

VOLUME 38  
WINTER 2001  
NUMBER 1



# THE M.C. GILL DOORWAY

*New Vistas in Composites*

M.C. GILL CORP., 4056 EASY ST., EL MONTE, CA 91731 • PHONE (626) 443-4022 • FAX (626) 350-5880 • [www.mcgillcorp.com](http://www.mcgillcorp.com)

## *The Ever Watchful Eye*



*Today many more eyes  
are watching for Q.C.*



**E**ven before he graduated from the University of Southern California in 1937, M.C. Gill went to work for the U.S. Rubber Company in their Quality Control department. During his five-year stint with U.S. Rubber he worked in virtually every department there but always as a QC engineer. With that rather auspicious indoctrination in Quality Control it is no wonder that since Day One, i.e., September 11, 1945, the M.C. Gill Corporation has stressed

quality of product and service. It has always been M.C.'s basic philosophy to make a product with the degree of quality such that he could be proud to have it bear his name.

He also believed in "enlightened quality", i.e., "QC" meant Control of Quality which would not be so low that it barely passes the specifications required by the customer, NOR would it be so high as to be overkill and unaffordable. Most of our products are semi-structural load

## *and Q.A.*

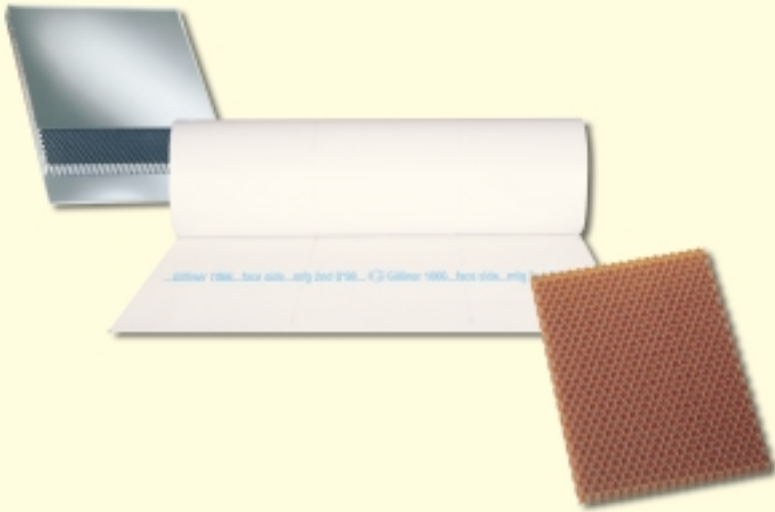


bearing and could be made so that they would never fail. However, they would be so heavy and expensive that few, if any, customers would be willing to pay the price for that degree of quality. In other words, we can exceed the customers' specifications or we can cut a lot of corners in the manufacture of the product. But, as Goldilocks once said, we'd rather make it "just right". That is what "enlightened quality" means to us.

*We unashamedly use the word "quality" a lot and have for some time. We often talk about it in the Doorway. Given our aforementioned reputation, we believe that we have a legitimate right to tout the quality of both our products and customer service.*

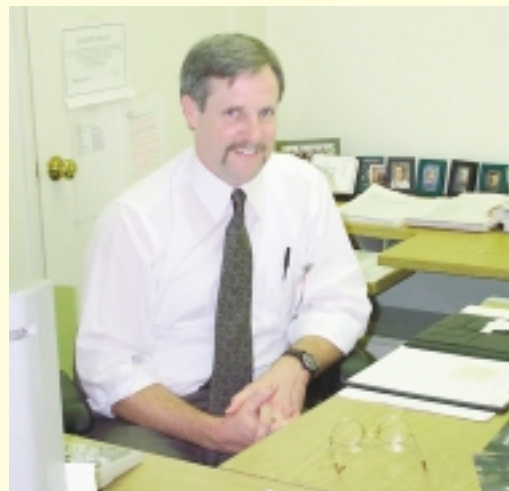
*As Hall of Fame pitcher Dizzy Dean once said when he was chided for boasting of his accomplishments, "It ain't braggin' if you can do it." He could and did, and so do we.*



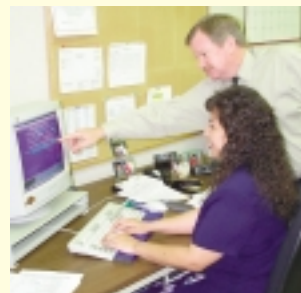


## *As the aircraft so did*

The critical demands of the commercial aircraft industry accelerated the growth within our Quality Department. In 1971, we had two QC inspectors, both of whom reported to Phil Gill, then R&D and Quality Manager. Nine years later we had three inspectors and they still reported to Phil. But in 1985 we hired our first full-time QC Manager. Because sales have increased so dramatically, and products and their specifications have become more sophisticated, our Quality staff has grown accordingly.



**Phil Giffin is our Director of Quality.** His Department is organized with Managers for Quality Control, Assurance, and Technical Support.



# *industry grew and matured, our Quality Control and Quality Assurance Awareness*



**Quality Assurance Manager, Vern Shappell**, concentrates on systems, i.e., document preparation and control, and resolution of customer problems.



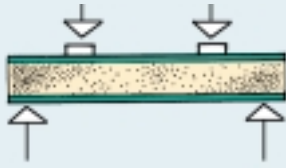
**Technical Support Manager Dean Lundberg**, with nine years of service reviews customer specifications and implementation of same in the production process.



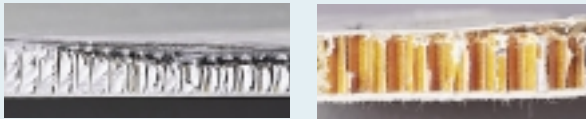
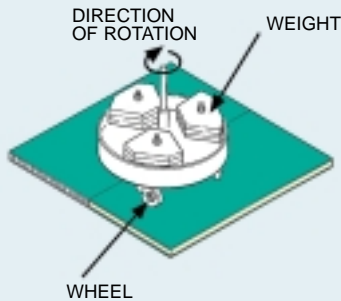
**Quality Control Manager Rudy Rodriguez**, with 31 years of service with the M.C.Gill Corp. is concerned with material and fabrication issues, e.g., receiving, work in progress, and finished goods.

