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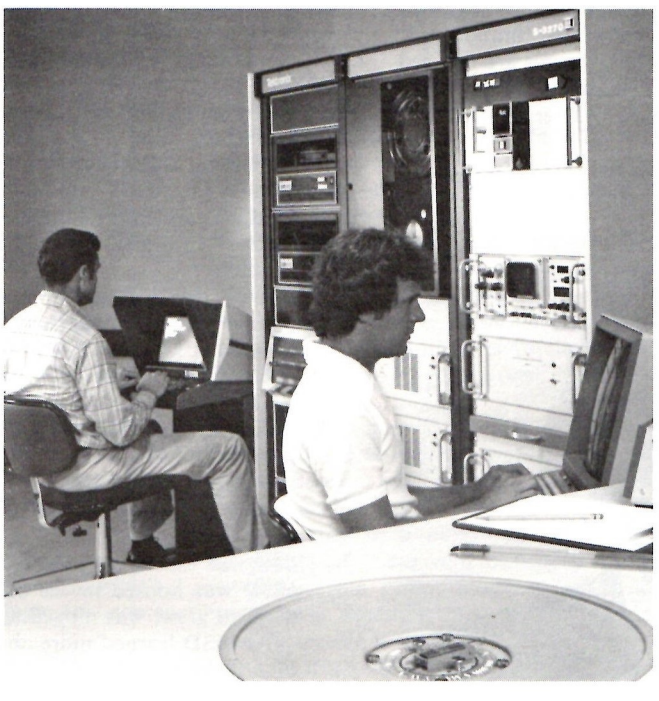

Tek systems developed to meet customer needs

Larry Sutter, General Manager Measurement Systems Division

An important concept that is helpful in understanding the operation and so the purpose of Measurement Systems Division is to understand, first of all, just what a business really is. In other words:

- What is a business? What is its purpose?
- Is it to sell a product or a service?
- Is it an organization to make money?

One answer that I like is that the purpose of a business is **to create a customer.** Let me explain. The needs a customer has alone determine what a business is, for one good reason: because the cuatomer **pays** for the goods or services a business offers. If you have no need, you won't buy a firm's product. The customer really becomes the foundation of a business by giving a value to the product or service a business offers.

So, if it is clear that a purpose of business should be to create a customer, then it is important a business fill a need the customer has. And it follows that a "successful" company is one that identifies and fills those needs better than other companies.

In the early 1900's, America's farmers had no easy way to purchase the goods they needed on a regular basis. It was too far to travel to town easily, and most small towns couldn't provide the breadth of merchandise that the farmer needed. Farmers also wanted a reasonable guarantee of reliability and quality. It wasn't exactly easy to return defective goods.

Well, a good businessman recognized this need and, to fill it, built a mail order catalog business that offered a wide variety of quality products, quick delivery, and a money-back guarantee. This company is—Sears.

Here is another example:

During the 1940's, the electrical engineer had no easy way to acquire important timing information about electrical signals. The engineer needed a quality measurement tool which would perform reliability.

Some very alert people recognized this need and, to fill it, built a product which acurately measured electrical signals and, in addition, offered uncompromising quality, high technology and innovation. What company are we talking about here? Tektronix, of course.

These are two familiar examples of how recognizing and filling peoples' needs can indeed create customers and become the foundation of large corporations.

Understanding customers—their needs, their problems and their values—is the best way to understand a business. It follows then that the best way I can explain MSD to you is to tell you about our customers. First, let me describe our customers in a general sense.

The MSD customer can be characterized as having certain needs which our products and services fill. The MSD customer often requires a **complete** test solution, and, in fact, may need more than one type of instrument to solve his problem. Often, then, the MSD customer needs a "System."

Our customer often requires automated or automatic operation. He may need the help and power of a computer to do the job. But he may also require real portability.

The MSD customer has come to expect traditional Tektronix accuracy and reliability. He or she may be in research or engineering, or working in some type of design. He or she is typically in a high-technology industry, working on very advanced projects.

This is a general description of the person who buys MSD produts. Now, some words on how we fill his needs.

Specifically, the Measurement Systems Division is four businesses which address four basic customer groups. These businesses are:

1. Benchtop Semiconductor Testers (BST)-products which test semiconductor devices.
2. Semiconductor Test Systems (STS)-large, automated systems for testing components.
3. Signal Processing Systems (SPS)-products for acquiring very fast waveforms.
4. TM 500-a broad line of general purpose test equipment.

Each one of these businesses has examined the needs of specific customer groups and provides test and measurement equipment which satisfies their requirements.

