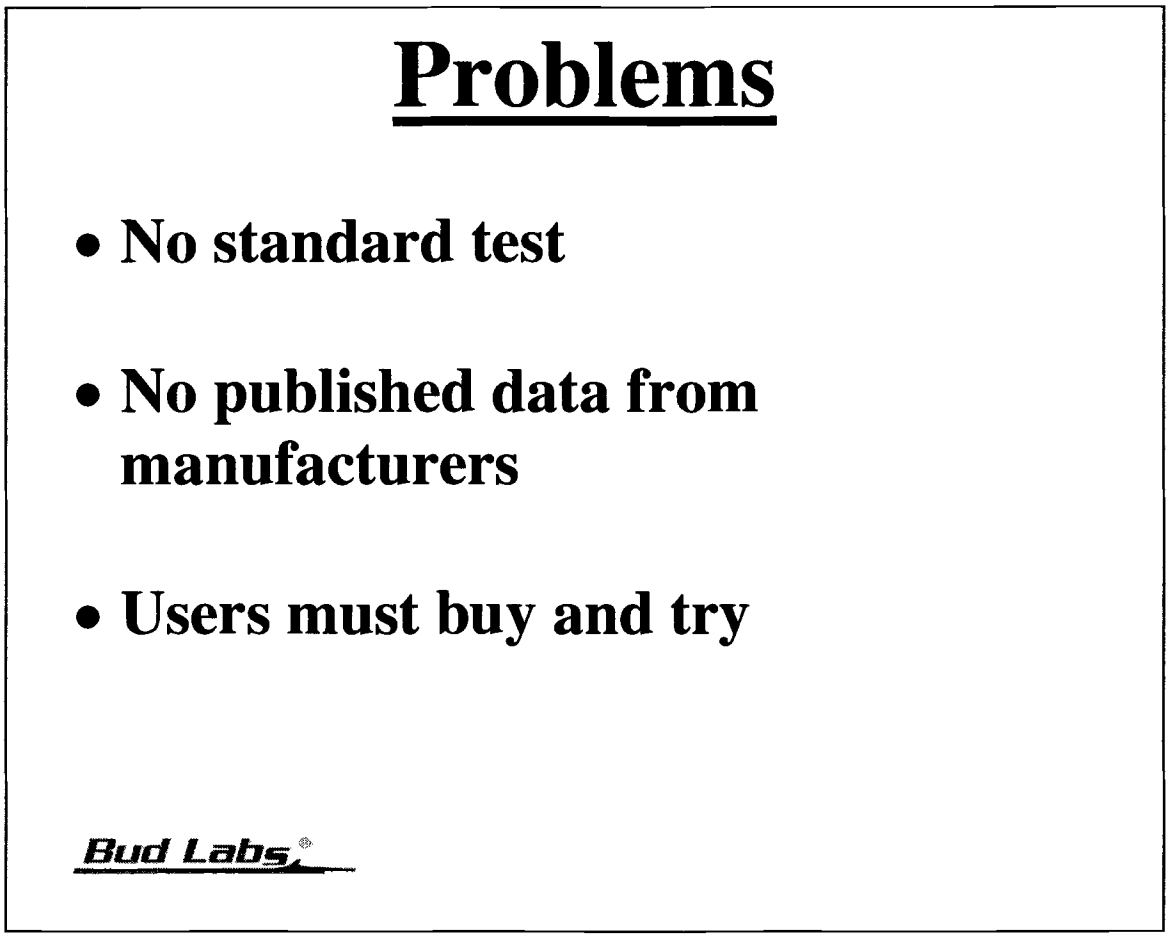


Fig. 3—Problem statement slide.

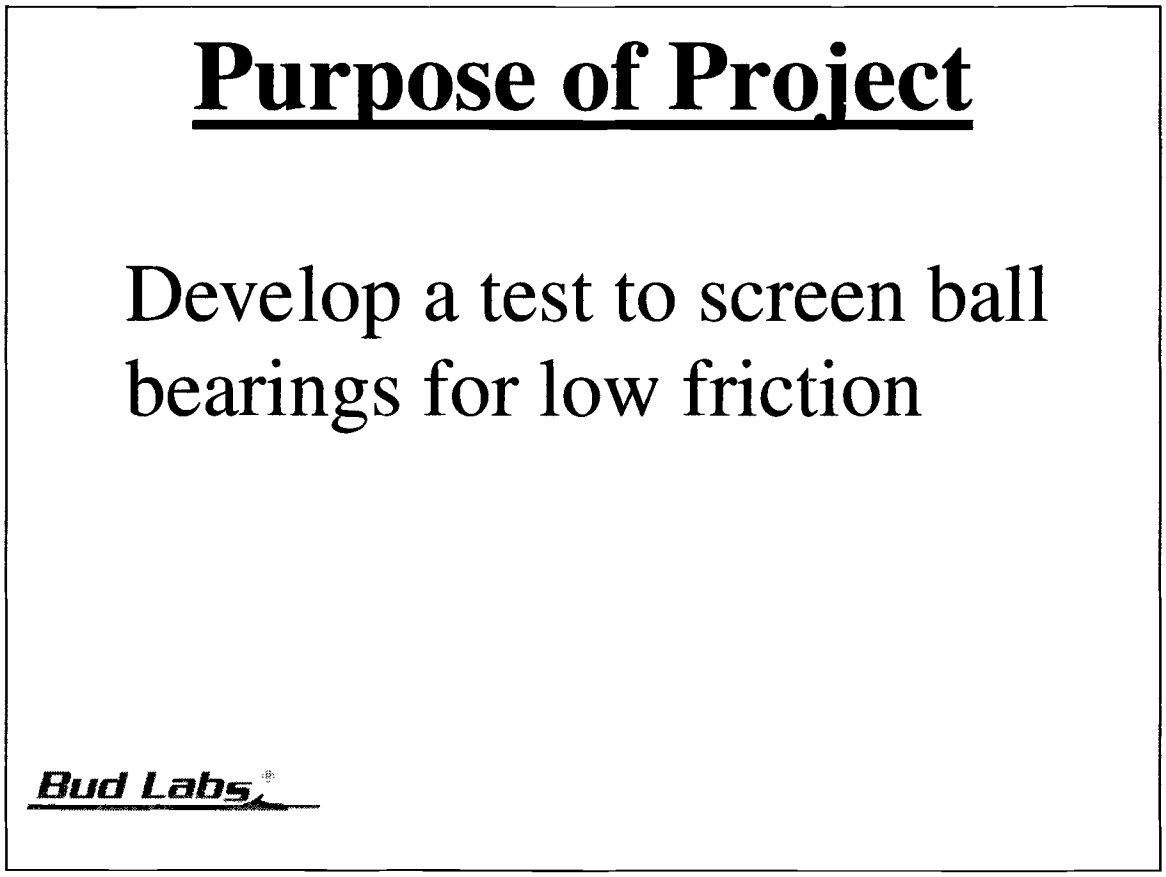


Fig. 4—Purpose slide.