**Our Quality staff responds to every important requirement. Currently the department—with one Director, three Managers, a Manufacturing Engineer, 13 Inspectors and a Document Control Clerk—keeps pace with demands.**

# Some material



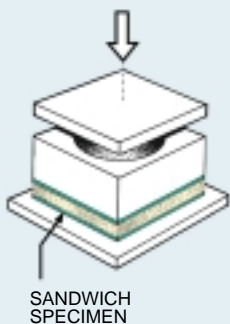
**Long Beam Flex** tests the facings (which should fail before the core). It is the standard test for determining the load bearing capability of a sandwich panel. It tells you how much weight the panel will support and how much deflection you will experience.



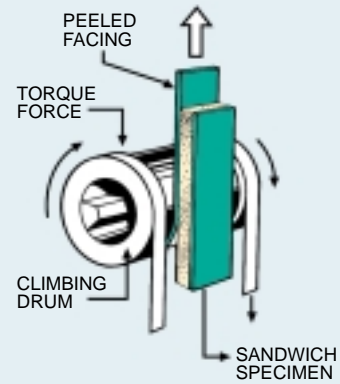
EXAMPLES OF CORE FAILURE IN AN ALUMINUM HONEYCOMB CORE PANEL (LEFT) AND A NOMEX HONEYCOMB CORE PANEL (RIGHT).

**Roller Cart** test determines the fatigue resistance of the core in an aircraft flooring panel. The test is a meaningful approximation of how flooring will stand up in-service in the aisles of commercial passenger aircraft. It simulates the wear and tear created by food and beverage carts in the aisles and galleys of these aircraft.

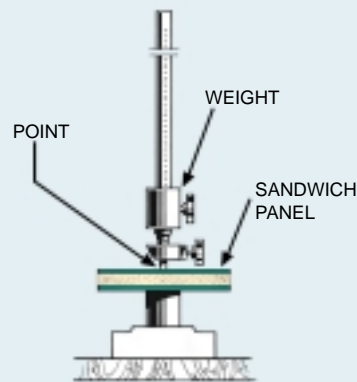
**Core Shear** tests the core (which should fail first). It reduces the span on a flex test to 15-30 times the panel thickness to see where the core will fail before the facings. Tells you, using a different test method for another component of the panel, essentially the same thing long beam flex does.



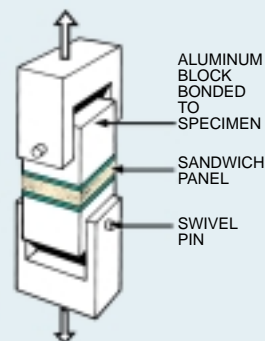
**Flatwise Compressive** measures the strength of the core in resisting compressive loads, such as women's spiked heels where loads might reach 4,100 psi.



**Climbing Drum Peel** measures the torque to peel the facing from the core. You don't want the facings pulling away from the core because it reduces the strength of the panel. However, experience has taught us that panels with quite low peel will serve quite well as flooring if the edges are not exposed to peel forces. For example, some of our 5007A panels with low peel values have lasted 20,000 hours in the aisles of jet aircraft. Delaminated flooring is spongy and tends to upset passengers.

