

## ORAL PRESENTATIONS

Engineers must make oral presentations as a natural function of their work, whether or not they want or like it. This happens because they work with information that others need to make decisions about implementing new technology, going forward with a product design, or choosing between competing technologies or designs. The persons most involved with the information, the engineer, has the details others need to make those decisions, so they are called upon to stand up in front of others to present that information.

Conferences, such as the many sponsored by the IEEE and other professional engineering and scientific organizations, provide opportunities for engineers to showcase new technologies, research, processes, and tools to their colleagues. The most common method of offering this knowledge is through a paper that is published in the proceedings of the conference and a talk, based on that paper, presented to a session at the conference. Those attending the session are scientists, practicing engineers, managers, and educators who have a vital interest in hearing the new information. If the presentation is vital and informative, those who hear it will often then read the paper for a more thorough treatment of the material and pass on their knowledge to their peers and organizations.

Careers are often made during these presentations, in both the presenters' organizations and their profession. Managers can make good decisions about how to proceed with technologies and projects, and others in the profession can use the information to make major technical advances. Conversely, poor decisions are often made because the engineer who had the knowledge failed to present it in a fashion that highlighted the critical information. What might appear to the presenter as exciting technical or scientific data are often seen as excruciatingly boring details by a manager or executive who has to make an important decision.

Failure to concentrate on three fundamental questions that are key to every piece of communication causes many people who give a presentation to be less than effective. The three questions are as follows:

1. What is the purpose of the presentation?
2. Who is the audience for the presentation?

3. What information does the audience need from the presentation?

An engineer who has worked for 6 months developing a prototype or technology has enough information to talk for days on it. But the audience only needs to hear the *right* information, presented in language it can understand, in order to achieve the purpose of the presentation. Again, most failures of oral presentations come from the failure of the presenter to consider the answers to these three simple questions.

## ENGINEERING THE PRESENTATION

Fortunately, once the answers to the questions of purpose, audience, and audience needs are known, the process of designing and developing a good presentation is analogous to that of designing and developing a new product. It is a process that most engineers use every day in their work environments, one which can help take the mystery and fear out of developing and delivering good oral presentations. By concentrating on a few critical planning details when first setting out to design an oral presentation, engineers can help ensure that they develop and present the right material in the right way to influence the thinking of others.

### Creating a Specification for the Presentation

A product specification tells how a product must perform, what requirements it must satisfy, and how it will satisfy those requirements. The specification for a presentation provides answers to similar questions by focusing on the three critical questions listed above. Knowing the answers to these questions, the engineer can narrow the range of information needed and select the proper language and graphics necessary to communicate effectively with the audience.

**Determine the Purpose of the Presentation.** Often someone else has already determined the purpose. A manager or person in a position of authority has asked for the presentation to solve a certain problem. Some of the requirements might be:

Do some research on technology *G* and make a presentation to my staff about how we might use it for the *ABC* product line.

Karen Wright, the vice president of engineering, will be here next week, and I want you to spend 10 min giving her a progress report on your project.

I'll let you go to that IEEE conference, if you put together a 30 min talk on the three most exciting new technologies you learn about.

Other times, an engineering team might decide to ask upper management for permission to adopt a new technology, buy new equipment, go ahead with a new process, or develop a new timeline for the development of a project. Each of these will probably require not only a written report covering the details of the proposal, but also a briefing for the senior staff so they can see the details quickly, ask pertinent questions, and make a decision.

Each presentation has a purpose, and the engineer must decide on that purpose before starting to develop the presen-

tation. Most presentations fall into one of three major categories:

1. To provide specific information to the audience about which the speaker has special knowledge
2. To persuade the audience to act in a way the speaker wishes
3. To tell the audience how to perform a function or process

Given the same starting information, the speaker must select specific details and present them in a way to achieve each purpose. The types of presentations normally found in engineering environments include the following:

Presenting technical information

Requesting approval for a project or part of a project

Reporting progress at regular intervals on a project or program

Reporting trouble on a project so important decisions about how to proceed can be made

Reporting at the completion of a project what went right, what went wrong, and suggested improvements for future projects

Giving an impromptu talk on some aspect of a project or technology in which the speaker is expert

Each of these presentations has a specific purpose that the engineer must have firmly in mind when developing and giving the presentation. Even the impromptu talk in which the speaker has almost no time to prepare has a specific purpose. The questions asked, the topic mentioned by the person asking the speaker to give the talk, the context of the discussion that sparked the impromptu talk, all provide guidance as to its purpose.