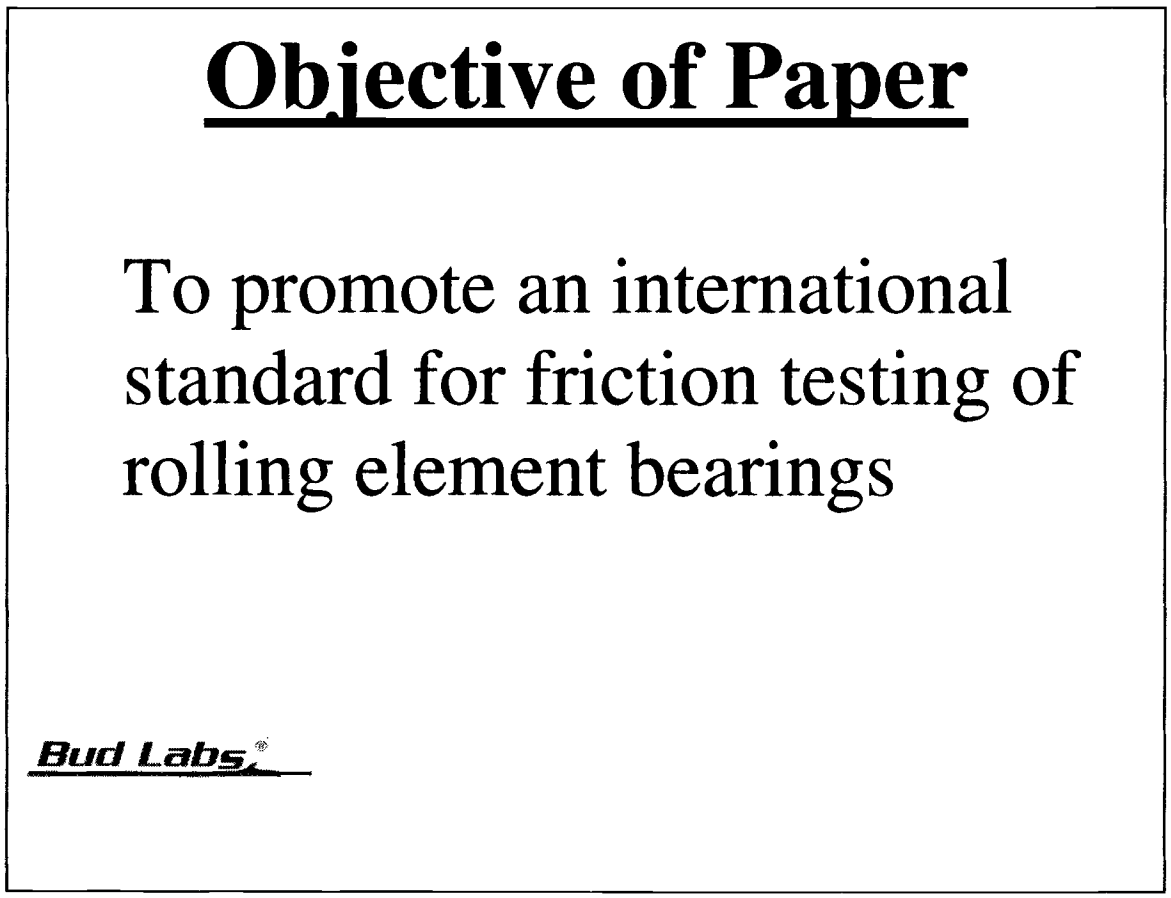


Fig. 5—Objective slide.

