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*as presented in sessions of the Metals Section
at the 41st National Safety Congress*

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Fuzzy combustible fibrous materials will also spread flame quickly across their surfaces.

From these two extremes we can scale down through many types of materials to those which are basically incombustible. The differences are great and appearances can be misleading. Combustible fibrous materials can be painted to slow down the rate of flame spread across their surfaces. Fortunately, many of these materials have been examined and tested in the "Tunnel Test" of Underwriters Laboratories, Inc., and the resulting data is readily accessible. This data can be very helpful in reaching conclusions as to the probable method of flame spread.

There is another factor which explains some of the rather mysterious quick spreading fires that witnesses so often testify leaped across a room or corridor. This is the so-called "flashover" characteristic which has been observed in numerous tests. It is closely related to room temperatures. Observations of test fires show that between 400 degrees F. and 500 degrees F. furniture ignites without flame contact, but when the room temperature reaches the vicinity of 600 degrees F. to 700 degrees F. a "flash-over" frequently occurs, and the entire room appears to burst into flame at once. This is probably the explanation of eye witness stories of flames which seemingly leap across a room or down a corridor with express train speed.

At this point I would like to interject one of my pet gripes. That is the term "flash fire." Newspaper reporters all use the term as if they knew what it meant! The public has seen the term so often that they think they know what it means. Unfortunately I don't know what it means, and I wish someone would let me in on the secret. I have talked to many fire investigators and have yet to find one who can define the term. Any one of the fire situations I described a few minutes ago could be termed a flash-fire. So might a slow gas-air explosion or flame racing through the vapors of flammable liquids. Although each one of these situations is different (and we must recognize those differences to trace down the source), we are allowing them all to be lumped under the term, "flash-fire."

Don't ever accept this description from a witness! Instead, continue to question him

concerning color of flame, position of flame, smoke present, odors and noises, if any.

Another clue helpful in tracing a fire to its point of origin are the signs which point to its direction of travel. In a Chicago disaster, fire and explosion raced across the third floor of a factory. As it went it burned only one side of each pillar and beam. Careful examination of structural members, as in this case, frequently will show more and deeper charring consistently on the same side, which gives a clear indication of the direction the fire was traveling. Moving under draft conditions, it does not tend to reach back and burn the reverse side of each structural member but tends to leap on to the next exposed surface.

With the preceding information, we are frequently able to trace the fire back to its point of origin. Then, from points of evidence previously discussed, we can put together the circumstances which brought together combustible materials and a source of ignition. If it traces back to a furnace room, for example, we can reach conclusions as to whether or not there was combustible material close enough to the heat source. Combining this with our knowledge of ignition temperatures of common materials, it is possible to determine how the fire started.

This is a critical point in our search for the fire cause, because many, if not most, investigations stop here and die. The verdict "fire from faulty heating equipment," or "fire due to electrical defect in basement."

The important point, if we are to learn anything for the future, is "why?" Why did the furnace overheat? What happened to the controls? Why? What caused the electrical system to overheat? Why didn't the fuse or over current device prevent it?

Very often the answer is there, particularly in those first few moments after the fire, before anything is touched.

I have laid great stress on the engineering reasons why this information is needed, but there is another and perhaps even more important factor involved and that is "arsen." If every fire was carefully investigated, it would be one of the greatest possible deterrents to arson. Since this is not an arson meeting, I have leaned over backwards to stay away from the subject. However, a study of fire causes and arson inevitably

me together. Both purposes could be admirably served by greater emphasis on the determination of the cause of every fire and why a failure occurred. I believe that photographs taken of the suspected point of origin of every fire would be of inestimable value.

When an explosion occurs, it is even more important to immediately obtain and record important information which could be the basis of future engineering changes. For example, some time ago an explosion occurred in a gas fired oven. This oven was equipped with complete safety combustion controls, but nevertheless it was obvious that flame failure occurred and the gas valve failed to close. Why? Before an investigation could be made a maintenance man dismantled the controls. The result? We will never know what part of that system failed until the next one blows; and then someone may pay with his life.