**Determine the Audience for the Presentation.** The audience for a presentation determines what detail is selected. If, for example, the primary audience is a high-level manager with little background in the primary technology to be discussed, then the engineer must provide background information at the beginning of the talk and perhaps present it in a simple graphic way. A presentation like this might be one to the vice president for finance who must make a decision about providing additional funding for a project. In this case, the vice president might be more interested in the resource allocations and return on investment (ROI) for the project than much of the technical detail. But technical detail is necessary for a better understanding of the project upon which to make a sound decision.

If the audience is the staff for the project and the staff members are very familiar with the technology, then technical details can be discussed in great depth. In this case, charts and graphs showing performance characteristics of components selected, decay of power ratings with increased temperature, or EFI emissions at ranges of operating frequencies might be appropriate. What might appear as jargon to the vice president for finance will be technical shorthand in this presentation, a way of using a common language to get the point across quickly. The engineer can assume a common ter-

minology and technical background of the audience and prepare the presentation with that in mind.

Presentations often have mixed audiences and require special audience identification. If the vice president for finance and the project staff, along with other senior engineering managers are to be the audience, the purpose of the presentation will help decide on the content, language, and graphic elements of the presentation. But the engineer must decide or must find out from someone in authority who is the primary audience. If it is the vice president for finance who must make a decision, then the speaker should tailor the presentation to the vice president. If, the presentation is a technical review in which the senior engineering staff will make decisions about component selection or changes to the product specification, then it should be tailored to the language and knowledge of the engineering staff. The primary audience should be the focus of the presentation. Others attending will have to do the best they can with the information presented. Short asides for those attending who don't have the technical background to help them understand the material are appropriate, and most engineering staff members won't mind. Senior engineering managers often get a bit out of touch with the leading edge of technology, and the asides to the vice president of finance may help keep others from being embarrassed by asking a "dumb" question.

**Determine What the Audience Needs from the Presentation.** Knowing the purpose and audience helps the engineer in determining what to put in and what to leave out of a presentation. The third ingredient in determining what goes into the presentation depends upon what the audience needs from the presentation. If the vice president for finance is the primary audience and must make a decision about the future of the project, the presentation must provide information the vice president needs to make that decision. Technical details probably won't help. But the financial details of the project might be very important, answers to questions like how many R&D dollars are to be spent for development, how much do the manufacturing materials of the product cost, what is the ROI, and when will the product reach the break even point? The chances are that the vice president will ask these questions if they are not answered, and having to ask them might create a poor impression of the speaker and the presentation.

A presentation to a senior engineering manager might review the technical specifications of the product under development, discuss the technical risks of the project, highlight contingency plans in case some technical obstacle can't be overcome, show how long the project will take, and detail what and when engineering resources outside of the project team will be needed. This presentation might be on the same project as the one described above for the vice president for finance, but will provide much different information because the needs of the audience are different. Some material will appear in both presentations, but in different terms and level of detail because of the difference in the backgrounds of the two audiences.

To review, the three questions that help the speaker determine the specifications for the presentation and focus it are as follows:

1. What is the purpose of the presentation?
2. Who is the audience for the presentation?

### 3. What information does the audience need from the presentation?

Once the engineer knows the answers to these three questions, he or she can start on the design of the presentation. It is a good idea for engineers, when first learning to give oral presentations, to write down the answers to these questions and refer to them frequently during the preparation of the talk.

#### Designing the Presentation

Now that the engineer knows what the specifications are, it is time to start designing the presentation. Just as an engineering team first establishes the design for a product before developing it, so the engineer must create a design for the presentation before developing it. This phase is analogous to doing a top-down document for an engineering project, starting with a block diagram or flow diagram of the major functions. The design document for a presentation is a completed outline that fulfills the design specifications developed earlier.

