VI INTERNATIONAL MEETING ON TITANIUM

GROWTH POTENTIAL OF TITANIUM(*)

Frederich Gieg
President, Titanium Development Association (USA) President,
RMI Company (USA)

(*) Paper presented by Ugo Ginatta, CEO, GTT

CALL US LUCKY

L. FREDERICK GIEG, JR.
PRESIDENT AND CHIEF EXECUTIVE OFFICER, RMI TITANIUM COMPANY
PRESIDENT, TITANIUM DEVELOPMENT ASSOCIATION

JOINT MEETING – TDA/JTS
OCTOBER 4, 1990
10:30 A.M.

GOOD MORNING LADIES AND GENTLEMEN. WELCOME TO THE FIRST JOINT MEETING OF THE TITANIUM DEVELOPMENT ASSOCIATION AND THE JAPAN TITANIUM SOCIETY. THIS MEETING IS A LANDMARK. FOR THE FIRST TIME, THE WORLDWIDE TITANIUM INDUSTRY IS FOCUSING ITS ATTENTION COLLECTIVELY ON THE DIRECTION FOR THE FUTURE. NO SINGLE COMPANY OR NO SINGLE COUNTRY CAN MAKE THE FUTURE GROWTH POTENTIAL OF TITANIUM BE REALIZED ON ITS OWN. THIS IS A TEAM EFFORT, SO LET'S BEGIN NOW.

WE TITANIUM PRODUCERS IN THE UNITED STATES ARE VERY AWARE OF THE EVER CHANGING CYCLES OF OUR BUSINESS. WE REMEMBER THE DIFFICULT TIMES PRIOR TO LATE 70'S AND EARLY 80'S WHEN THE INDUSTRY, AS A WHOLE, WAS ONE STEP AHEAD OF FORECLOSURE. SUDDENLY IN THE EARLY 80'S WE WERE AWASH IN CASH, AND OUR PLANTS WERE RUNNING AT PEAK LEVELS. THEN JUST AS SUDDENLY, WE SUNK BACK INTO RED INK AND

WAITED WITH CROSSED FINGERS FOR THE NEXT UPTURN.

AFTER SUCH WONDERFUL YEARS AS 1989 AND 1990 - ARE WE AGAIN GOING TO SIT BACK AND WAIT FOR THE NEXT CYCLE? WHAT ARE THE CURRENT DYNAMICS OF THE MARKETPLACE? OF COURSE, WE SEE SOME SIGNALS OF A PLATEAU OR DOWNTURN. AN INVENTORY ADJUSTMENT HAS BEEN UNDERWAY SINCE THE FIRST OF THE YEAR, AND DEFENSE DEMAND CONTINUES TO DECLINE. DEVELOPMENTS IN THE MIDDLE EAST HAVE CAUSED SOME ADDITIONAL UNCERTAINTY. TITANIUM DEMAND IN DEFENSE PROGRAMS COULD, IN FACT, REMAIN STRONGER THAN MOST ANALYSTS WERE PREDICTING, BUT COMMERCIAL PROGRAMS COULD BE STRETCHED DUE TO HIGHER FUEL PRICES. WE ARE ALL AWARE OF THIS, BUT LET'S LOOK OUT A LITTLE FURTHER -- SAY TO 1995. WILL THERE BE A HEAVY DEMAND IN MILITARY AEROSPACE? I DON'T THINK SO. WILL THE COMMERCIAL AEROSPACE DEMAND STILL BE CARRYING US FOR YEARS AND YEARS? I DON'T THINK SO. WHERE DOES THAT LEAVE US?

WE HAVE JUST FINISHED A CONFERENCE THAT HIGHLIGHTED THE PROGRESS TITANIUM IS MAKING IN A VARIETY OF APPLICATIONS, NEW PRODUCTS, ALLOYS AND IMPROVEMENTS IN PROCESSING THROUGH TECHNOLOGY. OBVIOUSLY, AS WE ALL KNOW, THERE IS UNLIMITED POTENTIAL FOR OUR METAL.