What can we expect then as a result of these investigations? Properly and carefully made they will provide us with the data that will show the failures in our modern technology. Armed with this information we will be in a position to determine the research needed to control our unusual fire problems and will also highlight our relatively simple fire problems that are largely a matter of human failures.

It is equally as important to investigate small industrial fires and classify and tabulate the results as it is to probe major catastrophes. Our major industrial fires were all small incidents at one stage of their development. By understanding thoroughly the conditions which allow small fires to develop we will automatically eliminate major catastrophes.

This is a plea for careful, painstaking fire investigations of all fires, not just those in which there is a suspicion of arson! I am certain that such a program will turn up a lot more suspicious fires than we are now recording.

I find it very difficult to distinguish between the "criminal" arsonist who sets a fire deliberately, and let us say the "involuntary" arsonist who allows a fire hazard to exist despite repeated warnings and recommendations. In each case the end result is the same, a disastrous fire. Only in the one case the time is definitely set in advance.

A well publicized program of thorough investigation of every fire is bound to discourage both types of arsonists previously described. This, in itself, will be a big step forward; in addition, we will be obtaining data to enable us to make the engineering changes necessary to make this a safer world in which to work and live.

The Fourth Dimension in Safety

By FRED C. PRESCOTT

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You have all seen three dimension movies and probably have done some talking with your friends about the possibility of three dimension television reception in the future.

For years we have known about, talked about, and worked with the familiar three dimensions of safety—education, enforcement and engineering.

I would like to talk about the fourth dimension of safety. This fourth dimension is enthusiasm—the one that gives the other three their real driving power. If I could draw a picture showing these dimensions, I would make enthusiasm the base by which the other three are supported. Without en-

thusiasm, any of the other three dimensions would fall flat on their faces.

Yes, enthusiasm would have to be the base—but it also can't help being a vital part of each of the other dimensions.

Imagine, if you can, trying to carry out any educational program without it. It would be like shooting your fireworks in the rain. Regardless of how pretentious your display, the whole thing would be bound to fizzle out. Chances are good you wouldn't even get your instructor off the ground. And without an enthusiastic build-up peppering the way, let me ask you: How far into any of all our fine safety books, articles, :



pamphlets do you think we'd ever get a reader?

And could you imagine an enforcement program without your enforcement men glowing with enthusiasm? Suppose they merely quoted the rules, dryly pointed out the hazard, and routinely told the offender how many had been injured by such violations. Do you think for a minute the offender is going to beat his chest and repent? Chances are you'd have to wake him up at least once during your discourse, and I dare say you'd have a hard time keeping awake yourself. No, you don't get very far in your enforcement program without enthusiasm.

Now this enthusiasm has to carry over even to your engineering. Safety engineering isn't a dry matter of rules and principles and problem-solving. Unless you've got real enthusiasm about making an operation safe, or improving an existing situation, your engineering can't reflect your best efforts. Your ideas will be weak-kneed because you didn't have enthusiasm enough to help develop them all the way. The best safety ideas are born when enthusiasm conceives them, promotes them, and triumphantly carries them through to fulfillment.

Granted we need enthusiasm. How do we get it? The only answer I know is tough to swallow; we generate our own. Enthusiasm comes from the top down and it is as contagious as the measles. You can't drive, shove, or coax it up from the bottom. Just as an illustration, suppose you plan a meeting on fire prevention. Sure, every October is Fire Prevention Month. That makes it easy—nothing to prepare, just get out last year's notes and dust them off. The same old notes are reworked, a new date placed on them, and five minutes before the meeting starts they are handed to the leader. I'll wager the meeting will go something like this: "Yes, it's October again—another meeting on fire prevention. Let's see, fellows:

1. Fires are costly;
2. fires put a lot of people out of work;
3. fires could cause loss of life;
4. fires are really bad things and we must all do our best to eliminate them at their source.

Now let's hear from you fellows on this all important subject of fires." In this pre-

sentation, in this example, there has been a complete lack of our fourth dimension: enthusiasm, and because of that, the meeting has suffered.

How different it would have been if some good, thoughtful preparation had gone into this meeting. A short color movie, if the facilities were available, color slides, model-audience participation. If you have enthusiasm you'll plan and you'll conduct a top-notch meeting.

