

*introduction**0-83*Larry Miles

Refrigerators.....Something else you're going to know about in a few minutes is one of the two men who brought it to birth and made it one of our finest products. Back in - I'm going to say about 1925 - they'll probably change it - Chris Steenstrup and Del Newman started to work on the refrigerator idea. Now, we always thought that they knew all the answers right from the start, but he claims they didn't. Del was the assistant engineering manager of the Refrigerator Dept. until his health forced him to take a little lighter schedule. Now he's working in liaison between the Research Laboratory and the Refrigerator Dept. He's in there every day searching for the thing that's tomorrow's thinking and helping bring it in and making it work today.

So, without further ado, I want to give you one of the finest engineers General Electric ever produced -- Del Newman.

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D. Newman

I don't know - that's a very fine introduction, and thank God for one thing, boys: the last time I talked to the Value Analysis crowd -- or whatever you call yourselves -- I was never so heartbroken in my life as when I found after some time that I had a copy of what I said. In other words, unbeknown to me, they had made a recording of my - the King's English - and when I read it I thought, "My God! Are they going to send that out to everybody in the General Electric Co. that was at this particular meeting?" It bothered me no end, and I went home and I said to my

first wife, Gertrude, I said, "Gertrude, of all the damn things that I've ever read in my life, or ever heard of, they made a recording of my speech, and the things that I said there about certain individuals I didn't mean it the way it reads in this or on this recording." She said - she always calls me "Delbert" - she said, "Delbert, will you let me read it after 36 years of married life?" I said, "No, Gertrude. You can't read this. My stocks will drop no end." So, I'm hoping and praying that there's no recording of what I'm going to say tonight.

First, I want to tell you a little story that I heard a man give in the Research Laboratory not so long ago. I thought it was pretty good. He was a great Christian. I try to live ~~x~~ up to the rules and regulations of the church, whether you'd believe it or not; the only difference is I think a little alcohol is often good for people over ~~x~~ certain ages - it kind of takes care of the high blood pressure and loosens up your joints, et cetera. The Mrs. doesn't go along with me. But this man, he was quite a Sunday School man; in fact, he represented the churches; and he went over to Europe on one of these trips as a representative ~~xx~~ of the churches and he told this story. I'm going to tell it to you because I think it's priceless. After all, when you get back home and your wife says, "Well, what did you learn", tell her this story.

It seems there was a colored gal -- are there any ladies here tonight? No, they're out -- I made sure; I was talking to them in the rear and I made sure; they don't worry about me at my age in life. I can talk to them - it's a wonderful thing to be 60 years

of age! When I wished<sup>d</sup> they would talk to me, they wouldn't; now, they'll talk to me and they feel sorry for me.

But it seems there was a colored gal; she was about to give birth to a child and she was having these terrific pains - it was terrible. So she said to the nurse (some of you fellows have heard this, probably), "Would you deliver a message for me?" She said, "Yes, I would be very glad to deliver a message for you." "Would you be kind enough to go down to the reception room and there's a good-looking colored guy down there; this boy, he's a nice, big, good-looking colored fellow. Will you invite him up here? I want him to witness what I's going through." The nurse said, "Well, I'm very sorry, but we can't invite anybody - there's no one allowed in the Delivery Room during the birth of a child. The pains that you're having are perfectly normal and I'm sorry; we can't. If there was anything serious, I'd be very glad to but under the circumstances we are not allowed to invite anybody in the room during the delivery of the child." "Well, will you deliver a message?" "I would be most happy to deliver a message." "Well, will you tell that good-looking colored boy, for me, if this is what I's got to go through after I's married, our engagement's off right now."

Well, I'm supposed to talk about Value Analysis, but I don't know - in fact, I haven't made any preparations. My good wife said to me the other day, "Why in the world don't you cut out your damn talking?" She said, "You sit out back and you've always got some damn thing on. Why don't you cut it out. You're at the age in life

you'll never get any farther. Why don't you take the path of least resistance and cut it out?" So, I haven't made any notes, and this is what you'd call a speech that is purely off the cuff.