NOW WHAT? DO WE SIT BY, ACCEPT THE NEXT DOWNTURN AS INEVITABLE, BEMOAN OUR FATE, RETRENCH, AND WAIT FOR THE NEXT BOOM? I SAY NO -- THERE IS AN ALTERNATIVE. THAT ALTERNATIVE IS TO STOP TALKING AND WISHING, AND MOVE THESE OPPORTUNITIES TO REALITY. THE 90'S CAN BE

THE “DECADE OF OPPORTUNITY” FOR TITANIUM, THE TITANIUM DEVELOPMENT ASSOCIATION AND FOR COMPANIES WHO AGGRESSIVELY PURSUE AND SUPPORT THE DEVELOPMENT OF NEW MARKETS. WE HAVE A UNIQUE OPPORTUNITY TO FORGE THE FOUNDATION FOR THE INDUSTRY'S PROGRESS DURING THE NEXT 10 YEARS, THAT'S WHY I “CALL US LUCKY”, WE ARE THE ONES WHO ARE FORTUNATE ENOUGH TO BE A PART OF MAKING THIS ALL HAPPEN.

BEFORE GOING FURTHER, LET'S STEP BACK A MOMENT AND ANALYZE WHAT'S ALREADY BEEN PUT INTO PLACE BY OUR INDUSTRY TO HELP OUR FUTURE PROGRESS, THERE ARE SIGNS THAT OUR INDUSTRY IS MATURING. LET'S LOOK AT WHAT HAS HAPPENED OVER THE PAST 10 YEARS:*

1. FULL-LINE SERVICE TO AEROSPACE INDUSTRY.

2. ACCEPTANCE OF THE RESPONSIBILITY TO SUPPORT THE NONAEROSPACE MARKETS.

3. ESTABLISHMENT OF THE TITANIUM DEVELOPMENT ASSOCIATION.

4. PROFIT SHARING PLANS --IMPROVED UTILIZATION OF LABOR.

5. EXPANDED GLOBAL PARTICIPATION.

6. INCREASED CAPITAL INVESTMENT.

---

* Fig. 1-2

7. GREATER INDEPENDENCE OF UNITED STATES TITANIUM COMPANIES.

8. EMPHASIS ON LOWERING COST OF METALLICS.

9. INTRODUCTION OF NEW PRODUCTS AND PROCESSING TECHNOLOGY.

10. IMPROVED PRODUCTIVITY THROUGH LABOR AND MANAGEMENT ACCEPTING ADDITIONAL RESPONSIBILITIES.

11. INDUSTRY-WIDE DISTRIBUTION SYSTEMS.

AS I WAS PREPARING THIS SPEECH AND REFLECTING ON THE EVENTS OF THE PAST, I WAS QUITE AMAZED AT HOW MUCH HAS BEEN ACCOMPLISHED. MAYBE WE HAVEN'T BEEN AS PASSIVE AS ORIGINALLY THOUGHT. I THINK THE 1986-1987 TIME PERIOD BROUGHT US ALL BACK TO SOME VERY BASIC THINKING. IN THE AREAS JUST COVERED, OUR FRIENDS FROM JAPAN AND EUROPE HAVE HELPED IMMEASURABLY IN OUR PROGRESS. WE HOPE, IN THE FUTURE, THAT EVEN GREATER AVENUES WILL BE OPENED, AND THAT INCREASED ACTIVITY WILL OCCUR WITH OUR FRIENDS IN THE USSR AND EASTERN EUROPE.