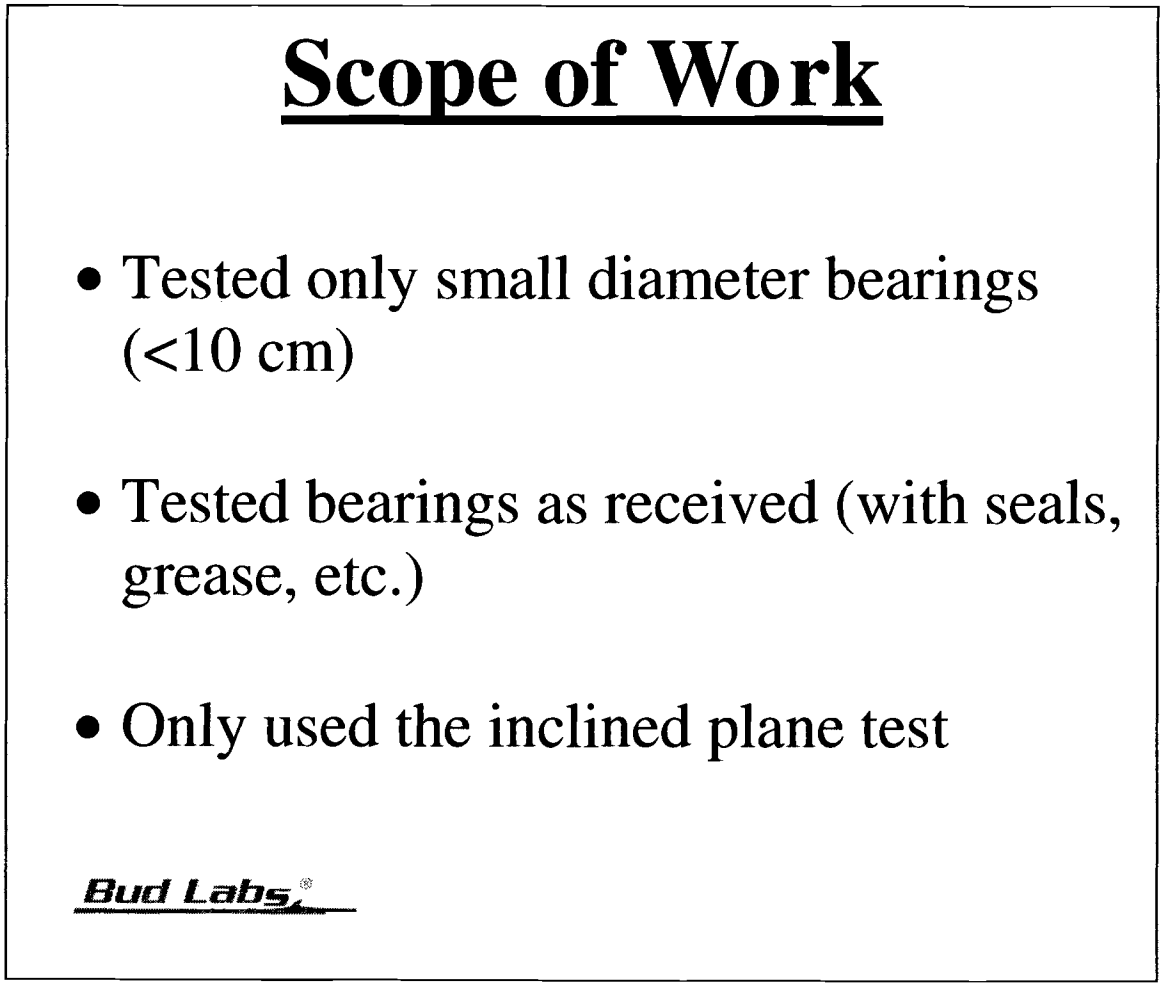


Fig. 6—Scope slide.

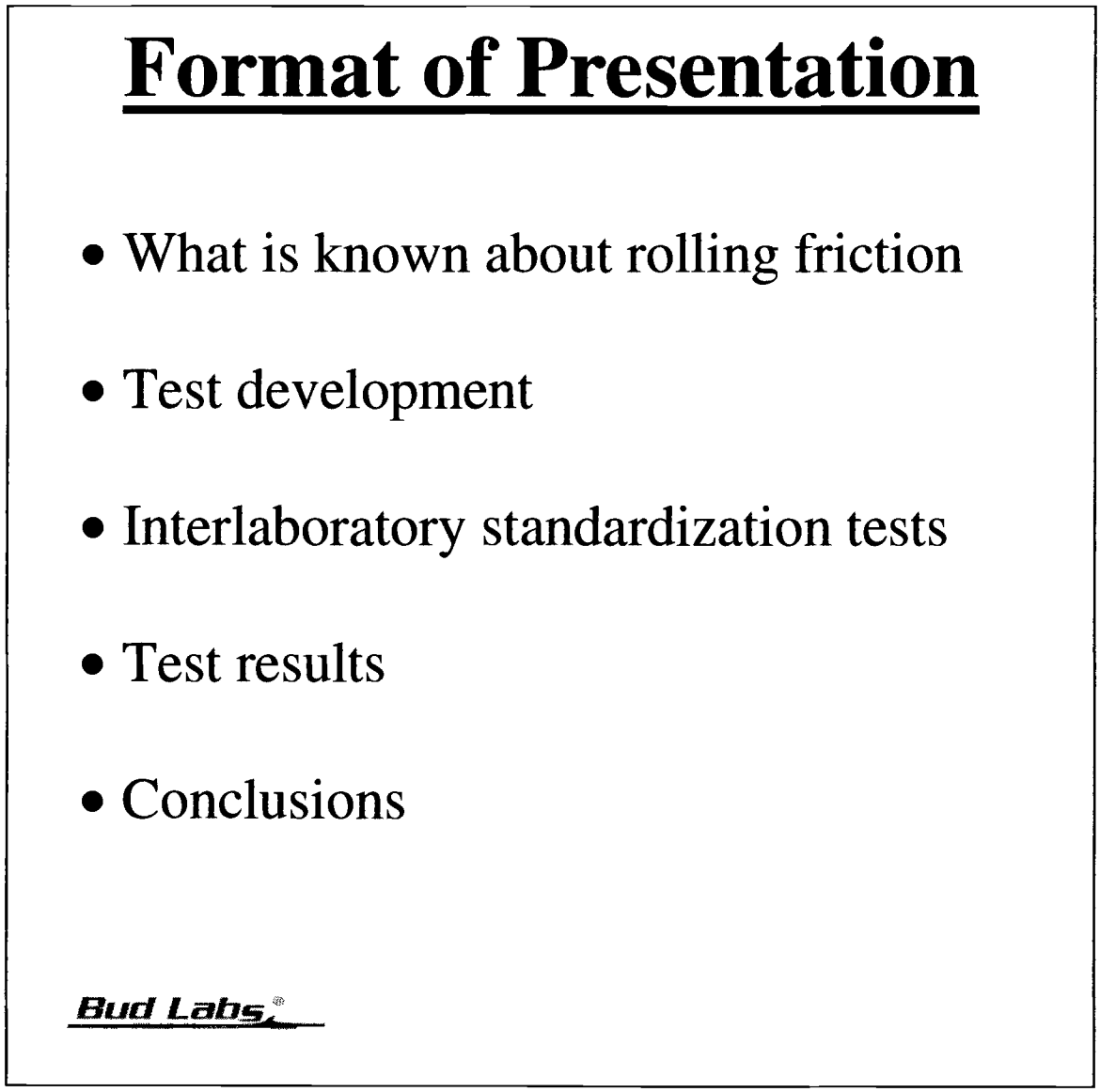


Fig. 7—Talk format slide.