But I did do a little thinking after lunch today, and I was trying to think: everything, I think, that General Electric has is Value Analysis. Commercialwise - how much money should we put in, how much selling; Accountingwise - how much money should we put in from an accounting standpoint; engineeringwise - well, are we spending the right amount of money from a development standpoint, are we getting value received for what we're trying to put into it --- oh, boy, I could go on and stress that point from a long point of view.

Manufacturingwise - is our investment proper, are we putting too much investment, are we tying an engineer up to the point that we put so much money in investment that we can't make a change and tie his hands. You can become so automatic that the poor engineer is lost if he's got to make a change of tomorrow. It's a big job. I don't belittle this problem.

A man in Value Analysis has got to be, to my way of thinking, he's got to be a good-looking fellow with a nice, big smile; somebody that everybody likes; that they don't think he's trying to encroach on somebody's territory - and God knows what. He is supposed to be, to my way of thinking, the most ideal thing that the Lord ever had. That's what I tried to tell my wife about myself, but she don't agree with me.

Now, I just want to go back a little bit. This may not relate

to this subject at all. I'm just going back to some of the things that I had to do with before we got into the refrigeration game, perhaps.

You know, back in the early years, Dr. Coolidge invented what was known as "ductile tungsten". It was a wonderful invention, but how were you going to apply it? After you had the material how could you solder it to other materials? So, he developed, along with his men, the method of hydrogen brazing, and they made a little tube furnace. They found that in a hydrogen atmosphere they could braze ductile tungsten to other metals and make contacts, and what-have-you. I was associated with the man, as a boy, for 28 years - old Chris Steenstrup. He wasn't a technical man; he just had a lot of common sense; hard-boiled; the old way of life, where you hire and you fire - brother, there's no fancy stuff connected with it -- you either do it or you don't do it. If he told you take the broom, you took the broom and swept the floor. He said to me one day, as a boy, he said, "Del, I think we could make a furnace and I think we could use hydrogen brazing for mass production." As a kid I didn't know; but the first furnace we made was a 6-foot furnace; and I worked on the board as a draftsman; started out as an Apprentice boy -- started out as an office boy, if you want to go back far enough -- and as an Apprentice boy, a pattern-maker, a foundry boy - I don't want to go all through that ceremony. But anyway, I finally wound up with this gentleman, and when he said to me, "Del, I think we could make a furnace that's about 6 feet in diameter and we could braze certain things," we made a 6-foot

furnace. We found that hydrogen, under the worst conditions in air, only builds up 100 lbs. per sq. in. pressure. He said, "That isn't too much; we can build it like a hot water tank; we can put the bolts into it and we tie it together, and if we do get too much air, what the heck - what happens? It wouldn't blow up the place." So, we did and it worked good, and then we got into a 12-foot furnace. Then we blew out all the window lights - 1500 window lights in Building #60!

Now, this is a fact. Everybody and their grandmother told us it wouldn't work. Naturally. Research Laboratory - brother, and I'm a research man now, a Ph.D., or something - it wouldn't work. "It'll blow up the whole city of Schenectady." Did he give up? No! What happened was it was like a plug hat and you lift it up --- and the girls can come in now; they're in, now -- when this furnace was lifted up in the air the hydrogen stayed in and the man wanted to find out, on his own, whether there was any hydrogen left, so he lighted a torch on a long pole with some waste, and he put it up in the hydrogen furnace, and brother! he found out there was hydrogen there. And out go the window lights!

I have seen that man, at 2:00 o'clock in the morning - because I lived with him and he fired me every week - every week he says, "You're done." And the next morning - and I used to go home and almost cry over it, - he'd say, "Del, no matter how many times I fire you we are always friends; remember that." I've seen that poor fellow almost cry; but we went on - he wasn't discouraged. I'm trying to give you men kind of -- King's English is "kind of", of course, instead of "kinda" -- but seriously, he wasn't discouraged.

He says, "Everybody's against ~~xxx~~ me, but it's going to work." They had confidence in him, and it worked. We brazed turbine wheels, and we did this and we did that -- I made a few notes.