NOW THAT WE UNDERSTAND WHAT IS IN PLACE -- WHAT MODUS OPERANDI DO WE SET FOR THE FUTURE? FIRST OF ALL, WE CAN NO LONGER AFFORD A REACTIVE OR DEFENSIVE APPROACH TO THE MARKETPLACE. IT'S TIME FOR OUR INDUSTRY TO APPROACH NEW MARKETS DYNAMICALLY, PROACTIVELY AND CREATIVELY. IN THE 1990'S, THE REWARDS FOR THIS APPROACH WILL BE BOUNDLESS.*

SALES AND MARKETING ORGANIZATIONS MUST BE TAILORED TO THE PARTICULAR NEEDS OF THE MARKETS WE PLAN TO SERVE. LET'S LOOK AT THE MARKETS CURRENTLY BEING SERVED.**

AEROSPACE ACCOUNTS FOR APPROXIMATELY 75 TO 80 PERCENT OF THE ANNUAL SHIPMENTS IN OUR INDUSTRY. WHILE IT CAN BE SAID THAT TITANIUM IS MATURING IN AEROSPACE, THERE ARE NEW APPLICATIONS BEING DEVELOPED THAT CONCENTRATE ON TITANIUM'S EXCELLENT STRENGTH-TO-WEIGHT PERFORMANCE IN ENGINE AND AIRFRAME APPLICATIONS. ON THE HORIZON WE SEE TITANIUM METAL MATRIX COMPOSITES AND TITANIUM ALUMINIDES AS THE NEWEST OPPORTUNITIES.*** HERE THE CHALLENGE FOR TITANIUM IS TO BREAK THROUGH THE CURRENT TEMPERATURE BARRIERS IN ENGINE AND AIRFRAME APPLICATIONS. AIRCRAFT AND ASSOCIATED ENGINES THAT COULD USE THESE MATERIALS INCLUDE MILITARY PLANES WITH NEW HIGH PERFORMANCE ENGINES SUCH AS THE ATF AND ATB, THE EXPERIMENTAL NASP AND PARTICULAR COMMERCIAL PLANES SUCH AS THE HIGH SPEED CIVIL TRANSPORT OR A VERY LARGE COMMERCIAL AIRPLANE.

---

* Fig. 3
* * Fig. 4
* ** Fig. 5

IN THIS MARKETPLACE OUR SALES/MARKETING APPROACH HAS STOOD THE TEST OF TIME. RELATIONSHIPS ARE DEVELOPED, AND OUR CUSTOMERS ARE EXTREMELY KNOWLEDGEABLE OF THE METAL TITANIUM. WE HAVE THE CORRECT CONTACTS AND, IN SOME CASES, OUR CUSTOMERS KNOW AS MUCH OR MORE THAN WE DO ABOUT OUR PRODUCT. WHILE WE NEED TO ALWAYS CREATE NEW IDEAS, EQUALLY IMPORTANT IS THE NEED TO RESPOND TO THE NEEDS AND WISHES OF OUR CUSTOMERS. REMEMBER, THEY RECOGNIZE TITANIUM'S VALUE -- THEY WANT TITANIUM TO EXPAND --OF COURSE, WE NEED TO INCREASE OUR RESEARCH DOLLARS -- WE NEED TO ENTER JOINT PROGRAMS -- ALL IN THE INTEREST OF MAINTAINING AND EXPANDING OUR MOST IMPORTANT MARKET.

YES, I THINK WE CAN AND WILL SERVICE THE AEROSPACE MARKET WELL IN THE 1990'S. BUT WHAT ABOUT OTHER MARKETS -- DO WE HAVE THE CORRECT MARKETING ORGANIZATIONS AND INFRASTRUCTURES TO REALLY PENETRATE THE NONAEROSPACE POTENTIAL?

IT IS IN THIS NONAEROSPACE ARENA WHERE NEW APPLICATIONS ABOUND, AND TITANIUM REMAINS IN THE GROWTH STAGE OF ITS LIFE CYCLE. THE NONAEROSPACE MARKETS BECOME, THEREFORE, NOT ONLY OUR BEST OPPORTUNITY FOR EXPANSION BUT AN ABSOLUTE NECESSITY FOR THE HEALTH AND GROWTH OF OUR INDUSTRY. THE ORGANIZATIONAL INFRASTRUCTURE REQUIRED HERE IS COMPLETELY DIFFERENT FROM AEROSPACE, AND I WILL EXPLORE THAT TOPIC IN MORE DETAIL IN JUST A FEW MOMENTS.