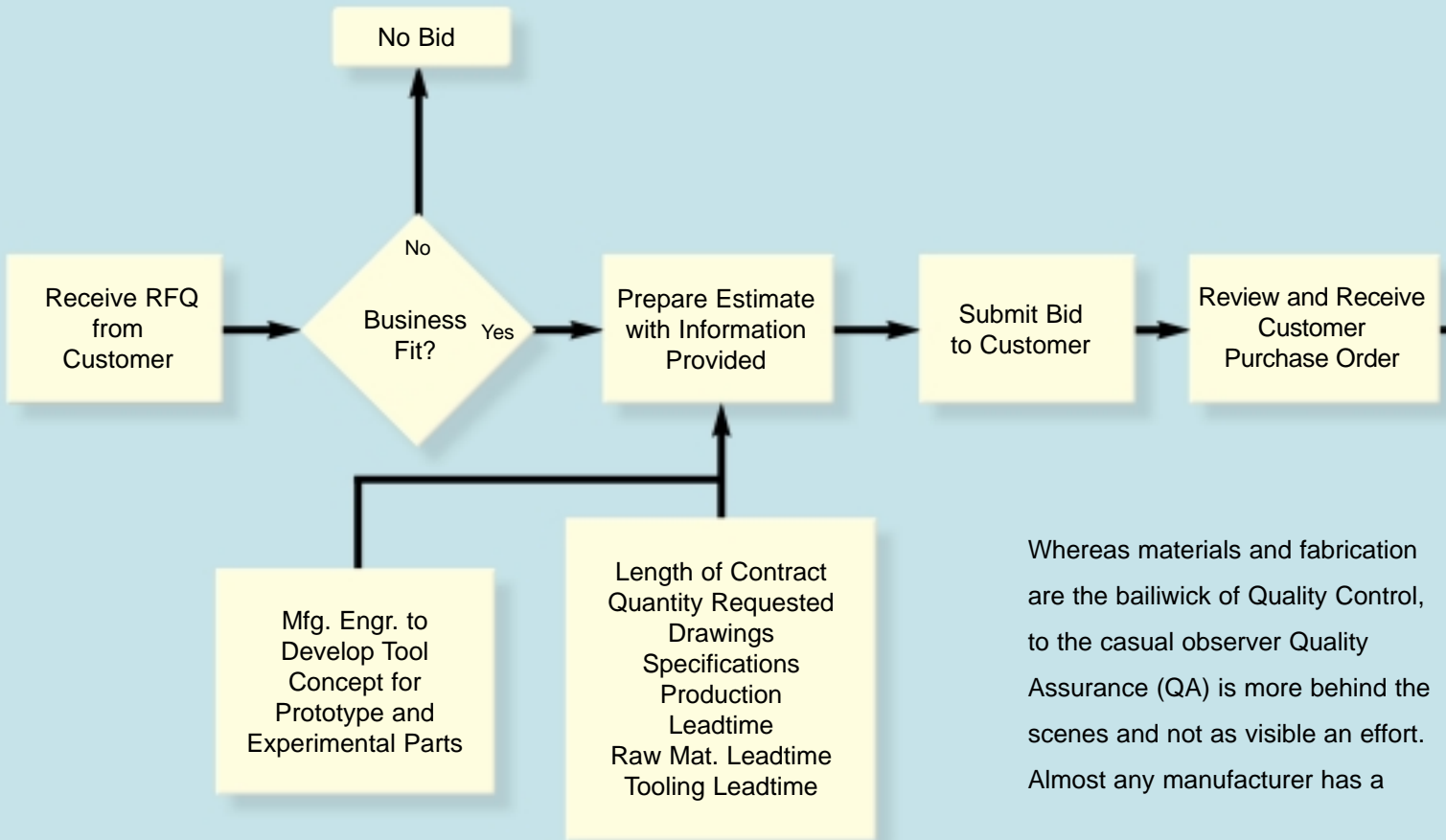


**Impact** measures the panel's resistance to damage from impact or puncture i.e., weights such as mechanics' tools dropping on an unprotected panel, as well as women's stiletto heels.



**Flatwise Tensile** measures the strength of the adhesive—a good indication of structural strength of core and adhesive, two very important contributors to the overall strength of the panel.

# *M.C. Gill Flow Chart*



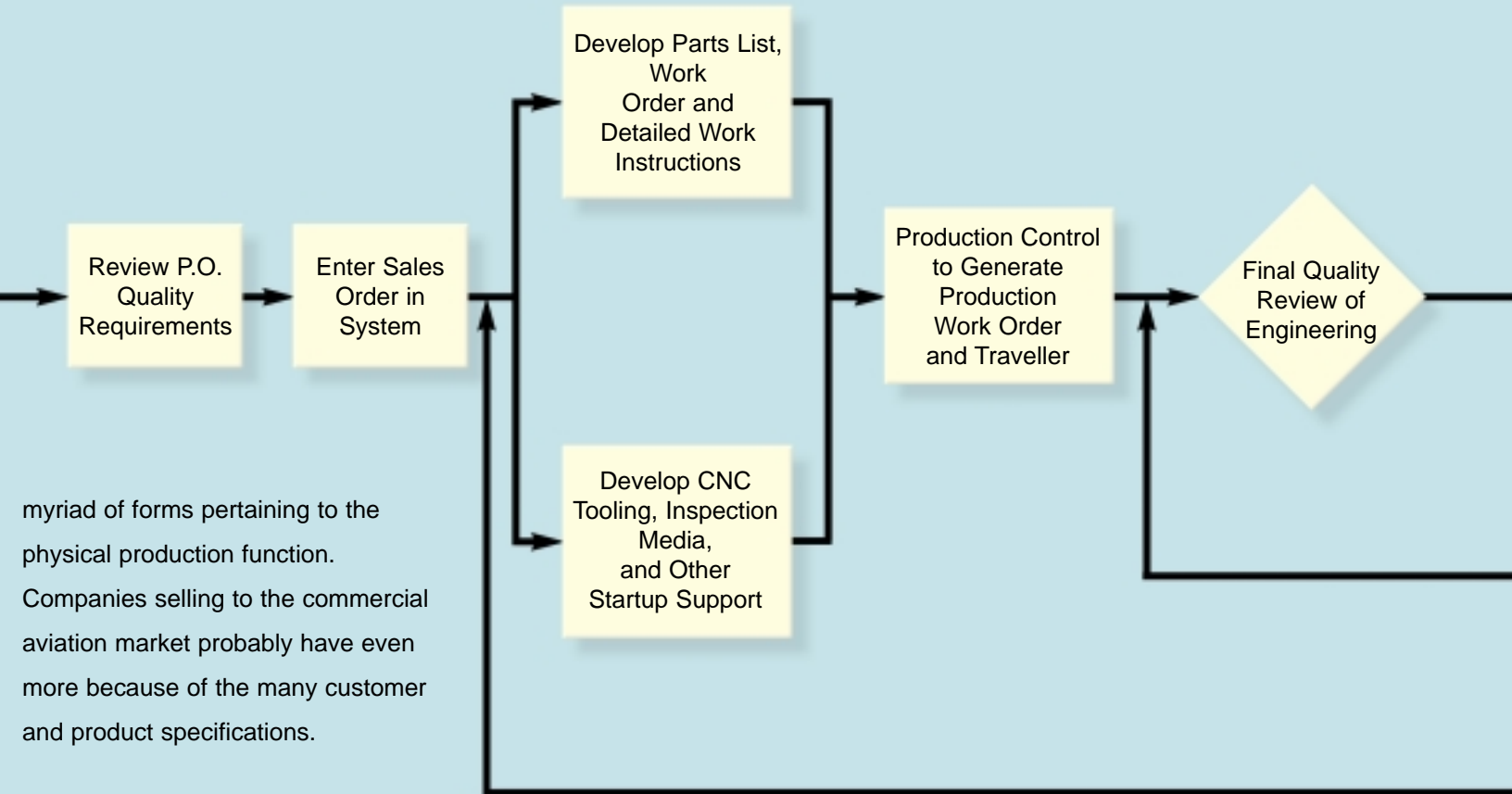
Whereas materials and fabrication are the bailiwick of Quality Control, to the casual observer Quality Assurance (QA) is more behind the scenes and not as visible an effort. Almost any manufacturer has a

One of QA's primary goals is eliminating copies of various documents. The proposed alternative for making and distributing revisions involves a few computer key strokes to the master and hitting "send". We are not quite there yet but our goal is to have the new system in place by the end of 2001. We will retain, offsite, copies in a master file to obviate a system catastrophe.

Another of QA's major functions is performance audits. Every procedure that requires a Gill document is reviewed at least annually. This is a hands-on review and is conducted to ensure that all employees are following procedures properly and, if not, taking immediate corrective action.



