

'Avuncular' Bob Holmes touts HCO to customers

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Tenth in a Series

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Some uncle-like advice that he likes to pass on to young engineers is to get involved in professional associations. As a past president of the 4,000+ member International Society of Hybrid Microelectronics (ISHM), he speaks with quiet authority on the advantages of such participation.

The camaraderie that develops through active membership is not only enjoyable, but it provides helpful professional contacts, Bob said. "If I have a problem, I can call people I know at other companies. If they've experienced the same problem and have a solution, 90 percent of the time they will share it." Tek personnel have also been able to visit other companies to learn how to set up a better manufacturing operation.

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Between his work and organizational activities, Bob admits to putting in a "lot of hours." But over the years he has still found some time for salmon fishing, crabbing and water skiing with the family. His wife, Ethlyn, is a former school teacher now in educational sales. They have two married children and three grandsons, which prompts occasional visits to Georgia and Florida.

Bob is a graduate of the University of Iowa with a degree in Chemistry. He worked at Dow Corning developing silicone materials and analytical techniques. He also had experience in water treatment and analysis prior to getting involved in microelectronics. His first



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Bob describes his present job as consultant, or problem solver, both within HCO and for Tek's outside customers. Inside Tek he works with people in most of the divisions. "I have a lot of freedom in my work, but I feel obligated to use that freedom in a positive way." He considers Tek's chief scientists and engineers as company-wide resources. "Not that they have all of the answers, but with their backgrounds they can help find answers."

"I enjoy every minute of my work," says Bob. "The hybrid industry has provided me a tremendous opportunity and I want to pass that opportunity on to others and help them achieve further growth. Young

engineers are energetic, enthusiastic, and dedicated. It is fun and exciting working with them."

Bob's professional contacts paid off for Tektronix when HCO became an outside vendor for hybrids, ceramics, and electro-optic components. "Some of my friends in ISHM had been after Tek 6-8 years to build hybrids for them. So when HCO became an outside vendor two years ago, I contacted those people and many are now customers."

"I tell them that HCO is a committed outside vendor, and is going to serve customers on a continuing basis," Bob said. The HCO engineering group has been organized into two separate activities, one to handle internal business and the other for the external customers. That organization has been "well received."

"Tek will not run out of capacity for a long time," he said. "And with a minimum of investment, existing capacity can be expanded." Besides turning a profit, Bob explained, there are two beneficial side effects to outside business: "Sometimes additional processes need to be developed to make those products, but then that technology can be utilized internally. The other is that as capacity is filled, efficiency improves."

The Hybrid Components Operation is a combination of several technologies. These include thick and thin film, hybrids, multilayer ceramic, ceramic components and electro-optics. HCO is a "full service"

custom hybrid vendor providing design, electrical simulation, thermal analysis, prototyping, manufacturing, trimming (passive and functional) and testing. "This diversity of technologies is not available in many competing hybrid operations. It is this diversity that presents growth opportunities for all employees," Bob said.

One of HCO's newest technologies, multilayer ceramics (MLC), is being used to fabricate Very High Speed Integrated Circuit (VHSIC) packages. Hughes Aircraft was first to contract with Tektronix for a 264 lead package in support of their VHSIC IC contract. The MLC group was so successful in providing Hughes with packages, Bob said, that they became HCO's best publicity agent.

"Hughes referred several other VHSIC IC contractors to HCO for their package needs. HCO has considerable background in ceramics, having made Tek's CRT funnels and ceramic components for many years. This expertise supports the multilayer ceramic operation. Multilayer ceramic has the potential of being one of HCO's biggest growth areas. As a new product line, MLC is also a challenge, as it reaches a new set of customers with different expectations."

HCO's thin film manufacturing is another potential growth group within HCO, Bob said. This group has processing capabilities that are "state-of-the-art" in thin films. Several of the processes are protected by patents. □

Holmes on hybrids: keeping it 'simple'

Chief scientist Bob Holmes tries to keep the answer simple when explaining hybrid circuits to persons not in the electronics business: "The dictionary defines a hybrid as something of mixed origin. Our hybrids combine passive and active components to provide miniaturization for electronics. In one sense, the hybrid may be considered the package for integrated circuits."

"Within hybrids there are two basic technologies: thin film and thick film circuits. Both of these technologies provide passive circuit elements consisting of resistors, conductors, capacitors and inductors. Active circuit elements, integrated circuits, may be added as bare chips or as packaged components. Bare chips are interconnected to the hybrid substrate using wire bonding. We define these as 'chip and wire' hybrids. Packaged components are added to substrates by soldering, and are frequently called 'surface mount hybrids'."

"Thick film and thin film terminology originated many years ago and does not define either of the two technologies very well. Thick film hybrids are fabricated using screen printing of specially formulated materials. Conductor materials may be gold, silver, platinum, palladium or alloys containing these conductive materials. Specially formulated compositions make resistors and capacitors."

"Thin films received their name because these vacuum deposited films are just a few thousand angstroms thick. (An angstrom is one millionth of a millimeter or about 4 billionths of an inch.) Thin films are formed by a variety of vacuum processes. The films are then fabricated into circuits using photolithographic processes not unlike those used to fabricate integrated circuits."

"In short, thick films are screen printed and thin films are deposited by vacuum processes and photoetched to make circuits."

"The thick film circuits are inherently less expensive to fabricate than thin films primarily due to lower cost equipment and higher production rates."