The following are some examples of how MSD products solve customer problems:

The first example deals with how **Semiconductor Test Systems** (STS) products affect the next automobile you may buy. STS products can be found at the Motorola Corporation in Arcade, New York, where engineers are developing an electronic engine control module, which will be delivered to Ford Motor Company for use in their 1980 cars.

This module will be responsible for three main areas in the new automobiles—emission control and fuel efficiency control.

It's a microprocessor based module, which includes many "chips," or tiny circuits, which direct the functions of the car's engine. Each "chip" is about the size of the end of your finger, and some of the chips can perform over 6,000 functions.

When the engineers at Motorola decided to use these chips to build the EEC, they knew that they would need to test each chip to make absolutely sure it would perform the necessary functions reliably. If the chip were to fail while the EEC was in a car, the control functions would not work, resulting in the engine not running, for example.

To test these highly complex, tiny chips, they needed a test system which has a fairly large computer to perform

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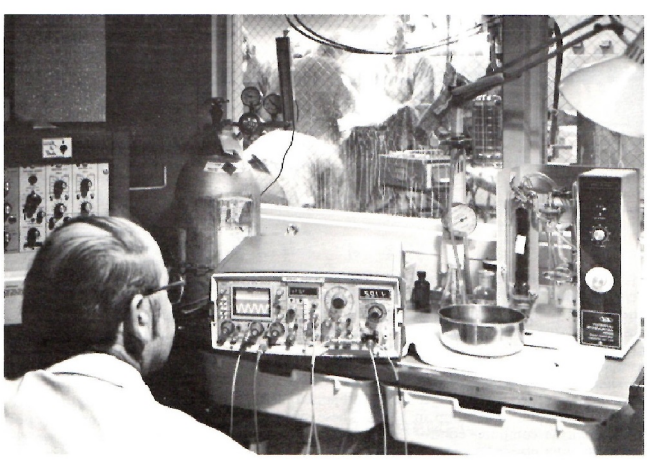

TEKTRONIX SYSTEMS are custom made for hospitals, research labs, engineers—customers with high technology needs.

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many calculations. They also needed a system which had very advanced measurement capability, to be able to check each individual function of the chip. They also wanted a system which was easy to use and could be programmed so that the test engineers could learn as much as possible about each chip.

After extensive study, the people at Motorola in Arcade bought three Tektronix S-3200 Automated Test Systems from the STS group in MSD. These systems gave them the computer control that they needed and the calculation power they wanted. The systems are programmable and easy to use, so the engineers can use the computer and its calculation power to their full advantage.

As a matter of fact, the measurement capability of the S-3200 system is recognized as absolutely the **very best** in the industry, and that's what the people at Motorola needed. The S-3200 systems are helping Motorola make sure the the EEC module will reliable and safe for the 1980 cars, working to control engine operation and efficiency.

Another use of STS products is in the computer industry. S-3200 Test Systems can be found at Digital Equipment Corporation, whose computers are used by themselves and are also sold to companies who need to put a computer into their own equipment. Here at Tektronix we use DEC equipment in some of our larger products which require computer control. They are the world leader in the small computer market-place.

DEC has a fine reputation for building some of the best quality small computers in the world. When people need highly reliable small computers, they turn to DEC as a supplier. Their computers are found in the medical market, aerospace and military equipment, satellites, and other complex instrumentation. DEC minicomputers are also found in some unusual places—the huge billboard in Time Square in New York is controlled by a DEC computer, and so is the light and sound system at Earthquake Ethel's in Beaverton. The yacht Courageous, which won the America's Cup in 1977, featured a DEC computer in its navigational system.

DEC builds their computers around very complex devices, called integrated circuits. At the heart of these ICs are small "chips" much like those in use at Motorola. DEC demands high reliability from these ICs, since reliability is vital in the application of their computers. They, of course, also demand high reliability from the test systems which measure the ICs, and that's why they turned to Tektronix. They wanted the most advanced test system available, with the test and measurement capability to fully insure that their ICs were functioning properly.

They purchased their first S-3260 Test System in the early 1970s, and now they own the largest amount of these systems of any Tek customer. There are S-3200 systems in the DEC plants in Massachusetts, Arizona, Hong Kong, Puerto Rico and Ireland, just to name a few places. They continue to purchase our S-3200 systems because we build the systems that meet their needs.

The next area I would like to talk about is how products from **Signal Processing Systems** (SPS) are used in an automotive foundry.

In Louisville, Kentucky, General Motors is using Tektronix equipment to test a part called a "steering knuckle" for their cars. This part, cast from a metal called modular iron, is the mechanism that holds the wheel of the car to the steering mechanism. If this part should break while the car is in use, there is a possibility that the car would go out of control.