FIRST, HOWEVER, LET'S ANALYZE THESE MARKETS. THE UNIQUE AND OUTSTANDING PERFORMANCE OF TITANIUM IN ENVIRONMENTS SUCH AS SEAWATER, CHEMICAL BRINES, BRACKISH, POLLUTED AND NATURAL WATERS HAS CONTRIBUTED TO ITS EXPANSION SINCE THE EARLY 80'S FOR MANY APPLICATIONS WHICH ARE JUST NOW COMING INTO USE.* THE MOST SIGNIFICANT OF THESE APPLICATIONS ARE MARINE/NAVAL, ENVIRONMENTAL/POLLUTION CONTROL, ENERGY EXTRACTION, AUTOMOTIVE, INFRASTRUCTURE REHABILITATION, AND MEDICAL IMPLANTS. LET'S LOOK AT SOME OF THESE.

DEVELOPING APPLICATIONS FOR TITANIUM IN THE MARINE MARKET CAN BE DIVIDED INTO THREE GENERAL CATEGORIES -- PRESSURE VESSEL, HEAT TRANSFER AND STRUCTURAL APPLICATIONS. THE SHIP SYSTEMS OF THE WORLD NEED TITANIUM TO IMPROVE PERFORMANCE AND RELIABLE SERVICE THROUGH THEIR LIFE CYCLE. WE HAVE BEEN “OUTMARKETED” IN THESE AREAS BY THE STAINLESS AND NICKEL INDUSTRY. TITANIUM SHOULD BE THE MATERIAL OF CHOICE.**

IN POWER GENERATION, GEOPOLITICS AND LONG-TERM ECONOMIC FACTORS FAVOR THE INCREASED USE OF COAL. ALL COALS CONTAIN VARIOUS CONCENTRATIONS OF SULFUR, WHICH CREATE POTENTIALLY HAZARDOUS POLLUTANTS DURING COMBUSTION. FEDERAL REGULATIONS IN THE UNITED STATES AND AROUND THE WORLD INCREASINGLY LIMIT THE AMOUNT OF THESE POLLUTANTS THAT CAN BE RELEASED INTO THE ENVIRONMENT. IN ORDER TO MEET THE CURRENT AND FUTURE

---

* Fig. 6-7
** Fig. 8

REGULATIONS, OVER 90 PERCENT OF THE POWER GENERATING FACILITIES IN THE UNITED STATES WILL BE FORCED TO UTILIZE SCRUBBER SYSTEMS -- SYSTEMS THAT SHOULD USE TITANIUM.*

THE DRILLING INDUSTRY HAS BEGUN TO TAP DEEP DEPOSITS OF OIL AND NATURAL GAS. THE KEY TO TITANIUM USAGE IN THIS INDUSTRY IS TO HAVE DESIGN ENGINEERS OPTIMIZE AROUND THE STRENGTH - DENSITY AND CORROSION RESISTANCE OF TITANIUM RATHER THAN CLONE TITANIUM WITH EXISTING DESIGNS USED FOR OTHER MATERIALS. AS MORE DEEP WELLS ARE DRILLED FOR HYDROCARBON PRODUCTION, THE POTENTIAL FOR USE OF TITANIUM ALLOYS WILL INCREASE TREMENDOUSLY. TITANIUM HAS DEMONSTRATED ITS EFFICIENCY AND COST EFFECTIVENESS IN THIS AREA ONLY TO A LIMITED EXTENT, MUCH MORE WORK NEEDS TO BE DONE.**

AUTOMOTIVE APPLICATIONS TO DATE HAVE CONSISTED OF HIGH PERFORMANCE SPECIALTY VEHICLES AND COMPRISE RELATIVELY SMALL VOLUMES. HOWEVER, THERE ARE SIGNS, SUCH AS HONDA'S NEW ACCURA NSX WHICH USES TITANIUM CONNECTING RODS, THAT THE TIME IS NEAR FOR EXPANDED AUTOMOTIVE USE. WHEN THE PRICE/VOLUME ECONOMIES OF SCALE CAN BE REALIZED, TITANIUM WILL BE SPECIFIED.***