And then we came to the monitor-top refrigerator. The old monitor-top; the work that the old                      did over there in France; when they were shipping vegetables and things of that sort to South America and they had a lot of trouble with spoilage. Well, they had the open type machine and he thought, "Well, we could make a hermetically sealed machine." Now, I don't want to go all through this; but a Frenchman sold the General Electric Co. on this idea. Fort Wayne tried to do something with it; they worked on it. But then the General Electric Co. decided to do something about it and they called in certain men in the Company, asking them if they would take an interest in this problem - "We're either going in this business, or out of it".

Now, this is a kind of an old story and I can't help but relate it, because the older I get the more I appreciate this man who was a thorn in my side many times and still I still love him. If we didn't have him we wouldn't be where we are today in our many businesses - in the appliance business.

The first unit that we made - I'll never forget old Chris; they ~~had~~ had a 2-cylinder job at Fort Wayne and they had a bronze compressor case, the fins that had to dissipate the heat - it was so costly they couldn't sell it to the trade. So they invited certain men in to look at this thing. Chris was one of them. So, Chris said to me one day, "You know, Del, Yeejus, I tank instead of a

2-cylinder pump we make a one-lunger out of it." That was his way of talking. I know it's a tough thing to balance, but I think we can balance it - we made the one-lunger and it worked. The first day that we had one working, one Saturday afternoon, over in the old Westinghouse Building, across the road from General Electric, the evaporator got cold and he said, "Del, put your hand on the evaporator. The damn thing is gettin' cold - isn't dat vonderful?" I said, "Who can afford to buy it? Seventy percent of the people in this country get \$2000 a year or less, and according to all the cost clerks this is going to cost \$1500 - that's a fact, according to the cost clerks." I don't belittle thesemen; now, don't get me wrong. But according to the cost clerks, where they put all the fancy stuff on - add 10<sup>4</sup>% or this and 15% for something else and 5% for so-and-so and incidentals and entertaining -- and all that kind of stuff; traveling, sleeping in sleepers --- and when you don't sleep in sleepers--- and all that -- it was \$1500. He says, "Oh, Del, don't worry about that; the main thing is the evaporator gets cold. We'll work out the cost. Nothing but copper - a little copper with a lot of cast iron and some steel. The basic materials are inexpensive. Don't worry about the cost. The Cost Department will cost us out of business, to begin with; but to hell with 'em." And he told Eveleth that!

Now, I'm not belittling Eveleth; I'm not belittling anybody. I'm just trying to impress upon you men the spirit of this man who fired me every damn week, and then said, "Del, we're always the best of friends, no matter how much we fire you". But the point was:

he had here in his mind - here's something that works; and after we made 20 models he said, "Now, we get the cost down." What did that mean? I can never forget it; I wish I could just live this whole thing with you, but it would take too much time. Like the crankshaft - he said, "Del, that costs a lot of money. We make that out of bolt-header. I was thinking about it last night in bed." These ideas you get, you don't get them between 8:00 and 12:00 and 1:00 to 5:00 -- it's when you lay the body down. If you're interested in your job. He says, "You know, I think we might make that on a bolt-header. The bolt is the cheapest thing, Del, we ever produced. All you do is just hit it and that upsets the end. We'll put the counterweight on and we'll just hit 'em on the end. If we don't get enough heading to take care of it, we'll put a little something, stampings, somewhere else to make it up."

Well, we were in business. We were 15 million dollars in the hole when we started; in three years time we were in the black. We used to advertise: "No belts - no fans - no pulleys - no stuffing boxes". General Motors said, "If you don't stop that advertising (now, this is Confidential; I'm General Electric now) - if you don't stop that advertising we will not buy one cent of General Electric equipment". We had to limit it; we had to cut it out; we had something good -- we were cooking on the front burner! If that's what you want to call it. It is the kind of man that he was. When they said, "You can't make check valves of this type", and they had every damn designer in the Company making check valves - any mechanic. Finally old Chris says, to the vice president, "I want you to do von

ting, or I'm done." He used to say to me, "~~Fixxx~~ Del, as a boy, I tell you von ting: save your money. Always get to the point where you're independent and you can tell them what to think. Always get independent." ~~Wxx~~ Well, you couldn't get anywhere else but independent because you had to work around the clock and you didn't have time to entertain your wife as a bride. Hell, you couldn't do anything but work, anyway. She cried because I never went to the movie with her for three years. It's a fact. .... (end of side 1) .... five feet of concrete; five feet this way, five feet that way, and I want it on the first floor so every time the train goes by to New York we don't have the damn thing bobbing. You can have all the damn check valves you ~~xx~~ want." And they did it. What happened? They made 175 an hour - they didn't have any trouble.