# For Quality Assurance...

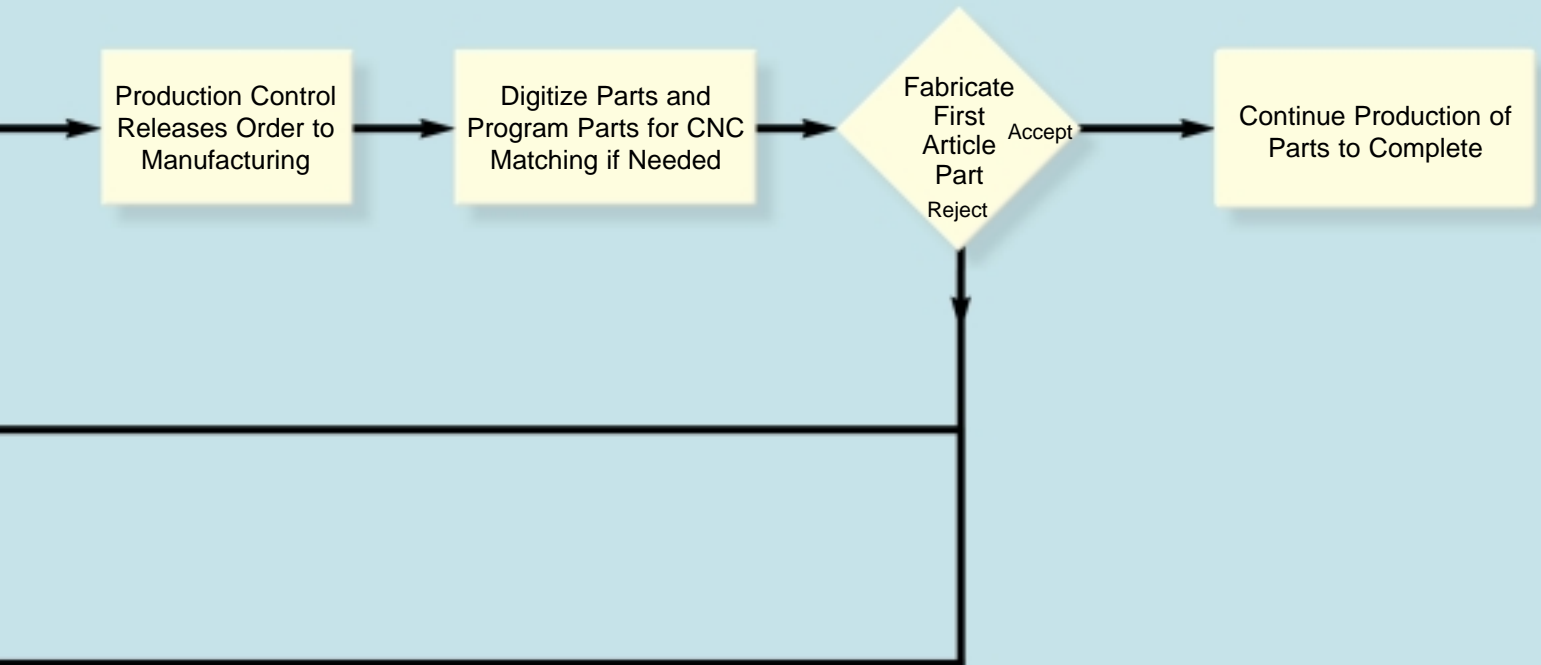


myriad of forms pertaining to the physical production function. Companies selling to the commercial aviation market probably have even more because of the many customer and product specifications.