It was our fault that we let a conference leader wilt on the vine. We injected very little enthusiasm in his part of the program. People didn't come to our meetings and when they came, they slept. In the past two years we have been working hard with meetings to give them sparkle, interest and a new look.

Starting right at the top, we took a deep interest in the program, bought a magnet projector, made two sound movies, prepared handouts for our meetings; put showmanship in the presentations, using flannibards, blackboards, slides, and other aids. Our attendance at these meetings during the past year has doubled. Enthusiasm brought the full house.

At Peoria, we have an expression, "Put handles on it." In other words, give us something we can think about and possibly use. Now let's try and put handles on the fourth dimension, which in our opinion, is most important and must be a part of a really successful safety program. How do you inject this into a program if it is not already present in the desired amounts?

1. Start at the top and radiate this enthusiasm for the all important work you are doing. Be the example setter for this chain reaction of enthusiasm.
2. Merchandise your product. It's a good one. Put it in attractive new packages. Just because it's old stuff, don't wrap it in a newspaper when all others are using modern, colorful, plastic coverings.
3. Give proper credit. Others along the line can't become enthusiastic if they never are recognized in the form of a "thank you" for good safety performance. Results in this field are achieved through the efforts of many people and ways must be found to thank them, either through personal letters, a personal thank you, a story in the employee paper, the local newspapers, or some other method.

2. No one can get enthusiasm when they are talking about what's wrong. And things are wrong when accidents are happening. But emphasize what is right. Don't dwell on the fact that two per cent of the people had accidents. No one can get enthusiastic about that. But they can certainly get fired up with the statement that 98 per cent of the people are doing things right and didn't get hurt.

Scrap isn't reduced nearly as effectively when people are told how much scrap is produced each shift as when they are told how many good pieces are produced.

Safety people have a tough job in this area because they are always talking to people when something is wrong so it is easy to get into the habit of thinking and talking in negative terms. Be on guard against this and emphasize the things that are right in a positive manner.

3. Changing people around in your own safety organization can be a good way to generate enthusiasm for new assignments.
4. To be enthusiastic you must have an objective in view and thoroughly enjoy your pursuit of that objective. Settle on a purpose and drive to that goal whatever it is.
5. If you don't have enthusiasm, try to learn the reasons why, and in so doing, you may learn that enthusiasm is being held in check by circumstances which can be corrected.
6. Don't you be guilty of killing some one's enthusiasm by failing to report back to them about what happened to their idea or project.
7. A group of trained safety people who are instilled with the feeling of belonging

on the team can accomplish more results faster than any similar group who only have the *work for money* feeling. An enthusiastic working safety teams pay off.

10. In the end, if you cannot find or generate enthusiasm, it might be well to seek some other line of work. For your own good, find something in which you can become enthusiastic, for enthusiasm is one of the important elements of success.

I remember a story of a famous trapeze artist who was instructing his students how to perform on the high bar. Finally, having given full explanations and instructions, he told them to demonstrate their ability.

One student, looking up at the insecure perch upon which he must perform, was suddenly filled with fear. He froze completely. He had a terrifying vision of himself falling to the ground. He couldn't move a muscle. "I can't do it! I can't do it!", he gasped.

The instructor put his arm around the boy's shoulder and said, "Son, you can do it, and I will tell you how." Then he made a wise statement. He said, "Throw your heart over the bar and your body will follow." That remark gave the novice the incentive he needed.

Remember that sentence. *Put your heart into your activity.* Put your heart into determining where you want to go and what you want to do. Make it so important to you that you will not take no for an answer. Expect the best, not the worst. It is what is in your heart, either good or bad, strong or weak, that usually and finally comes to you.

If you want a good program you'll get it. *If you work at it with sincere enthusiasm.*

Presentation of Awards

By W. J. M. REDWOOD

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I have purposely included the ladies in my situation. They are definitely part of our success as a safety organization. I particularly refer to mothers and wives who give us not only the incentive to work safely

ourselves, but the inspiration they give us to guard and guide the manpower of industry. Safety no longer confines its activities to the boundaries of a plant, it overflows into the surrounding communities. Safety is a con-