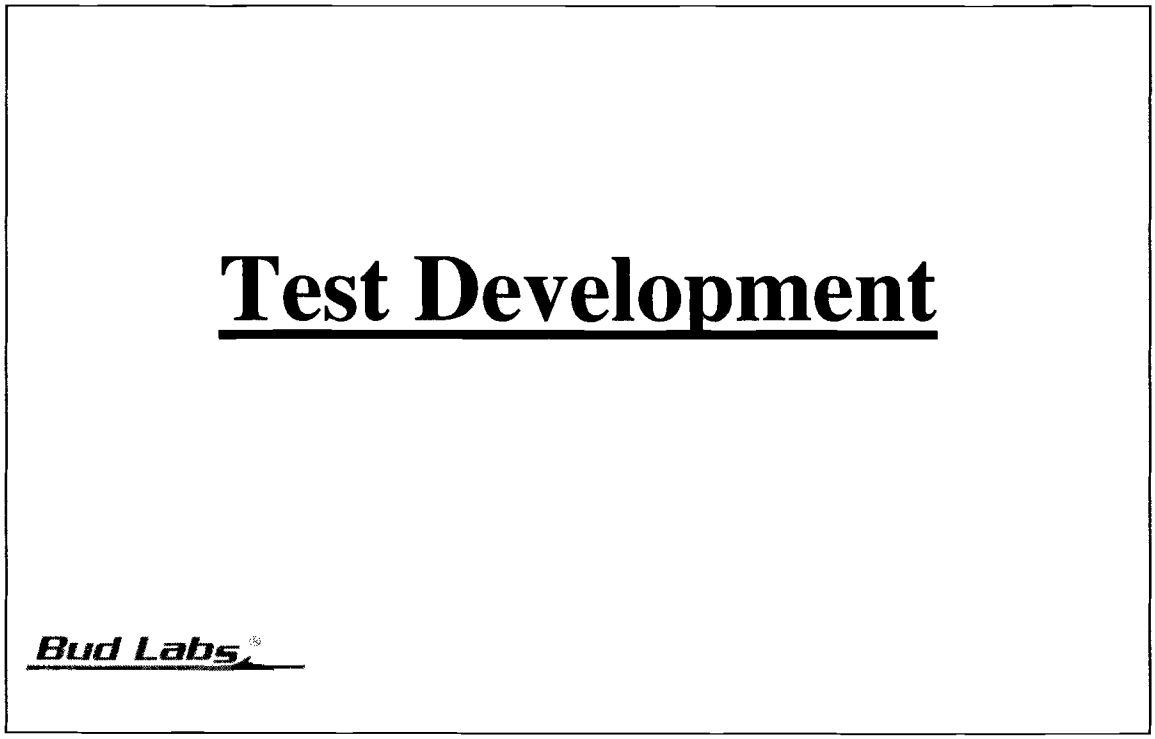


Fig. 8—Section head slide.

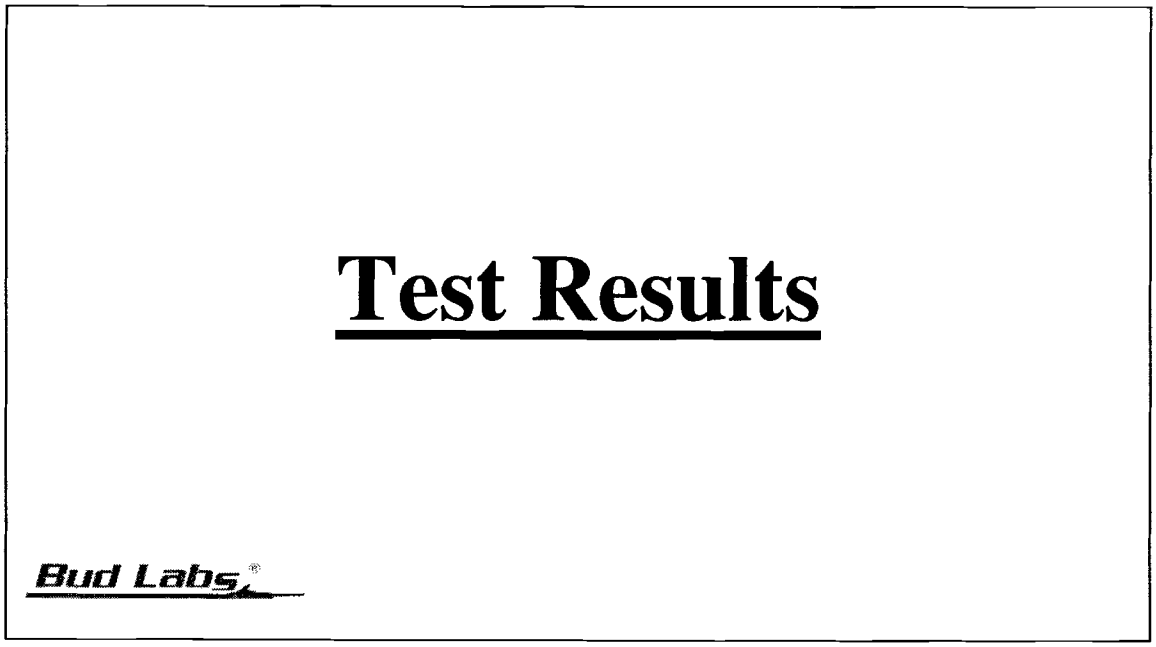


Fig. 9—Section head slide.

Recommendation:

Proposed Revisions To The ASTM G 174 Loop Abrasion Test Method

Procedure	Abrasive Type	Abrasive Size (mm)	Spindle Speed (rpm)	Loading mass (g)	Test Duration (passes)	Number of abrasive loops used
a For uncoated metals	Al_2O_3	30	300	200	680	1
b For thin (<250 i m) hard coatings	Al_2O_3	3	100	100	680 or to penetration	1
c For thick (50 to 2500 i m) thermal spray or plated coatings	Al_2O_3	30	100	100	75 or to penetration	1
d For uncoated cemented carbides, cermets, ceramics	Al_2O_3	30	100	100	80	4 (Fresh every 20 passes)

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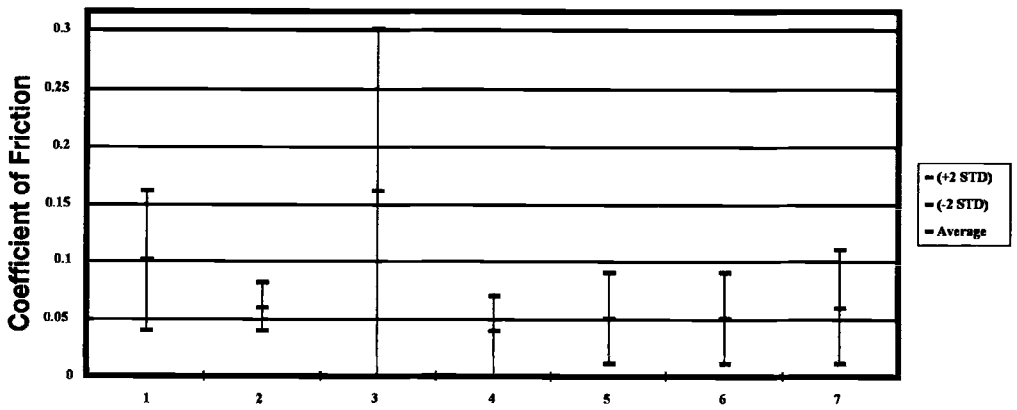
Fig. 10—Table slide.



Rolling friction coefficients based on the average of the data from all five labs

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Fig. 11—Graph slide.