No, don't get me wrong - this man was a genius in the Company; and yet I could say a lot of things about him, honest-to-goodness. I could wring his neck, but I still love him. That's where you've got to be big. He did a lot for General Electric.

So, that's what it is in the refrigerator business. Costwise, anything we had we'd look it over; he'd just say to me, "Now, I quote this man and they criticize me a lot for quoting, and I don't get paid extra for this, I can assure you," but he'd say to me, "Del, you know, when it comes to cost reduction" (I'm only trying to pass things along that I have ~~xxxxx~~ learned, and it doesn't make a darn bit of difference - my salary - it doesn't make a darn bit of difference one way or the other.) He used to say to me,

"Del, remember one thing always: consider the basic materials that go into a thing~~x~~, if you aren't using diamond dust". That was a great story here. "If it's just cast iron, steel, a little copper, don't worry about that; don't worry about the process, the big thing, to work out is: is it good? Are you interested? Is it a good thing? We work that out afterward." That's all we did; that's all we did in the Refrigerator Dept.

I wish I could tell you right now - only I won't state it - the profits of the Refrigerator Dept. -- and they're going through birth pains now, brother, and I'm not kidding -- as against the losses in the Major Appliance Section as a whole; how they wind up - but I think probably they'd shoot me at sunrise if I ever told you, so I won't tell you.

Aluminum - aluminum braze -- that was a tremendous thing. The Aluminum Co. of America made some aluminum ~~facili~~ vacillators with tubing for us. Well, they made the evaporators and we ran them and they were efficient; but they were costly. We ran them, though. Then came aluminum brazing. I used to live with those men at New Kensington; I was down there every month for three years. After the new ~~abrazing~~ alloy, after we had the first 30 we wanted a number of them. It would cost \$75,000 for this, and they said, "Del, I think we'll absorb the whole thing because we can see tremendous possibilities if this goes across." They absorbed the whole cost. How much do you make use of this place without costing you anything? We're working on ovens for ranges today on the same basis. New things -- and the aluminum brazing based on that -- and honest-to-

goodness, on this I can tell you: had we been smart and realized the difficulty between copper and aluminum, just a little drop of water off of a copper tube on aluminum, it carries the copper ion down and eats a hole right through it. Brother! We had been in this thing, in mass production, and every damn thing we're making - gee, it's costing us a couple million dollars to take care of complaints; but we're saving millions and millions because we've gone through it and we've learned.

Now, you might say, "Well, we could have been so smart and said 'Oh, brother, you've got to watch out for copper and aluminum; these two metals don't get along together and we have all these problems of electrolysis and what-have-you in the electromotive field', but we didn't know it until we got into it." Thank God, we got into it that way. We were in it, and we're making millions and we've learned how to handle it.

So, when it comes, now, to things that worry me most, you might say, "Why the hell should you worry?" But the things that really worry me most are the things of tomorrow, the new things. You can take this and figure out another way to blank it out; but new ideas, new things. We have - and you look at John Horn's report and I didn't know John was going to be here; honest-to-goodness, I didn't. I brought it down, because I had a letter from Dudley Chambers and he's copied everything John has on the front sheet, here, of which he said, "Are you using the information resources? What are your comments?" I'll read this - well, normally the way an engineer would read, he'd take it and he'd do one of two things, like I used

to do: You'd turn it over to somebody in the department and say, "Read it; is there anything....?" And the man would read it. The other way, you try to ~~xxx~~ read it yourself and you read it - report - yeah - yeah - yeah - and you put it in the vertical file.