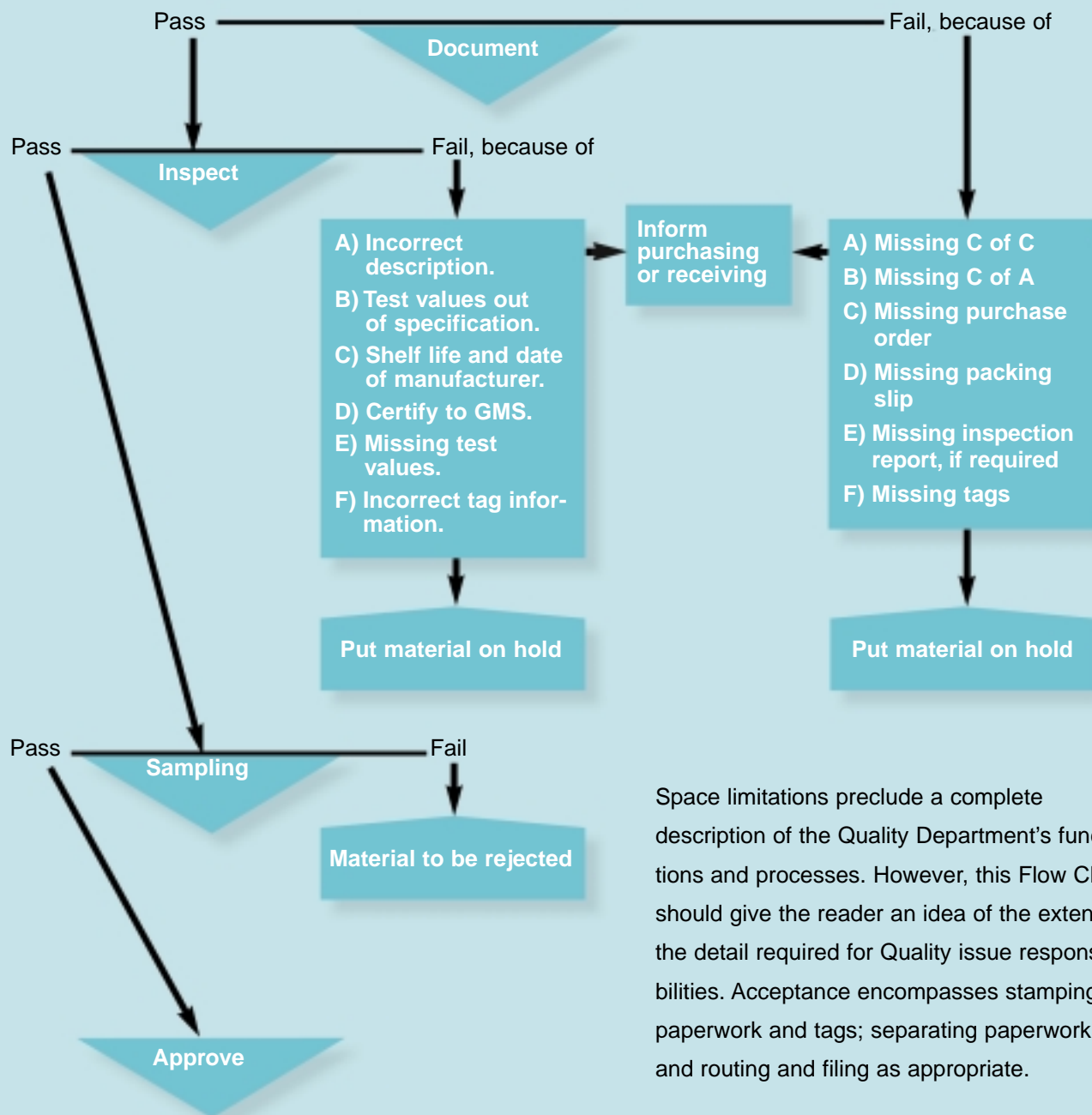


# *Documentation Is Its Game*



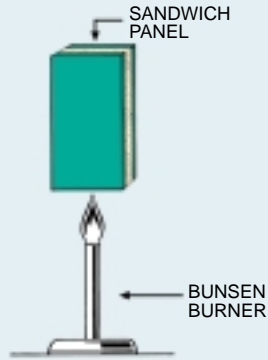
# Flow Chart for Receiving Materials

Quality's involvement does not stop when production begins. Quality Control, in particular, remains involved in the production process from receipt of raw materials until the product is shipped to the customer. And, in those rare instances where the customer is dissatisfied with the product, for whatever reason, Quality is an important part of the process that resolves these issues.



Space limitations preclude a complete description of the Quality Department's functions and processes. However, this Flow Chart should give the reader an idea of the extent of the detail required for Quality issue responsibilities. Acceptance encompasses stamping off paperwork and tags; separating paperwork, and routing and filing as appropriate.

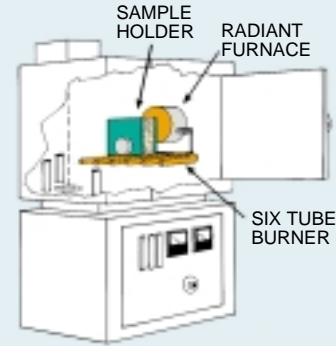
# tests we use...



**Smoke, Toxic Emissions and Heat Release.** Of all a sandwich panel's properties, low smoke and toxic emissions, and low heat release are arguably the most important from a safety standpoint. One result of the tragic aircraft crashes that occurred during the 1980's and early 1990's is increasing concern on the part of the FAA, airframe manufacturers, airlines, and the M.C. Gill Corporation related to passenger hazards caused by post crash conditions, namely fire, smoke and heat.

New standards were established by the FAA in 1988 for heat release rates of certain aircraft components. Heat release values for samples tested are reported in terms of kilowatts of heat per square meter for the peak heat release in terms of kilowatt-minutes per square meter for a two minute integrated heat release. In 1990, the FAA assigned maximum values of 65 and 65 for peak and total heat release (reduced from the original 100/100 in 1986).

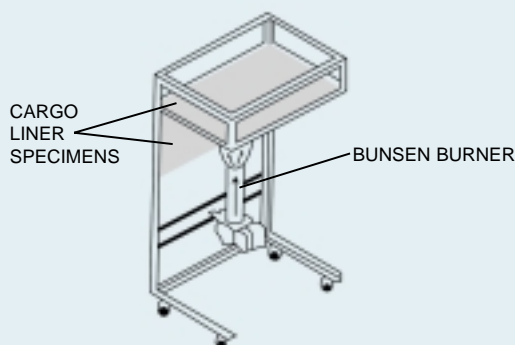
The measurement gains perspective when one considers that a one-square foot piece of red oak flooring approximately one-half inch thick will yield readings of 130/130 under identical test conditions—twice the maximum values currently allowed by the FAA.



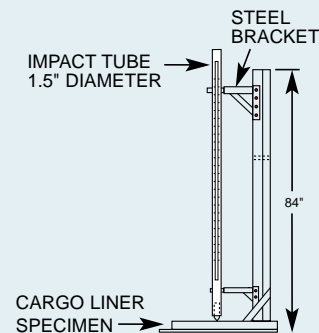
**NIST (NBS) Smoke Chamber** measures the smoke emitting properties of materials when exposed to heat and flame under flaming and non-flaming conditions. In other words, if there is a fire, how much smoke will come from the panel and how difficult will it be to see inside the aircraft.

*Although flooring panels are not required to pass the heat release tests at this point in time, the M.C. Gill Corp. has developed, in response to customer requests, a number of panels that will pass these tests. To manufacture panels that enable airlines and airframe manufacturers to comply with these new standards, we developed new products and "reintroduced" existing ones that utilize phenolic resin systems in their construction. Our goal is not so much to decrease prices as it is to increase value and service life.*

*Phenolic resins are inherently non-burning and exhibit very low smoke emissions and toxicity in a fire compared to almost any other organic polymer. Most M.C. Gill sandwich panels are well within the FAA's regulations and likely would pass any near future standards that agency might adopt.*



**A special test fixture** simultaneously exposes sample sidewall and ceiling liners to a kerosene burner. The flame temperature is 1,700°F. The ceiling sample is placed 8" above the burner cone and the sidewall sample 2" from the burner cone. The burner is placed under and next to the samples for 5 minutes. The criteria for passing is that no flame can penetrate either liner, and that the temperature measured 4" above the horizontal ceiling liner can not exceed 400°F.



**This test was developed** to measure impact resistance of cargo liners. The impact device consists of a 12 lb. falling weight and the puncture point resting on the specimen. The impact head is driven into the sample by raising a 12 lb. steel rod in an upright cylinder to a measured height and released on the impact head. Penetration is determined by lightly probing the area of impact with a sharp pointed instrument, e.g., a 2H pencil. Small delamination on the surface front or back, or slight rupture of surface fibers, without complete penetration of the impact head is considered acceptable.