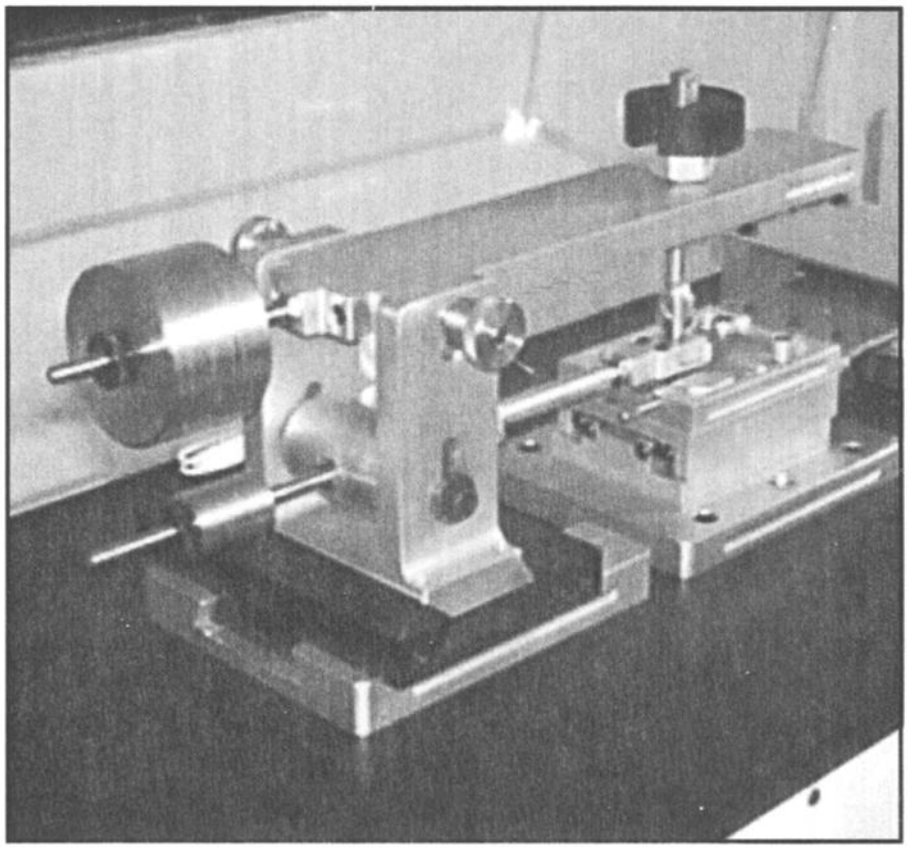

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Fig. 12—Photo Slide.

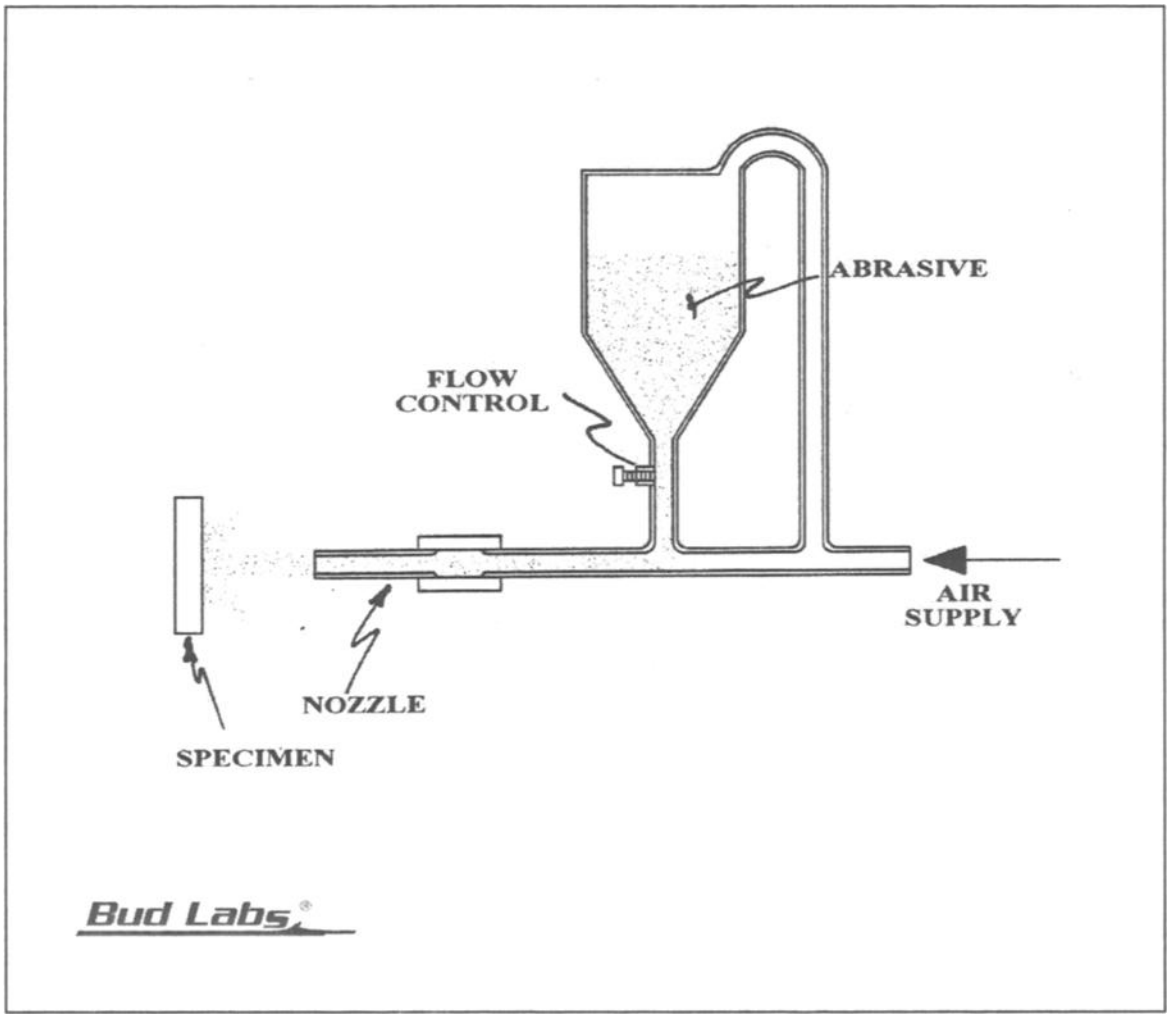


Fig. 13—Schematic slide.