**Gather the Information Needed to Prepare the Presentation.** The first step in any project is gathering the material needed to design the presentation. Memos and email from team members or management, notes made during meetings or phone calls, product specifications, and lab notebooks all provide information needed for the presentation. Where the engineer is uncertain of information, phone calls or email to the right persons can fill in the details. Reviewing the available information will refresh the presenter's memory and help form a solid basis for designing the presentation. Using the specification developed above, the presenter can easily identify material that must be included in the presentation and what should be left out. Another aid at this time is to make notes that condense information and gather it in one place. Creating a text file of the information that can be manipulated by cutting and pasting can help get material organized more quickly and make it more accessible.

**Make a Working Outline.** An outline is nothing more than the skeleton of the presentation. It is brief enough to view in its entirety to see how the pieces fit and make sure all the pieces are in place. The outline doesn't have to be formal, the way most composition teachers demand, just something written down to provide the backbone for developing the presentation. [Note: using the outlining feature of most word processing applications provides an easy way to get the outline done.] These outliners make it easy to include new information, restructure the outline, and add notes to which the presenter can refer. The outlines produced can also be collapsed to give the writer a better idea of how the major pieces fit and whether each level provides the same level of detail. These outlines are accepted by most computer presentation applications, like Microsoft PowerPoint and Adobe Persuasion, making the process of creating overheads or a desktop presentation much more automatic.

A presentation should have a beginning, middle, and end. Although this sounds obvious, many presentations fail because this rule is forgotten. It is best illustrated by the old military adage: "Tell 'em what you're going to tell 'em, tell 'em, and tell 'em what you told 'em." To decide "what you're

going to tell 'em," the engineer should again review the purpose, audience, and audience needs developed in the first part of this process.

Designing the beginning is easy. It should be a statement of the purpose of the presentation. This can be the first point on the outline and can come directly from the statement of purpose written during the specification phase. If the purpose is to inform senior management of the benefits of using a new technology in future products and approve a project to bring that technology in house, the purpose should state that. It might be worded something like this:

The purpose of this presentation is:

To help you understand BDX technology

To convince you that we should use BDX technology in future products because of enhanced performance, lower cost, and lower technical risk

To get your approval for a plan to bring BDX technology in house

This statement lets the audience know immediately why they are hearing the presentation and how they must use the information they hear and see.

The middle of the outline consists of those major points the speaker must present to the audience to achieve the purpose. For example, the purpose statement in the previous paragraph already lists the major divisions:

What BDX technology is

How it can enhance performance

How it can lower cost

Why it offers lower technical risks

What the plan is for bringing BDX technology in house

These are the five major headings of this presentation. Once the major ideas are in focus, each can be fleshed out into minor points which are critical to developing the major ideas. In a complex presentation, the minor points might be broken down further into subpoints. It is important to note, however, that all the major ideas should be in place before trying to break them into minor points. Trying to provide minor points before all the major ideas are in place often leads to poorly organized presentations.

The end of the presentation is merely a restatement of the beginning of the presentation. In this case it might be something like: "Now that you have been introduced to the BDX technology, have seen how it can enhance performance, reduce manufacturing costs, and lower the technical risk in the development of future products, I am convinced that you will want to approve our plan to bring BDX technology into our processes."

**Test the Outline Against the Specification.** When the outline is finished, test its completeness and appropriateness by making sure it meets the specification developed earlier. Ask these questions:

Does the outline focus on the purpose?

Is the audience capable of handling the information?

Will the presentation provide all the information the audience needs to achieve the purpose?

Where the outline falls short, revise it. If the outline provides information not needed for the purpose, eliminate it. Just as a design team conducts a design review before moving into development of a product, so too must the presenter conduct a design review before moving into the development of the presentation.

### Developing the Presentation

If this were a technical paper or journal article, the engineer would now write the first draft from the outline, fitting the material gathered earlier into the outline. But since this is an oral presentation, the engineer must put information collected in the first steps of this process into the outline as reminder notes.