THE REPAIR OF EXISTING INFRASTRUCTURE AGING IN OUR NATION'S HIGHWAYS, BRIDGES, AND PARKING DECKS, PERHAPS EVEN BUILDINGS, SUGGESTS ENORMOUS POTENTIAL FOR TITANIUM. THE JAPANESE INDUSTRY HAS LEAD THE WAY IN DESIGNING USE IN BUILDINGS, AND THIS SHOULD BE SPREAD THROUGHOUT THE WORLD.****

---

* Fig. 9
* * Fig. 10
* ** Fig. 11
* *** Fig. 12

TITANIUM IN THE HUMAN BODY FOR IMPLANTS HAS IMPORTANT GROWTH POTENTIAL, BUT MORE RESEARCH MUST BE CONDUCTED ON WEAR RESISTANCE, ESPECIALLY ON ARTICULATING SURFACES, AND ALLOY DEVELOPMENTS IN ORDER FOR ACCELERATED GROWTH TO OCCUR.*

I COULD GO ON, BUT MUCH OF THIS DATA YOU HAVE HEARD BEFORE. LET ME OFFER AN OBSERVATION OR TWO. THERE IS MORE POTENTIAL FOR TITANIUM USE IN THE MARKETS I'VE JUST HIGHLIGHTED THAN THE ENTIRE EXISTING AEROSPACE CONSUMPTION OF TITANIUM ANNUALLY! HOWEVER, THIS POTENTIAL WILL NOT COME TO THE TITANIUM INDUSTRY LIKE IT DID IN AEROSPACE. INSTEAD, WE MUST GO TO THE MARKETS! WE MUST BE THE AGGRESSOR, AND WE CANNOT AFFORD TO GO IT ALONE. HOW DO WE DO THIS?**

I WILL USE MY OWN COMPANY AS AN EXAMPLE OF HOW WE ARE APPROACHING NONAEROSPACE MARKETS. FIRST OF ALL, WE HAVE A TECHNICAL MARKETING GROUP WHICH IS TOTALLY DEDICATED TO DEVELOPING NEW MARKETS. IN MANY CASES, THESE PEOPLE ARE INTERFACING WITH DESIGN ENGINEERS AND COMPANIES WITH WHOM WE HAVE HAD NO PREVIOUS CONTACT, THE SALES FORCE, IN TURN, IS NOW ON AN EXISTING MARKET SEGMENT BASIS WITH PRODUCT TEAMS TO ENSURE ACCURATE AND FAST RESPONSE TO OUR DEVELOPING CUSTOMERS. THE IDEA HERE, OF COURSE, IS TO DEVELOP EXPERTISE IN THESE PRODUCTS AND MARKETS TO A LEVEL WE HAVE NEVER HAD BEFORE. WHAT HAS MADE US SUCCESSFUL IN AEROSPACE IS KNOWING EVERY FACET OF OUR MARKET. WE CANNOT EXPECT CUSTOMERS IN THESE NUMEROUS NEW

* Fig. 13
** Fig. 14

MARKETS TO DEVELOP APPLICATIONS AS WAS DONE IN AEROSPACE. THROUGH RESEARCH AND TECHNICAL MARKETING, WE NEED TO DIVE IN AND MAKE THINGS HAPPEN. WE MUST BE AGGRESSIVE. WE CAN'T WAIT -- WE HAVEN'T GOT TIME TO WAIT. THE POTENTIAL CUSTOMER'S PROBLEMS AND QUESTIONS MUST BE ANSWERED, AND NEW OPPORTUNITIES ADDRESSED. FOR INSTANCE, WE MUST DEMONSTRATE HOW TITANIUM CAN BE USED AS AN ALTERNATIVE TO OTHER MATERIALS THROUGH NEW DESIGNS AND CREATIVE APPROACHES. WE MUST CONDUCT EDUCATION AND TRAINING SEMINARS -- INITIATE EDUCATION IN FIELD INSTALLATION AND MAINTENANCE -- DESIGN COST COMPETITIVE SYSTEMS WITH OTHER MATERIALS -- BE WILLING TO SUBSIDIZE NECESSARY TESTING TO PROVE OUR PRODUCTS' CAPABILITIES -- DEVELOP JOINT PROJECTS WITH CUSTOMERS. IN ADDITION, WE MUST MAKE TECHNICAL MARKETING AND RESEARCH EMPLOYEES ACCOUNTABLE. CHARGE THEM WITH THE RESPONSIBILITY TO BRING PROFIT AND VOLUME TO THE BOTTOM LINE. AT THE SAME TIME, EXECUTIVE MANAGEMENT CANNOT PANIC AT THE LEAST BLIP IN THE MARKETPLACE AND REDUCE THESE IMPORTANT SEGMENTS OF MIDDLE MANAGEMENT. THERE ARE NO MORE IMPORTANT EMPLOYEES IN OUR COMPANIES TODAY THAN THOSE IN RESEARCH AND TECHNICAL MARKETING. THEY ARE OUR FUTURE -- THEY WILL MAKE US OR BREAK US, BELIEVE ME!