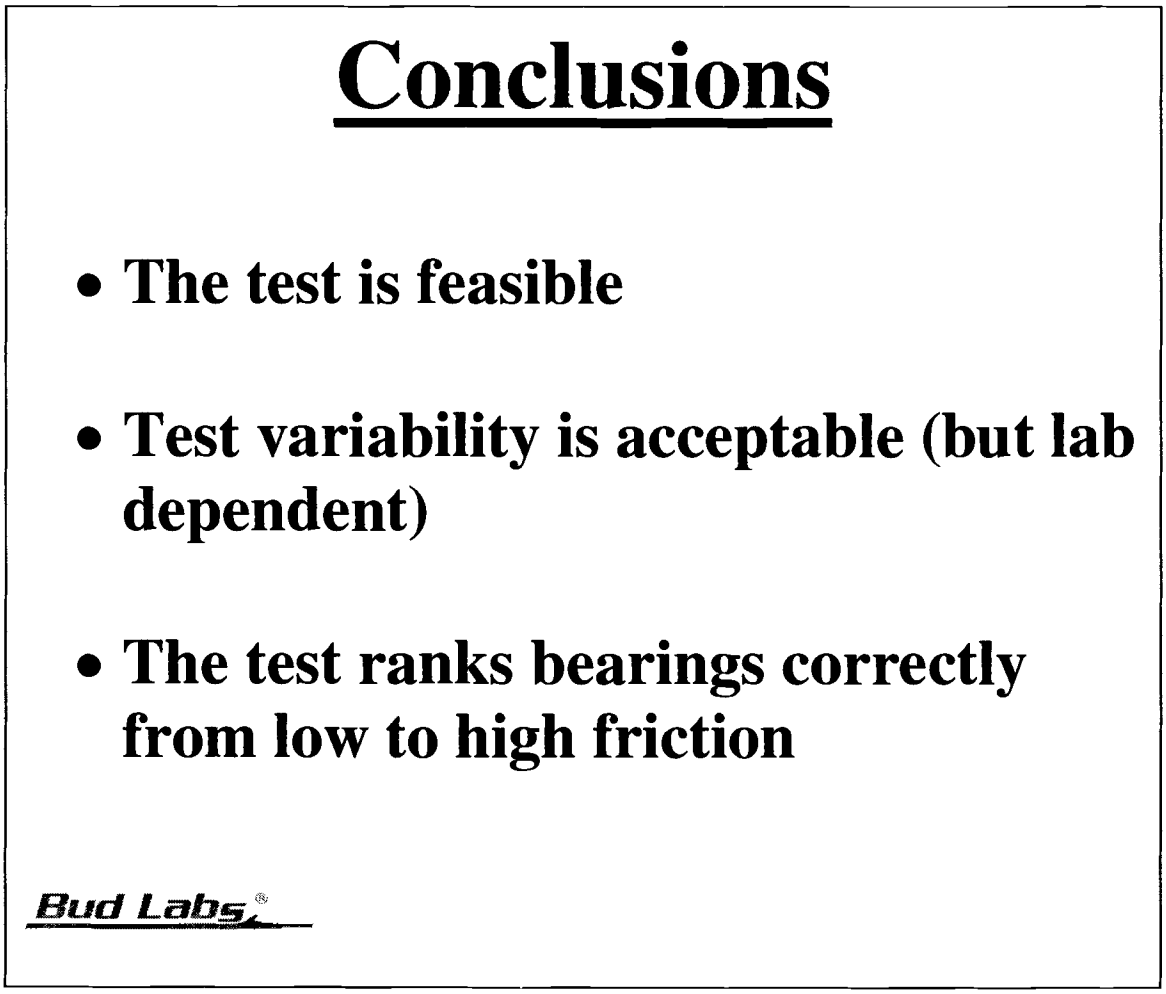


Fig. 14—Conclusion slide.