**Fill in Outline with Notes.** The engineer should now add information that appears in the gathered material into the outline. If you are using the outliner feature of a word processor, just type the notes right into the outline. It is best to write only words, phrases, specific numbers, or data into the outline to jog the memory about important points the speaker wants to make. Don't add complete sentences because they will hide the important points during the presentation when there is no time to read. Some speakers make the mistake of writing down everything they want to say and wind up reading their presentation to the audience. This is the very worst kind of presentation because most nonprofessional readers don't read with good pacing and emphasis and they cannot sustain any meaningful eye contact with the audience.

The engineer should look carefully at each piece of information to see if it can best be presented in graphic form. Tables, charts, line drawings, data flow diagrams, block diagrams, pictures, photographs, and cartoons often get the point across better than words. The audience can see the information and often carry that image away from the presentation, whereas words are often forgotten. The outline should show where each graphic piece fits. Incidentally, graphics display the important information needed so the speaker will have to refer less often to notes.

**Test Your Notes Against the Specification.** Read through the outline and associated notes to see how they meet the specification. Don't try to make adjustments during the first reading of the material. Just get a feeling for how the entire presentation flows or doesn't flow. Trying to make adjustments during this first reading may cause more problems than are already in the presentation because of the limited viewpoint the presenter has at this point. Once the entire presentation has been read, go through it again, testing it against the specification and make changes as necessary:

- Eliminate information that is extraneous to the purpose.
- Research areas that need more information.
- Ensure that terminology is consistent with the audience's knowledge and experience.
- Make sure words and graphics tell the right story to satisfy the needs of the audience to achieve the purpose.

When the outline and notes are in the right order and meet the specification, consider what material should appear on the presentation materials. And remember if the same general

topic must be offered to different audiences for different purposes, the speaker should prepare different presentations.

**Develop Presentation Materials.** Now that the material for the presentation is in final shape, the presenter should put them in the forms to be used during the presentation. A typical set of materials needed for a presentation are as follows:

Transparencies for an overhead projector, 35 mm slides, flip charts or posters, or a computer-based presentation that is fed to a projector or large monitor.

Speaker's notes

Handouts for the audience

The materials used for the presentation should be kept as simple as possible. Many organizations have developed templates designed to make all presentations attractive, standard, and effective. The engineer should avoid the temptation to use colors, fonts, clip art, and other devices that seem high-tech, but which can detract from the presentation if not used artfully. The rule here should be to keep the focus on the important points of the presentation, not on unusual combinations of color, clip art, and special effects. A well-designed and -developed presentation using black-and-white overhead transparencies is often the most effective. Color, when it is used, should be used to add to the effectiveness of the presentation. For example, providing data in a chart format in which colors allow easy identification of categories, adds to the ease with which the audience can read and interpret information.

Most presentation software also prints speaker's notes and handouts for the audience. These can be very useful to both the speaker and the audience. Speaker's notes provide an easy way to keep the information flow synchronized to the display. And the audience handouts provide a good place for notetaking and writing down questions for later discussion. Another valuable reason for producing speaker's notes and audience handouts is to avoid the traps set by Murphy's Law. If there is only one bulb in the projector, it will blow at the beginning of the presentation. If there is only one room with a presentation projector, someone with more clout than the speaker will requisition it. The speaker's notes and audience handouts then allow the presentation to go on as scheduled, with the speaker using the notes for reference and the audience following along with the handouts.

### Rehearsing the Presentation (Testing)

At this point in the development of the material, the engineer should consider it a prototype. It must be tested to see if it really works. Will it survive the scrutiny and questioning of a live audience? For most speakers, even practiced ones, nerves start to tingle and fear creeps in around the edges. Many actors and performers admit to having *stage fright* before each performance. One way to help relieve that anxiety is to rehearse the presentation in front of a friendly audience first.

**Practice with Friends.** Most engineers who must make a presentation are part of a work group with whom they are friendly and relaxed. It is a good idea to give any presentation a dry run with an audience that is familiar. Before starting this first presentation to a friendly group, however, the

speaker should review with the group the purpose of the talk, the characteristics of the audience, and the audience needs. This will help forestall comments and questions that are not valid, given the context of the presentation. It will also help them offer better advice on what might be added or deleted. Someone may also know information that is critical to the presentation but of which the speaker is ignorant. Although embarrassing at the time, it will be much less embarrassing than if discovered at the actual presentation.