So, the General Motors Foundry had a real need for equipment to help them "see" flaws and failures in the steering knuckles. But this equipment had to "see" where the human eye cannot—inside the iron part. So they use the Digital Processing Oscilloscope from SPS to help them detect failures in iron parts by using ultrasonics, a technique of non-destructive testing.

As for requirements, General Motors needed a system which would fit into a production line. And the system had to be programmable, so that the test could be changed as the different sizes and types of steering knucles needed to be tested. The Tektronix Digital Processing Oscilloscope, using 7000 Series plugins, can be controlled by a computer to automate this measurement, so that the General Motors Foundry has the flexibility they need.

It is important the test system be able to work quickly so that production is not slowed down by testing, and it must be acurate, so bad parts don't slip through. The Tek Digital Processing Oscilloscope works quickly and delivers very precise, accurate measurements, which is what the GM Foundry needed.

They also needed a test system which would be easy to use—to be able to leave the test system alone and let it do its job of testing parts. They needed an "automatic" system—which is just what we built for them. (It includes IDG products as well.) The results of the test are automatically stored in the computer in numeric form and are easy to interpret. This helps the GM Foundry reduce their liability by providing safe parts for automobiles.

Another—and very exotic—use of SPS products is in energy research.

At Lawrence Livermore Laboratories in California, scientists are working to develop the technique of laser fusion, which is considered to be an energy source of the future. Fusion involves combining small atoms to produce a larger atom. This combination produces a reaction, which forms helium and releases a large amount of energy.

It is interesting to note that the energy which comes from the stars and the sun is also created by fusion. Fusion is different than fission, which involves splitting an atom apart. The Trojan plant in Oregon uses fission to produce energy. Fission can create a large amount of radioactive material—fusion does not.

Much of this laser fusion research occurs at the Shiva Laser facility at Lawrence Livermore Laboratories. The facility is among the most advanced in the world, and the scientists there needed highly advanced equipment to assist their pioneering research effort.

In developing laser fusion, it is necessary to measure a force which explodes inward—known as "implosion." This implosion occurs when 20 laser beams are focused on a small particle of material, and the material implodes. This gives off a great deal of energy, with very little radioactive residue.

You can see that the advantages of this energy source are tremendous. Unfortunately, laser fusion is not refined enough to be used as a commercial source of energy quite yet. Lawrence Livermore Laboratories and other high technology research centers are working to refine this energy source for the future.

In this application, the scientists needed to measure various forces generated by the fusion experiment. They needed test systems to be very accurate, since they're dealing with such an important, yet still unknown, phenomenon. So, in the Signal Processing Systems group, we created the 7912AD Waveform Digitizer to fill their needs.

Once the measurement data is captured, the scientists needed the power of a computer to analyze the results. The 7912AD Waveform Digitizer met their needs, since the system features computer control. After the wave forms are captured, they are fed into the computer, where calculations can take place.

Because of our contributions to this facility through our state-of-the-art instruments, the scientists and research personnel at Lawrence Livermore gave Tektronix an award in appreciation of our assistance. It is interesting to note here that a laser was used to carve the plaque.

Now, from lasers to hospitals and use of **TM 500** equipment.

One of our customers is Christian Hospital Northeast in St. Louis, Missouri. Like most large hospitals, Christian Northeast is equipped with many large diagnostic and monitoring systems, such as cardio pulmonary resuscitators, pulmonary monitoring systems, X-ray equipment and patient monitors.

These systems must be constantly checked for accuracy and precision, to make sure that they will not fail in an emergency, and to make sure that they meet federal safety standards. To calibrate and monitor this equipment, Christian Hospital Northeast uses a Tektronix TM 500 Medial Instrument Calibration System, known as MICS.

Since many of these sophisticated medical systems are much too large to be moved to a test lab, a test calibration instrument to check these systems must be small enough and light enough to be taken to the systems. The TM 500 MICS package fits on a lab cart and can be easily moved from system to system.

Because so many people depend on the accuracy of this diagnostic and monitoring equipment, the test instruments which monitor the equipment must also be highly accurate and reliable. The TM 500 MICS meets these needs.

Since these medical systems are so important, the test system must be able to work quickly and easily to solve problems. The TM 500 MICS system was engineered to be easy to use and includes such features as an instant digital readout showing the biomedical test engineer exactly what percent of error is in the equipment he is testing. This saves time for the engineer and helps him to get life-saving equipment back in order as quickly as possible.

That's another example of how Tek products fill customers' needs.

Now I would like to show you how TM 500 products are used in the communications industry.

The TM 500 instruments are used by many recording studios and television and radio stations to insure the **quality of sound** that is recorded.