"Thin films, because they are photolithographically defined, have smaller geometries, thus the circuits are smaller. The resistors have improved properties (lower temperature coefficient of resistance and stability) over those fabricated by thick film. HCO considers thick and thin film processes to be complementary and often combine the technologies to provide the customer the performance that is required."

"In HCO, the substrate (the material on which the circuits are fabricated) are ceramic compositions. A variety of materials are available to choose from to meet the circuit performance that the customer expects."

"We are always looking for better and lower cost materials. We'd like to have better dielectric materials, improved thermal dissipation, better conductors, and resistors having improved electrical performance—all at lower cost. And we'd like a substitute for gold."

"The hybrid technology is still advancing to provide improved electrical performance. In the early 60's, hybrid people said that hybrids would replace printed circuit boards. When integrated circuits came along it was predicted that IC's would replace hybrids. Both of these predictions have been proven wrong. Now, over 25 years later, printed circuits are still being used and the hybrid industry is healthy and growing." □



CONTEST WINNERS: LID employees whose balloons reached the farthest point were, from left, Hannah Tseng, Connie Horne, Doni Danner and Wayne Wilburn. Wayne's balloon was found in a hay field near Black Lake, south of Coeur d'Alene, Idaho. He wins the hot air balloon ride. Other balloons landed in Eastern Washington south of Spokane. Balloon contest was part of LID's new products celebration. Frank Hermance (LID GM), back row, presented the awards.

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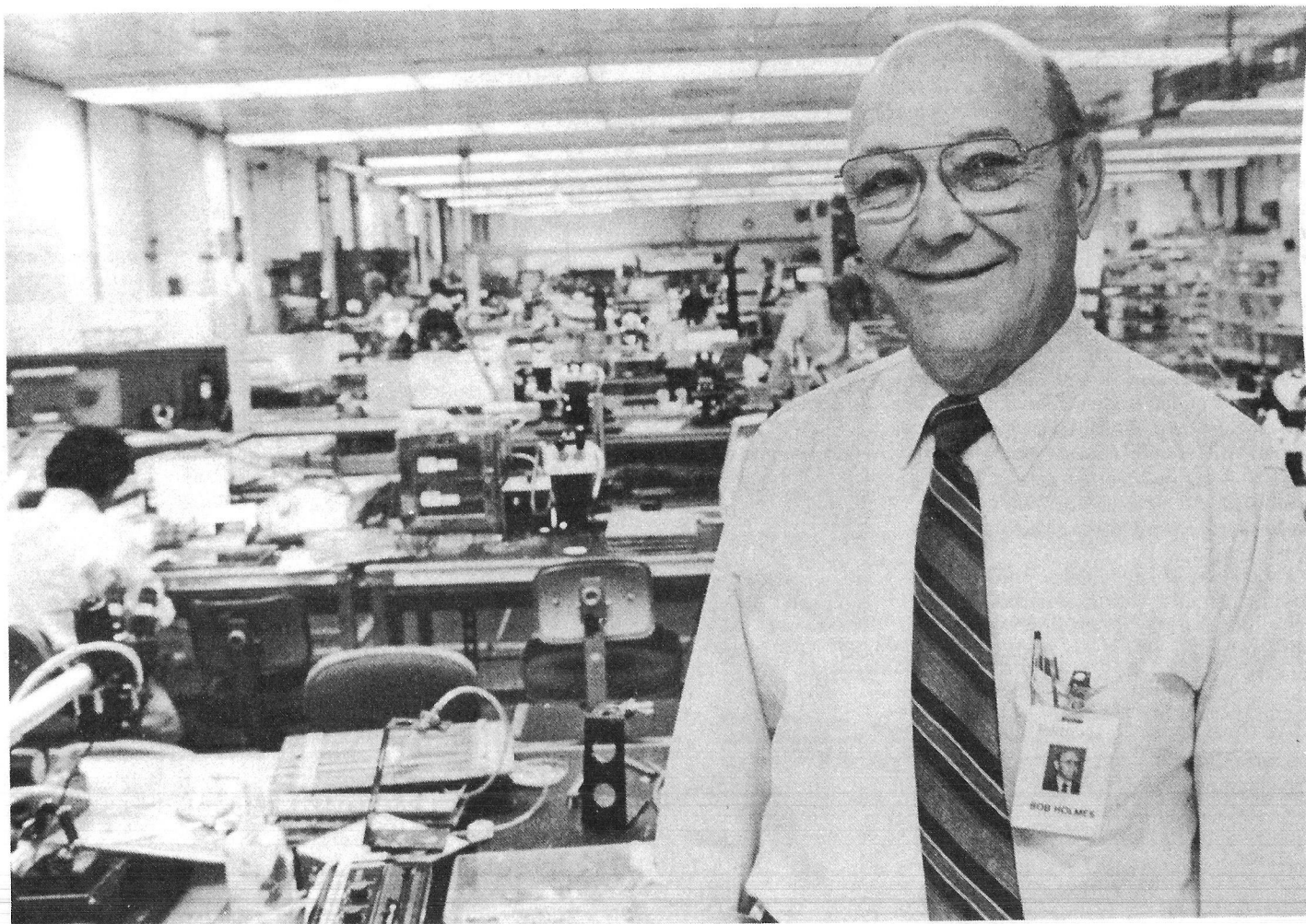
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