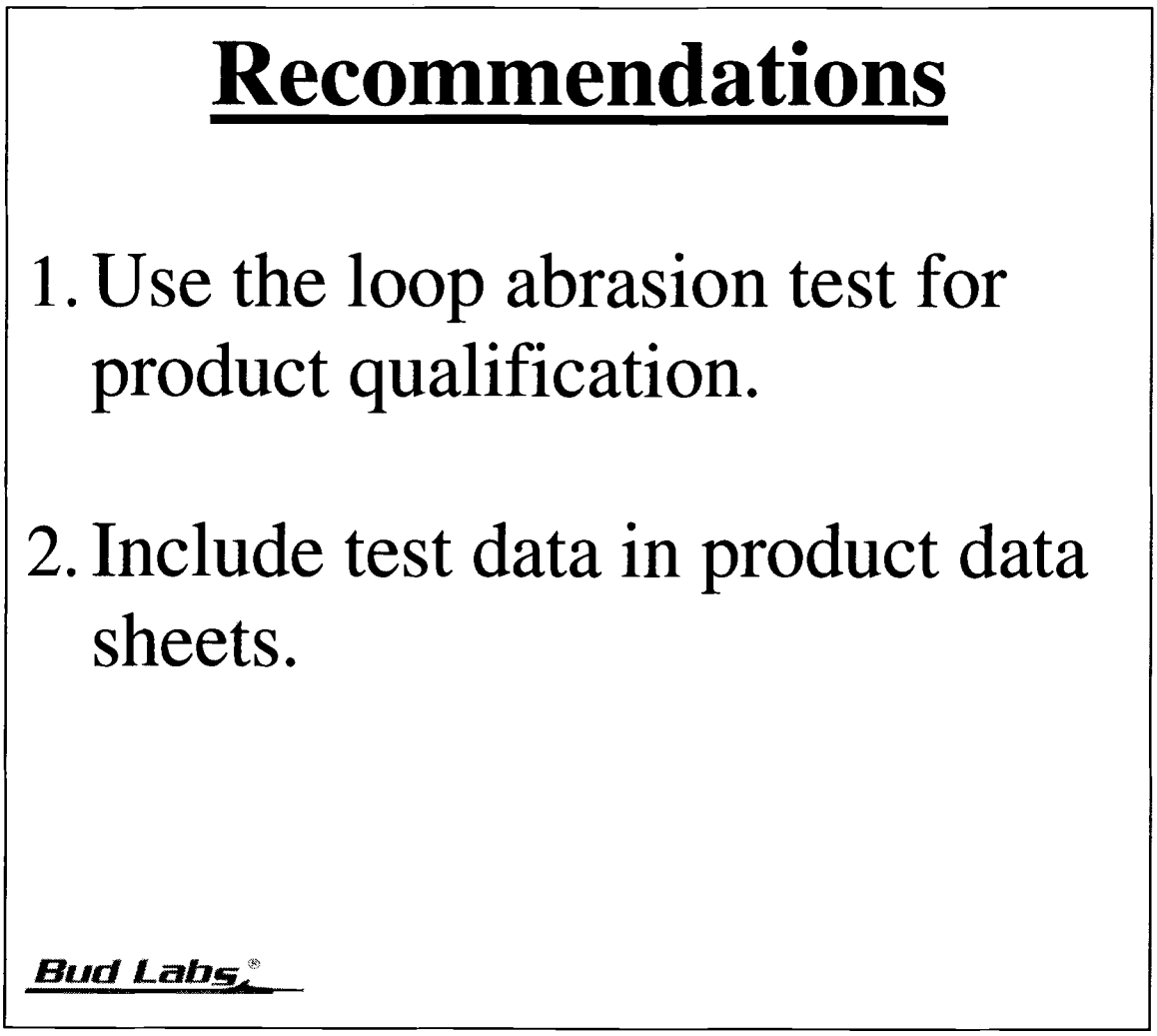


Fig. 15—Recommendation slide.

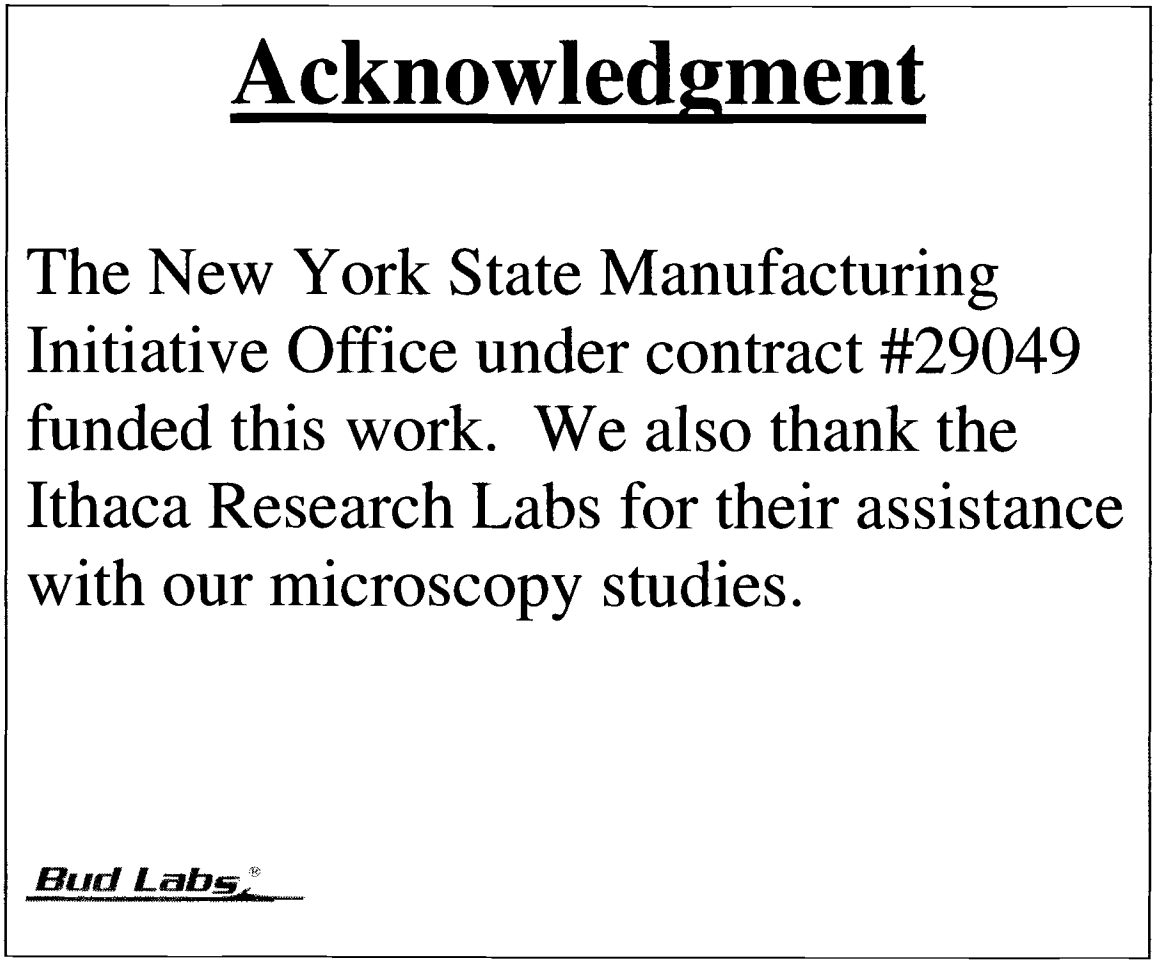


Fig. 16—Acknowledgment slide.

Appendix III: Presentation Checklist—Things to Consider in Preparing and Delivering a Technical Presentation

Strategy:

1. Who asked for the talk? _____
2. Who will be your audience? _____
3. What do you expect to achieve by your talk? _____
4. How will your presentation present value to your audience? _____
5. Where will your talk happen? _____
6. When will your talk happen? _____
7. Will you be able to use slides? _____
   overheads? _____
   chalkboard? _____
   all of the above? _____
   other? _____
   No AV equipment? _____
   PA system? _____
8. How long can you speak? _____
9. Do you need a handout? _____
   talk on CD? _____
   talk on computer file? _____
   other documentation? _____
10. What is your overall strategy for this presentation? _____
    _____
    _____

Audience Accommodation:

1. What is the composition of your audience? _____
2. What will interest them? _____
3. What "level" should your presentation be? _____
   detailed? _____
   general? _____
   theoretical? _____
   basic? _____
   other? _____
4. What visual aids are appropriate for this audience? _____
   _____
5. Can your visual aids be seen by all? _____
6. Will you be heard by all? _____
7. Is there anything in your presentation that might offend (or blame) anyone in your audience? _____
8. If you are expecting action from audience members, have you made this clear? _____
9. Have you included basic presentation elements? _____
   format? _____
   agenda? _____
   introduction? _____
   body? _____
   conclusions? _____
   recommendations? _____
10. What will you do to control your time limit? And the time limit of others (for meetings)?
    _____
    _____
11. How do you plan to include the audience in your presentation? _____