Seriously, I'm trying to give the God's honest truth on this thing. I am really taking John's report - now he puts a lot of effort into this, and the old boy would like to shoot me at sunrise a lot of times, and honestly, I didn't know John was going to be here, but he talked to me in the back a little while ago. "Edited by John Horn", see? Engineering Service Division. Now read, the first thing he has here. I decided I'm going to take this every night and read one paragraph and I'm going to scheme on it. I'm not getting paid for this. Chromizing is the first one - he wants your comment on: Is it worthwhile or isn't it? He talks about chromizing. I read this, and I said to a man this noon in the Research Laboratory - Floyd Kelly - I said, "Floyd, are you interested, do you know about ~~xx~~ chromizing?" "Oh, yeah, I know about it. I've done a lot of work on chromizing. That's a good process, yeah - yeah - yeah. Damned expensive - I was in that years ago - damned expensive - I was in it years ago - that's too damned expensive." You might say, "Well, the path of least resistance - let's throw it off; too damned expensive." But there's a lot of water over the dam in the last few years.

I think the first thing is, somewhere, somehow, in the organization, that you take that thing - that's what I'm doing. I ~~x~~ want to see a piece of material that's been chromized, and I want

to see if it's been run at these hours that he speaks of at these temperatures; and I want to see if it's good -- I don't care what it cost to do it; I just want to know if it's good. All I want to know is, "Is it good?" ~~xxxxxxx~~ Is it as good as 18 & 8 stainless steel that he talks about, at these temperatures or lower? Is it as good as that?

All right. What's wrong? Well, it costs a barrel of money - you've got to put this up; maybe you've got to put a ~~whole~~ whole factory up. Then I'd say, "Why? Is there any reason why we can't do it differently in mass production? What would it mean if we had thousands and thousands of pounds to do it? Not just pass over it lightly, chromizing, blah-blah-blah." You talk to somebody - that's too costly - that's the ..... where do we go from here?

That's what I'm trying to do, boys, believe it or not. I'll give you another one - John's ~~x~~ got it in here somewhere. You may look at this and read it and you'll laugh it off: phosphate coatings! Gerard - Works Laboratory. You'll read it, the same as anybody would read it, the same as I would read it, not knowing about it. But I'd know about it. This, to me, if I didn't do another damn thing in my life for General Electric for what they pay me -- in all my secretaries and all the fancy stuff that goes for entertaining, and everything -- brother, if this thing could come about it's the biggest damn thing that we've had in the appliance game in one hell of a time. Ranges - for dishwashers - for small appliances - for toasters. I'll tell you why. Maybe I shouldn't speak this way tonight, but they're not recording it.

(Somebody tooted for me to shut up.) I'll tell you why: Do you know that you can take glass and put an electrically conductive coating on it and you can do one of the most beautiful broiling jobs for an oven that you ever saw in your life. You put this - place this electrically conducting coating; the whole thing comes up to temperature; it's on the outside of this oven. What's wrong with it? It takes too damn long to come up to temperature ~~xxx~~ because glass developed by Corning people - glass, you've got a ~~xx~~ quarter-inch of glass; it takes 1/2 hour to come to temperature~~x~~. People today they get up in the morning, and they want to say "Good morning", and they put the temperature on and the coffee boils and five minutes later they're on the elevator, or something; you know, in the Metropolitan area.

So, you want a very low specific heat. Well, it's in here. John's report. Now, the thing is to - somebody - to study this and look into this, and the reason why I am so damn interested and the reason why this has been such a heartbreaking thing and everybody told me it wouldn't work, but I heard, by a certain individual, they said, "Del, you ought to look into phosphate coatings". I get a man by the name of Gerard to do it.

Now, the bad part of it is I first go to the engineer and I say to the engineer, like I used to be - one of those birds - it wasn't Delbert in my case; it's another fellow. "You know, I think we could put a phosphate coating on a piece of material. Will you give me \$1000? We'd like to try it." "Gee whiz, no...blah-blah... what are you talking about? You know I've got \$350,000 already....

blah-blah-blah....show me the piece, first?" You know, that's natural. That's what I'd say to a vendor: "Give me a piece. I want to see it work." So what do you do?