# *The Quality Watch Goes On and On*

Virtually every product we manufacture is made to at least one commercial aviation, OEM or military specification which encompasses several mechanical, physical, acoustical, or electrical properties. In addition, most products must pass at least one of the FAA's Federal Airworthiness Requirements (FAR) before it can be installed. Our Quality Assurance personnel routinely test for compliance to OEM specifications and FARs. Finally, we extensively utilize SPC (Statistical Process Control) to chart key product characteristics. SPC is an integral part of our commitment to continuous product quality improvement.

**1.** This dial indicator table monitors consistency of honeycomb thickness over its entire area. Uniformity is paramount if 100% of the core area is bonded to the skin.

**2.** Whatever the type of test, it requires the selection of a representative sample and that it be prepared, labeled and identified for testing.

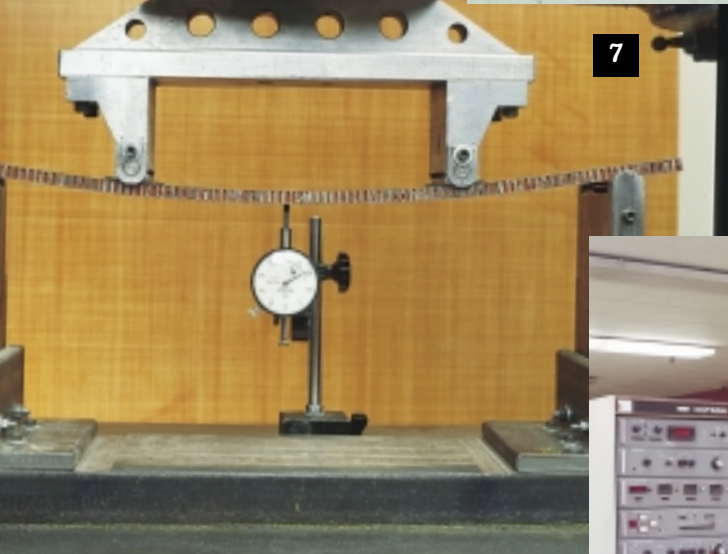




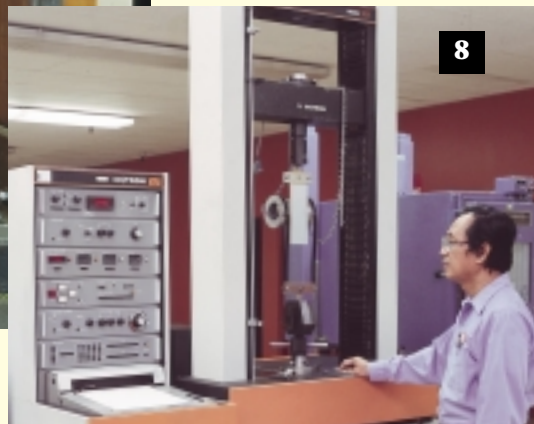
5



6



7



8

**3.** The NIST (NBS) smoke chamber measures the smoke emissions of materials exposed to heat and flame. It allows for selection of low smoke density, and therefore safer materials.

**4.** Testing 45° burn, per FAR 25.855, on the flame tester. Cargo liners must pass appropriate FARs prior to installation.

**5.** The climbing drum peel test measures the force required to separate (peel) a sandwich panel facing from its core; it is a measure of the bonding strength of the adhesive.

**6.** The Boeing dart tester is used to check baggage compartment liner resistance to puncture. Along with flame resistance and smoke emission characteristics it is probably a cargo liner's most important property.

**7.** A sandwich panel in a test fixture designed to measure flexure, i.e., its load-bearing/deflection capabilities.

**8.** The Instron mechanical tester is one of three universal testing units kept busy by QA and R&D.

**AIRBUS INDUSTRIE**

|                                                     |                                                                         |                                                            |                        |
|-----------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------|------------------------|
| A300/A300-600/<br>A310/A330/A340                    | Passenger flooring<br>Passenger flooring and<br>containerized cargo     | TL53/5000/79, Ty 1<br>TL53/5000/79, Ty 2                   | 4105 Ty 1<br>4105 Ty 2 |
| A300/A310/A300-600                                  | Passenger flooring                                                      | TL53/5000/79, Issue 8*,<br>Annex A, PC 3,<br>Ty 1 and Ty 2 | 4405 Ty 1<br>4405 Ty 2 |
| A319/A320/A321/A330/A340                            | Passenger flooring, aisles/galleys                                      | 5360 M1M 000600, Issue 3*<br>Ty PC 3                       | 4505                   |
| A319/A320/A321/A330/A340                            | Passenger flooring, under seat                                          | 5360 M1M 000600, Issue 3*<br>Type PC1                      | 4605                   |
| A319/A320/A321                                      | Passenger flooring<br>Cargo flooring, containerized                     | 5360 M1B 000100<br>5360 M1B 000100                         | 4205<br>4322           |
| A300/A310/A300-600/<br>A319/A320/A321/<br>A330/A340 | Cargo flooring, containerized                                           | 5360 M1M 000500, Issue 5*<br>Type CCC1                     | 4522                   |
|                                                     | Cargo flooring, bulk                                                    | 5360 M1M 000500, Issue 3*<br>Type BCC2                     | 4223                   |
| A300/A300-600/<br>A310/A319/A320/<br>A321/A330/A340 | Cargo flooring, bulk                                                    | 5360 M1B 000100                                            | 4323                   |
| A330/A310/A300-600/<br>A319/A320/A321/A330/A340     | Cargo lining panels<br>Cargo lining laminates                           | 2550 M1M 0008 00<br>2550 M1M 0008 00                       | 4422<br>1367A          |
| A300/A310/A300-600/<br>A319/A320/A321               | "h" profile for fabrication<br>of decompression panel 'frame'           | 2550 M1M 0004 00                                           | 3072                   |
| All applicable models                               | Cargo flooring,<br>main deck<br>freighter aircraft<br>combi/convertible | 5360 M1M 000500, Issue 5*<br>Type MDC2                     | 4123                   |