One of these recording studios is the Sausalito Music Factory in California, which uses a TM 500 Audio package of measurement equipment. (By the way, Sausalito Music Factory is located in Los Angeles.)

At the music factory, sound engineers are using the TM 500 Audio set to measure the volume of sound, the precision of the tone and the distortion of the "noise" in the background of the recording.

A recording studio usually has from three to fifteen different sound studios. Each sound studio has a huge bank of electronic equipment. Because this equipment can't be moved, the test equipment must be portable, so that the sound engineer can take the test set to each sound studio as he needs to test the equipment. The TM 500 Audio set is portable, and is small enough to set on a recording console as it's being used.

The recording studio needs to make sure that their sound equipment is recording correctly **before** the recording is made. By checking their sound equipment thoroughly, they don't need to wait until the recording is played to see how it sounds—they know that their equipment is functioning properly. The TM 500 Audio set tells the sound engineer about the decibels recorded by the equipment—is there distortion, is there electronic "noise" in the background, is everything working as it should?

Well, this is the last application I have for you today. I hope understanding our customers helps you understand what MSD does.

Now I'd like to tell you about the plans for the Walker Road Site.

Just as our products are built to satisfy customers' needs, the MSD Walker Road facility was designed to customer's requirements.

Measurement Systems Division began as a small engineering group building custom products—systems designed exactly to customer's specifications. At first, MSD was housed in the old Sunset Plant, and as the division grew, was moved to Bulding 39.

As MSD learned more about solving customer's problems, the need for a larger facility became apparent.

In spring, 1977, the division moved to the Walker Road site. This building, formerly the Abel Book Depository, required some modification and remodeling to transform it into a facility which is customer-oriented.

A look at how the Walker Road facility is organized shows how the customer dictates even the organizaiton of a business.

In the center of the Walker Road facility are the Marketing groups. Here is determined what the customer needs, and how our products can help fill those needs. Near Marketing are the various Engineering groups where systems are designed, always keeping in mind what our customer is trying to do. Next are the Manufacturing groups where systems are assembled.

MSD Operations and Administration provide support to the business groups along with Finance, Support, Personnel, Site Management and others playing a major role. Operations includes support which is used by all the business groups—areas such as Shipping, Kit Preparation, Flow Solder, the Model Shop and the computer facilities for computer-aided design.

The Walker Road facility includes areas which are built for customer assistance. To help train customers to use Semiconductor Test Systems, the two STS training rooms include about a million dollars worth of test system equipment, dedicated solely for customer training in programming, service and use.

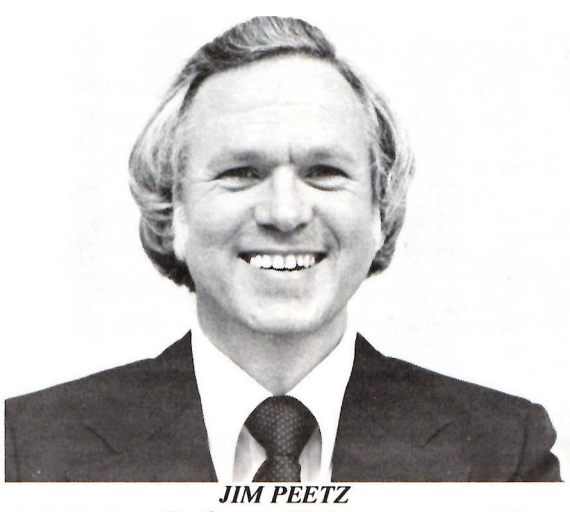
Training classes are continuously given to help our customers maximize the usefulness of the S-3200 systems. Signal Processing Systems has two training and demonstration rooms, with classes being held about two weeks out of every month.

All of the SPS demonstration and training equipment can be rearranged in a variety of configurations, so that the training system can exactly match the one the customer has purchased.

When MSD first moved to Walker Road, things were quite a bit different than they are now. Before our new 10,000 square foot cafeteria was built, hot dogs were the main course for Building 94 personnel, as you might remember. The new menu that came with our new tri-level cafeteria attracted some interesting residents, including the Walker Road peacock, Pico, and his mate, Milli, who was donated by an employee's brother. And an escaped "chimp" (from our next door neighbor the Primate Center).

Final addition to the Walker Road facility is Building 92, a 210,000 square foot facility which will be completed in early 1979 and give Walker Road a campus-like setting similar to the Beaverton Industrial Park.

So that the Manufacturing Groups in building 94 can expand, some MSD Engineering groups will move into the new building. The Business Units of MDA (Microprocessor Development Labs) and Logic Analyzers from LID, Digital Service Instruments (DSI) from SID, and Monitors from Communications Division will move to Building 92 very soon.



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