The easiest path and least resistance is to say, "The hell with it; not me." I invite them to lunch, one of my special lunches. I get the guy, who can put the phosphate coating, and then I get another guy who shouldn't be in General Electric who puts on the electrical conducting coating, and I say, "Will you have a cocktail - make it a double..." and after you get about two shots in him you say, "(Sotto voce) Is there some way you could make this?" You know, it's like making a special bore for a lawnmower that you can't buy and you go to the boss and say, "I want a bolt and so-and-so-and-so..." it may cost \$25.00 in the Company's overhead...when you make a bolt....blah-blah... "You old s-o-b, I shouldn't do it for you, but I will." That's the kind of a thing. Finally you get it; you get the \$1000. Now we've got \$10,000, because it worked.

Fortunately, in this case the first damn sample worked. Then we had a hell of a job to make the second sample work. Then I was on the spot; then what happened? Then we found out that our thermocouples weren't right and we were heating it ~~thex~~ three times hotter than we ever wanted to heat it; it's like steel - if you heat it high enough the damn thing will melt. You'll kill anything if you go too high in temperature. What was wrong?

Well, these are the things that can be done in General Electric. We have the facilities. God bless you, I don't know the answer, how

to get around it. One of the finest things in the world to help you with your problems is a damn good expense account. Honestly. Good entertaining expense account, without any questions asked.

But we do have, and what John - and John hasn't paid me; I'm taking this, every night, I'm taking one paragraph and I'm thinking about it. Ye Gods! For the rest of my life I'll be going through this darn thing. And he's trying to do a job. The Research Laboratory is sitting down right now; I know this, because I'm in liaison meetings every Monday. What can we do to make use of our ~~new~~ facilities in the Company? Why have we got ~~away from~~ to wait for Bendix to come out with an automatic washer and dryer and then we do it? Why have we got to wait for somebody to come out with color in refrigerators and then we do it? Why have we got to come out with automatic defrosting after somebody else does? Why have we got to have toasters that look at the bread and tell you when it's light brown and dark brown after somebody does it? We have these facilities, honestly, and these are the things that I'm trying my damndest to work on.

I'm trying to say Boys, don't get discouraged. Make up your minds. Here's this impeller - I wanted to talk about that; I don't want to take up too much time. Look at it - that's the vacuum cleaner of tomorrow - instead of a 2-speed job - maybe there's a vacuum cleaner man here somewhere - Research Laboratory - this is 70% efficient against a 20% efficiency 2-stage job. How are we going to make it? Who can make it? It's too costly. The Aluminum Co. brazes that thing in a flux at 1000 deg. - just like French-drying

potatoes. Now, I think that Value Analysis men should be able to look at a thing like that and evaluate it and say, "Gee, this is a wonderful thing. How can we make it at a reasonable price?" Then perhaps you should have somebody - maybe it's Larry Miles' section; I don't know; that you could go to and say, "We don't want to give this up like they did this. They wanted to give it up because it was too damn costly and go to a die-casting". All that kind of stuff. Somebody in the Company should know the facilities around the Company and know what you can do.

Now, we've found that we can make that thing 20¢ less than even a die-casting and it has a 70% efficiency - and this 20% - and that 70% allows in a vacuum bleaner to do things you've never dreamed of. We've shown this at 3000 cycles per second what happens when you clean a rug. What really happens when you clean a rug? Some of the dirt - ~~xxxx~~ your wives, when they get all through - the dirt comes up here and goes back over there; you watch it. She thinks she's got a swell job but she's got a lousy job. All you do and you take a mirror over there and that's it. Honestly; don't look the same; kind of buries it down in a little bit.

But I'm not trying to criticize the Company. We have these facilities, and maybe it's Larry Miles' job to set up an organization that can talk to you men and say, "I know what goes on around the country. Go to the Aluminum Co., sure, they'll do it for you. Or somebody else can do something else for you". I could on and talk about sole plate fryers, and I could talk about dishwashing, I could talk about why are clothes dirty and what's surface chemistry

and tell you about that sort of thing. It's a big job, boy, and all I want to leave with you is that we have the facilities in this Company. God help you, how you get it out I don't know. I'm working on it; but we do have it. And when we have to play second fiddle to somebody else, (I don't know if there are any vice presidents here, or not) I say it's time somebody kicked the lid off somewhere, because we shouldn't do it and we do and Larry's trying his darnedest to help you.

So, Larry, wherever you are, this is my speech for the day, and it's off the cuff and ..... If I can help in any I'm always glad to do it.

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