\*Preferred 'New Generation' panel

**BOEING**

|                                      |                                                       |                            |                                                                   |
|--------------------------------------|-------------------------------------------------------|----------------------------|-------------------------------------------------------------------|
| All 700 Series                       | Cargo liner                                           | BMS 8-2 Cl 2               | 1366/1366T                                                        |
| All 700 Series                       | Cargo liner                                           | BMS 8-223 Cl 2             | 1367/1367A                                                        |
| 777                                  | Cargo liner                                           | BMS 8-223 Cl 4             | 1367B                                                             |
| 737                                  | Cargo liner<br>(lower sidewall)                       | BMS 8-2 Cl 3               | 1076B                                                             |
| 747                                  | Cargo liner                                           | BMS 8-2 Cl 1               | 1076A<br>(ceiling only)                                           |
| All 700 Series                       | Nomex® honeycomb core<br>Passenger and cargo flooring | BMS 8-124 Cl 4<br>BMS 4-17 | Gillcore® HD<br>4417, Ty I-V, IX<br>and Drawing<br>69B15779(Ty V) |
|                                      | Passenger flooring<br>high traffic                    | BMS 4-17 Ty VI             | 4417A                                                             |
| 747-400,<br>767-200/-300,<br>and 777 | Passenger flooring                                    | BMS 4-20                   | 4709, Ty II<br>and Ty III                                         |
| 737 and 757                          | Passenger flooring                                    | BMS 4-23                   | 5424, Ty I<br>and Ty II                                           |
| 777                                  | Aft cargo flooring                                    | BMS 7-326                  | 5433C                                                             |

**BRITISH AEROSPACE**

|                             |                                                       |           |           |
|-----------------------------|-------------------------------------------------------|-----------|-----------|
| 146-200/300,<br>ATP, and RJ | Passenger flooring,<br>under seat                     | BAeR 3231 | 4609 Gr L |
|                             | Passenger flooring, aisle                             | BAeR 3231 | 4609 Gr M |
|                             | Passenger flooring<br>entries, galleys and lavatories | BAeR 3232 | 4004A     |

(Note: Customer should specify core density when ordering to BAeR 3232.)

|                                    |                    |           |      |
|------------------------------------|--------------------|-----------|------|
| <b>RAYTHEON</b><br>HS125-800. 1000 | Passenger flooring | BAeR 3247 | 4109 |
|------------------------------------|--------------------|-----------|------|

|                        |                                 |                              |                                |
|------------------------|---------------------------------|------------------------------|--------------------------------|
| <b>JETSTREAM</b> 31/41 | Bulkheads, consoles             | MAT 006, Ty 1,<br>Ty 2, Ty 3 | 4004B, Ty 1,<br>Ty 2, and Ty 3 |
|                        | Passenger flooring<br>and cargo | MAT 003                      | 4017T                          |

**deHAVILLAND**

|        |                      |                       |             |
|--------|----------------------|-----------------------|-------------|
| Dash 8 | Cargo liner          | DHMS P1.42 Cl A       | 1566        |
|        | Cargo liner          | DHMS P1.42 Cl B       | 1366        |
|        | Nomex honeycomb core | DHMS P1.26<br>Issue F | Gillcore HD |