**Give the Presentation to a Select Group.** As a normal part of the review process for presentations going to high-level managers and executives, many middle managers will ask that the presentation be given to them and their staff members first. This review allows the speaker another opportunity to practice the talk and get more familiar with the material. If a review like this is not required, the speaker should seriously consider asking for one. Not only does this provide another opportunity to have the presentation critiqued, but also gets the speaker more comfortable with the information.

**Revise the Notes as Necessary.** After each practice session, the speaker should review the comments from the audience and make the necessary revisions, but not just because someone said so. The speaker should review the comments with the specification in hand and make only those revisions that help the presentation better meet the specification. Before the real presentation, the speaker should practice the material at least one more time.

**Visualize the Presentation as Going Well.** Finally, when it seems there is not much more the speaker can do to prepare for the presentation, there is one other trick that works well for many people. World-class athletes are often caught on television visualizing their performance before they start into their routine. The Olympic skier will visualize each gate on the course and imagine going successfully and quickly through each one. This technique can work effectively for a speaker also. Spending some time alone with eyes closed, working through the material, seeing the audience responding well to each point, can help a speaker relax and approach the presentation with confidence. If time permits just before the actual presentation to the target audience, the speaker should visualize the presentation.

## DELIVERING THE PRESENTATION (PRODUCTION)

If the speaker follows the process described above, actually making the presentation will seem anticlimactic. The information has been thoroughly planned and developed, the presentation has been through several dry runs, and the speaker is in command of the material. That is at least half, but probably more like 85%, of the battle. The only part of the process left is to run through the material one more time, this time in front of the intended audience.

### Getting Ready for the Presentation

A few more checks will help reduce the nervousness and uncertainty that all speakers feel before making an important presentation. These checks are like making sure all the equip-

ment in the factory is up to specification and working properly before starting a production run.

**Arrive Early and Check the Room.** The speaker should arrive at the room in which the presentation will be given at least thirty min before the audience. Make sure the room is laid out properly. Place audience handouts at each position around the table and on chairs away from the table. This will save time and effort once the presentation begins. If the temperature in the room is not proper, set the thermostat to a more appropriate setting. If pencils, pads, and water are to be provided, make sure they are in place. Having some small logistical detail out of place can induce a severe case of jitters in a speaker before an important presentation. Try to anticipate any other problems that might be settled before the audience arrives.

**Check All the Equipment.** The speaker should turn on any equipment to be used during the presentation to make sure it works properly. This can include video cassette recorders and television monitors, computers and associated projectors, the humble overhead projector, light dimmers, and projector screens that are motor driven. The speaker should make sure everything works as planned and he or she is familiar with how to operate it. Have the first overhead or slide on the projector or the computer presentation at the first image so a flip of the switch starts the presentation moving ahead. One hazard that sneaks up on many speakers is a projection screen that won't stay down. Discovering that at the start of an important presentation can induce a severe case of nerves.

**Greet People as They Arrive.** Most speakers have an increased anxiety level when staring out at the faces of people they don't know. Standing at the door of the room and informally greeting people and chatting with them helps relieve this anxiety. Greeting the vice president of finance, for example, a person the speaker might not know, is one way to help the speaker realize that the vice president is just another human being. Standing silently at the front of a room slowly filling up with people the speaker has no or little acquaintance with is a sure way to build a case of nerves just before the presentation.

### Conducting the Presentation

The preliminaries are out of the way, and the speaker must quickly get to the material in the presentation. Being confident and competent in the material goes a long way to making the presentation go well. There are, however, a few points to consider about the presentation itself.

**Start and End On Time.** The speaker should not become engrossed in greeting those entering the room and not start on time. The only reason, at this point, for not starting on time is if a key member of the audience has not yet arrived. If the presentation is for the vice president of engineering, the speaker must obviously wait for that person. If the vice president is in the room, but the speaker's manager is not, start the presentation on time. A punctual start will help bring about a sense of competence and planning in the audience and help the speaker achieve the purpose of the presentation.