Researching Your Subject:

1. Is your title an abstract of your talk? _____
2. Where did you get the information that you will present? (Tell your audience)
   your work? _____
   work of others? _____
3. How certain are you that the facts and figures that you will present are correct? _____
   very certain? _____
   somewhat certain? _____
   not certain? _____
4. Have you researched the literature on your subject? _____
   _____
5. Do you have a list of references for those who want to "dig deeper?" _____
6. Have you established the level of detail that is appropriate for your audience? _____
7. Have you established a time budget for each element of your talk? _____
8. Are you completely comfortable with your thesis? _____

Presentation Preparation:

1. Have you merged your strategy, audience information, and research into a presentation outline? _____
   purpose? _____
   objective? _____
   scope? _____
   format? _____
   sections? _____
2. Do you know what you are going to say? _____
3. Will visual aids assist your thesis? _____
4. What kind? _____
   slides? _____
   overheads? _____
   computer? _____
   charts? _____
   chalkboards? _____
   other? _____
5. Did you storyboard your slides? _____
6. Have you checked slide font size for audience readability? _____
7. Do you have any cluttered or illegible slides? _____
   more than 50 words? _____

more than 1 graph? _____
more than 1 photo? _____
paragraphs? _____
less than 30 point text? _____
too much adornment? _____
not enough clear space? _____

8. Have you projected your slides and viewed them from the farthest point in your audience? _____
9. Does your talk contain facts, not conjecture? _____
10. Have you told your audience. . . .
    Why you did the work? _____
    What they will hear? _____
    What subject you are addressing at all times? _____
11. Have you had your finished presentation reviewed by a trusted peer? _____
12. Have you addressed acknowledgments? _____
13. Do you have a ready-reference/outline to use during your presentation? _____

Intellectual Property/Legal Considerations:

1. Does your talk leak secrets or inappropriate information? _____
2. Does your talk or visual aids use information copyrighted to others? _____
3. Do you have permissions for use of copyrighted material? _____
4. Have you considered all ramifications (business, legal, friendship, etc.)? _____

Visual Aids Review:

1. Have you had another person proofread all text, charts, graphs, etc.? _____
2. Have you queried the need for each slide/aid? _____
3. Do your visual aids support your thesis? _____
4. Do your slides look neat? _____
5. Can each slide pass the "person on the street" test for understandability? _____
6. Are you using tables that cannot be simplified as a graph, etc.? _____
7. Do you have text slides to delineate parts of your talk (procedure, test program, test results, etc.)? _____
8. Do your slides use strange fonts? _____
   If so, why? _____
9. Are your slides cluttered with distracting features? _____
   clip art? _____
   excess texture? _____
   hard to see colors? _____
   too dark background? _____
10. Are your graphs simple (per person on the street test)? _____
11. Do your slides summarize, or are they "all the data"? _____
12. Do your charts and graphs contain suitable captions? _____
13. Have you considered color blind attendees in choice of colors? _____

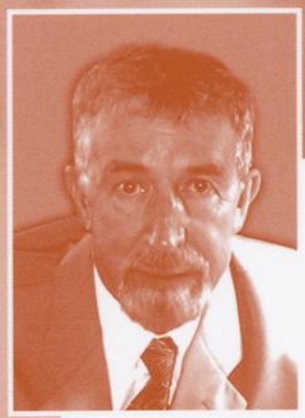
Making Your Presentation:

1. Have you checked the facilities in the presentation venue? _____
2. Have you practiced your presentation? _____
3. Is your presentation within your time allowance? _____
4. Do you have a control program in place for your nervous tics (uhs, you know, ok, etc.)? _____
5. Do you need to talk slower to accommodate audience members with a different first language? _____
6. Do you have an eye contact strategy? _____
7. Do you have appropriate dress available for your presentation? _____
8. How will you keep to your allotted time? _____
9. Are you prepared for questions? _____
10. Is an evaluation appropriate, or will there be one? _____
11. How will you get feedback on your presentation? _____

IV

Appendix IV: Suggestions from AV Professionals on Slide Preparation (from various sources)

- Use horizontal format (landscape) for all slides.
- Allow white space (border on top, bottom and sides) around substance of the slide.
- Color backgrounds only with pale colors (pale yellow, very light blue, light gray etc.).
- Use a single dark color for words.
- Use only one graphic (photo, graph, sketch etc.) per slide.
- Use "Times" font for word slides.
- Use Helvetica font for graphs.
- Avoid tables.
- Consider colorblind audience members when preparing slides. Most cannot see red on black, yellow on blue, line art with red and green lines. (Also, color blind people cannot usually see the red dot from laser pointers—use a mouse arrow.)
- Make titles bold.
- Use a minimum of 24-point font for word slides.
- Use only uppercase and lowercase lettering.
- Limit text to eight lines per slide.
- Use italics for subtitles and keywords.
- Place presenter's name and affiliation in small font in the bottom left hand corner of each slide.
- Number slides in small font: (page __ of __) in bottom right corner of slide if they are to serve as a handout.



Ken Budinski is a Materials Engineer who has made countless technical presentations during his professional career, as well as in his personal life. His work has required presentations on his research and development, on project proposals, on environmental issues, on teaching engineering materials to others, and even on promoting ASTM standards. In his personal life, he had to make presentations at public hearings, in courts of law, at retirement gatherings, and at numerous other occasions.

Mr. Budinski has a B.S. in Mechanical Engineering (Kettering University) and an M.S. in Metallurgical Engineering (Michigan Tech), and he is currently Technical Director at his son's company, Bud Labs, in Rochester, NY. Bud Labs manufactures friction and wear testers and performs contract testing to solve friction and wear problems. Mr. Budinski has spent most of his career in large manufacturing facilities: six years at a General Motors division and 38 years at Eastman Kodak's largest manufacturing facility. This book is an outgrowth of communication tutorials that he presented for years to co-workers at Eastman Kodak.

Mr. Budinski is the author of other technical books: eight editions of Engineering Materials: Properties and Selection, Prentice Hall; Surface Engineering for Wear Resistance, Prentice Hall; and Engineer's Guide to Technical Writing, ASM International. He has presented over 100 papers on his research work at conferences in the United States and around the world. He has authored more than 50 papers in refereed journals, and he is a Fellow of ASTM International, ASM International, and The Rochester Engineering Society. He has been a member of ASTM International since 1972 and is a past Chair of the G02 Committee on Wear and Erosion. He is currently Chair of the G02.50 Friction Subcommittee.

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