|                                            |                                          |                               |                           |                                        |                                                                                            |                                                |               |      |
|--------------------------------------------|------------------------------------------|-------------------------------|---------------------------|----------------------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------|---------------|------|
| <b>EMBRAER</b><br>EMB-110, 120,<br>and 123 | Galley/bulkhead                          | MEP-02-011                    | 5040                      | <b>MCDONNELL DOUGLAS</b><br>All models | Cargo liner                                                                                | DMS 2226 Ty 1                                  | 1167/1167A    |      |
|                                            | Galley/bulkhead                          | MEP-15-017                    | 4117                      |                                        | Cargo liner                                                                                | DMS 2419 CI 1                                  | 1367A *       |      |
|                                            | Galley/bulkhead                          | MEP-15-029                    | 4122A                     |                                        | Nomex honeycomb core                                                                       | DMS 1974 Gr A                                  | Gillcore HD   |      |
|                                            | Passenger flooring,<br>aisle             | MEP-15-030                    | 4009                      |                                        | MD-80, MD-90,<br>DC-10, MD-11,<br>and B717                                                 | Passenger flooring,<br>aisle/under seat        | Dwg 7954400   | 4509 |
|                                            | Passenger flooring                       | MEP-15-031                    | 4017T Ty I and<br>Ty II   |                                        | Passenger flooring,<br>aisle/under seat                                                    | Dwg BZZ 7002                                   | 4017T         |      |
| <b>FOKKER</b><br>F100                      | Passenger flooring,<br>under seat        | FoN1-4350CC102,<br>102S, 102T | 4018, 4018S,<br>and 4018T | DC-9 and early<br>MD-80's, DC-10       | Cargo liner                                                                                | DMS 1946 Ty 1/Ty 2                             | 1100/1100G    |      |
|                                            | Passenger flooring,<br>aisle             | FoN1-4354DD120                | 4019                      | MD-80/MD-90<br>series                  | Passenger flooring,<br>under seat                                                          | Dwg S3932194                                   | 4106A/B       |      |
| <b>LEARJET</b><br>All models               | Passenger flooring                       | LES 1149                      | 4001                      | Cargo flooring                         | Dwg S00096                                                                                 | 5242                                           |               |      |
|                                            | Passenger flooring                       | LES 1189                      | 5040                      | Cargo flooring                         | Dwg 7954401                                                                                | 4004                                           |               |      |
|                                            | Passenger flooring                       | LES 1227                      | 4201                      | DC-10 series<br>MD-11                  | Passenger flooring,<br>lower galley, wet areas of<br>main deck DC-10F and<br>MD-11F combis | Dwg S3933941                                   | 4022A/B       |      |
|                                            | Bulkheads                                | LES 1247                      | 4101                      | Passenger flooring,<br>lavatory/entry  | Dwg S3933942                                                                               | 4022A/B                                        |               |      |
|                                            | Bulkheads                                | LES 1277                      | 5101                      | Passenger flooring, under seat         | Dwg S3932194                                                                               | 4106A/B                                        |               |      |
|                                            | Bulkheads                                | LES 1070                      | 5020                      | Passenger flooring, aisle              | Dwg S3932193                                                                               | 5042B                                          |               |      |
| <b>LOCKHEED</b><br>L-1011                  | Bulkhead/galley/shelving                 | LAC-C-28-917                  | 4030L                     | Cargo flooring aft, non-doorway        | Dwg S3932195                                                                               | 5042B                                          |               |      |
|                                            | Bulkhead/galley                          | LAC-C-28-1145                 | 4030A                     | Cargo flooring (low traffic)           | Dwg S4931863                                                                               | 5042B                                          |               |      |
|                                            | Passenger flooring,<br>aisle/under seat  | LAC-C-28-1386                 | 4017L                     | Cargo flooring<br>lower fwd and ctr    | Dwg S4929905                                                                               | 5142                                           |               |      |
|                                            | Passenger flooring/<br>pressure bulkhead | LAC-C-28-1147                 | 4088                      | Cargo flooring aft, doorway            | Dwg S4932048                                                                               | 5242A                                          |               |      |
|                                            | Passenger flooring/<br>bulkhead/shelving | LCM 28-1033<br>STM 28-003A    | 5020<br>5320              | DC-10, MD-11<br>Freighters             | Flooring, upper and<br>lower deck                                                          | Dwg BZZ7002 Ty III<br>Dwg BZZ7002 Ty IV & Ty V | 4017T<br>5065 |      |
|                                            | Cargo flooring                           | LAC-C-22-1356                 | 5033/5034                 | C-17                                   | Crew flooring                                                                              | Dwg 9D0059                                     | 4022A         |      |
|                                            | Cargo flooring                           | LAC-C-22-1356                 | 7133/7134                 | Passenger flooring                     | Dwg 9D0207                                                                                 | 4109 Ty 1/Ty 2                                 |               |      |
|                                            | Galley/interior                          | LAC-C-28-1247                 | 5017                      |                                        |                                                                                            |                                                |               |      |
|                                            | Galley/bulkhead/ceiling                  | LAC-LS60204                   | 4122A                     |                                        |                                                                                            |                                                |               |      |
|                                            | Cargo liner                              | LAC-C-22-1249 CI 3            | 1366/1367<br>/1367A       |                                        |                                                                                            |                                                |               |      |
|                                            | Cargo liner                              | LAC-C-22-1249 CI 3            | 1366T                     |                                        |                                                                                            |                                                |               |      |
|                                            | Nomex honeycomb core                     | STM 28-105                    | Gillcore HD               |                                        |                                                                                            |                                                |               |      |

\* 1367A is interchangeable with all other Douglas cargo liner specifications for thicknesses up to and including .040".

Reprints of this Quick Reference Guide can be obtained by contacting the Marketing Services Department at 4056 Easy Street, El Monte, CA 91731; phone at 626-443-4022; fax to 626-350-5880.

# THE FUNNY SIDE

Customer: "Do you honor credit cards?"  
Sales clerk: "Honor them? We worship them."

\*\*\*\*\*

If you think education is expensive, try ignorance.

\*\*\*\*\*

One of the hardest things to put up with is a good example.

\*\*\*\*\*

Talk is cheap because supply exceeds demand.

\*\*\*\*\*

Some people get lost in thought because it's uncharted territory.

\*\*\*\*\*

The toughest part of getting to the top of the ladder is fighting your way through the crowd at the bottom.

\*\*\*\*\*

Truth is stranger than fiction-and nowhere near as plentiful.

\*\*\*\*\*

Actually, there's no secret to success. Have you ever known a successful person who WASN'T willing to tell you about it?

\*\*\*\*\*

Old age: Wishing you didn't have to go instead of wondering why you weren't invited.

\*\*\*\*\*

If you miss the good old days, turn off the air conditioning.

\*\*\*\*\*

If the husband has the last word, then that's the start of a new argument.

\*\*\*\*\*

Teenagers express their burning desire to be different by dressing exactly the same as all other teenagers.

\*\*\*\*\*

The handwriting on the wall means your kids have found the crayons.

\*\*\*\*\*

Actual Quotes of Questionable Wisdom:  
"This 'telephone' has too many shortcomings to be seriously considered as a means of communication."  
Western Union internal memo, 1876.

\*\*\*\*\*

# Trivia

A mosquito beats its wings up to 600 times per second.

\*\*\*\*\*

The only female deer that grows antlers is the reindeer.

\*\*\*\*\*

India ink originated in China.

\*\*\*\*\*

Great Danes originated in Egypt.

\*\*\*\*\*

Jordan almonds come from Spain.

\*\*\*\*\*

The recipe for German chocolate cake was developed by Sam German, an English baker, in the 1700's.

\*\*\*\*\*

Moths hear 1,100 percent more than people, owls hear the same, and mallard ducks hear 50 percent less.

\*\*\*\*\*

Female bald eagles are larger than males.

\*\*\*\*\*

Soil is made up of rocks and minerals, humus, water, air, and living organisms.

\*\*\*\*\*

In 1818, Massachusetts became the first state to ban the hunting of robins.

\*\*\*\*\*

Ben Franklin was lucky with his "kite and key" experiment. The next two men that tried it were killed by lightening.

\*\*\*\*\*

Daniel Boone died from indigestion from eating too many sweet potatoes.

\*\*\*\*\*

Herbert Hoover was the first U.S. president to have a telephone on his desk. Before 1929, the president had to use a phone booth outside his office.

\*\*\*\*\*

Back in 1910, a football team was penalized 15 yards for an incomplete pass.

\*\*\*\*\*

In terms of population, Phoenix, AZ, is the largest state capital and Pierre, SD, is the smallest.

\*\*\*\*\*

There are 25,000 self-storage rental facilities in the U.S.; total square footage of storage space is one billion; and, an average of 90 percent is rented at any given time.

\*\*\*\*\*