The presentation should be planned to take less time than allotted so the speaker can answer questions the audience

may have. When the allotted time is up, the speaker should gracefully bring the session to an end. Mention that there is time for only one more question, ask the person or persons who are the primary audience if there are any more questions before your time is up, or just thank the audience for its attention. If the audience has made decisions based on the presentation, reiterate the decisions to make sure everyone present is clear on what they are. If people or groups have been given actions to accomplish, review those actions and the dates those actions should be complete. Attending to these details provides a sense of closure and purpose to the presentation and allows a graceful exit for the speaker.

**Plan to Handle Questions.** Handling questions during the flow of the presentation has its advantages, but can also destroy the speaker's well-planned timing. If waiting until the end of the presentation seems best, the speaker should state that at the beginning. That is no guarantee, however, that the audience will accept the request. It is up to the speaker to keep the presentation moving along at a pace to allow it to be completed in the allotted time. If someone in the audience asks a question that will be covered in a later part of the presentation, the speaker should state that and move on. If the audience insists, then discuss the answer, and later, when reaching that part of the presentation, mention that the point has already been covered.

**Deal Quietly with Hostility.** Most speakers will, at some time or another, find someone in the audience who is hostile to the purpose or the speaker. Reacting to hostility with hostility guarantees negative results. The best approach for the speaker is to acknowledge the concerns voiced and move on. If the hostility persists, the speaker should ask the person or persons to meet at a later time, and to let the presentation continue. This approach will often win the rest of the audience to the speaker's side because most people are embarrassed by unbridled hostility.

If the speaker feels during the design and development processes that the whole audience will be defensive or hostile, the approach to the purpose should be changed. Rather than start with the purpose, the presentation should start with material that all can agree on. A statement such as, "Our company needs to find processes and technology that will lower development and production costs," will help defuse hostility. The presentation should move from universally acceptable statements to statements of fact that help the speaker show an alternate way to achieve those mutual purposes. The speaker should present logical movement from universally acceptable statements in the direction of the speaker's purpose and recommendations. If the audience can accept the logic of the presentation, hostility should be lowered and a more rational approach to decision making should occur.

#### Learning from the Experience (Evaluation)

Once the terror, euphoria, nervousness, or whatever feelings were induced by the presentation subsides, the speaker should review the experience to help with future ones. And be assured there will be future presentations. As mentioned at the beginning of this article, having to make presentations is a fact of an engineer's working life.

**Analyze the Presentation and Its Results.** Consider the overall presentation by "playing back the tape" of how it went. Using this evaluation to make future presentations better will help the engineer gain confidence and competence. The engineer should think about the following questions:

Did I clearly state the purpose so the audience understood it?

Did the presentation focus on the purpose?

Did I correctly analyze the audience's experience and knowledge?

Did I correctly anticipate the audience's needs?

Did the presentation meet the audience's needs in terminology, information, and structure?

Did the organization of the presentation help the purpose or get in the way?

Was the length of the presentation right, not too short, not too long?

What should I do differently for the next presentation?

The engineer should make this evaluation within a day or so of the event, while the feelings and sense of how things went are still fresh. A week later, other intervening activities will dull the memory and the evaluation will not be as valuable.

**Use the Evaluation to Improve.** The engineer should make notes during the analysis and refer to them when getting ready for another presentation. Keeping the notes in a separate file on the computer used to design and develop presentations is a good way to see progress. Comparing earlier evaluations to more recent ones can show progress in making oral presentations.

Reading about how to make oral presentations in an attempt to get better is no substitute for making them. Reading about how to play tennis or golf is no substitute for getting onto the tennis court or golf course and playing the game. The way an engineer can develop better presentation skills is to give more presentations, using the process described in this article. With experience, design and development time shortens for future presentations. Although it might seem painful, one way to get the practice needed to improve is to make presentations at every opportunity. When the project team must present a progress report to management, the engineer who wants to improve should volunteer to give it. Soon others will defer to the volunteer, letting their own fears of making an oral presentation keep them from learning.

The important concept is for engineers to find opportunities to get better at making presentations, to enhance their careers, and to help their company's performance. Overcoming the fear of making oral presentations can be one of the most energizing ways an engineer can move forward. The skills so acquired can carry over into other community activities the engineer is involved in, making them more enjoyable and rewarding.

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