WHAT IS THE NEXT STEP? THE TITANIUM DEVELOPMENT ASSOCIATION, OF COURSE.* HOW DOES THE TITANIUM DEVELOPMENT ASSOCIATION FIT INTO ALL THIS? JUST BEAUTIFULLY, BUT HERE AGAIN WE MUST HELP MAKE IT HAPPEN. OUR TITANIUM DEVELOPMENT ASSOCIATION HAS REACHED THE

* Fig. 15

FIRST PHASE OF MATURITY. THROUGH OUTSTANDING CONTRIBUTIONS OF ORIGINAL MEMBERS, THE ASSOCIATION HAS GAINED A FOOTHOLD, AND IS RECOGNIZED AS THE REPRESENTATIVE OF OUR INDUSTRY. THE ADMINISTRATIVE MECHANISMS ARE NOW IN PLACE TO HANDLE OUR GROWTH IN THE FUTURE. HOWEVER, WE MUST MOVE TO THE NEXT STEP -- THE NEED FOR INCREASED TECHNICAL INPUT AND OUTPUT. WE MUST APPOINT A NEW TECHNICAL DIRECTOR WHO WILL EXPAND OUR PARTICIPATION AT TECHNICAL SEMINARS AND MEETINGS THROUGH EDUCATING POTENTIAL USERS ON THE PROPERTIES AND APPLICATIONS FOR TITANIUM. ADDITIONAL APPLICATION-ORIENTED COMMITTEES MUST BE ESTABLISHED FOR BOTH THE DEVELOPMENT OF NEW MARKETS AND SOLVING ANY PROBLEMS THAT WE ENCOUNTER AS WE DEVELOP NEW APPLICATIONS. THE TDA, THROUGH OUR TECHNICAL DIRECTOR, SHOULD DIRECT JOINT TESTING UNDER AN R&D PROGRAM TO SPEED UP INTRODUCTION OF NEW ALLOYS.

I ALSO FORESEE THE TDA ACTING AS A CATALYST FOR MEETING THE CHALLENGES PRESENTED BY NEW GROWTH OPPORTUNITIES FOR THE TITANIUM INDUSTRY. LIKE THE ENGINE AND AIRFRAME MANUFACTURERS, OUR INDUSTRY MUST FORM STRATEGIC ALLIANCES, POSSIBLY THROUGH THE TDA, TO DEVELOP THE NECESSARY NEW PRODUCTS AND PROCESSES. OUR FEDERAL GOVERNMENT IS RECEPTIVE MORE AND MORE TO THESE TYPES OF ARRANGEMENTS.

FURTHERMORE, TDA AND JTS TOGETHER CAN PIONEER EFFORTS OF COOPERATION IN AREAS WHERE THE WORLDWIDE INDUSTRY WOULD BENEFIT. IT IS IMPORTANT THAT TITANIUM SOCIETIES, THROUGHOUT THE

WORLD, WELCOME MEMBERS FROM OTHER COUNTRIES AS OUR TDA HAS DONE IN THE UNITED STATES.*

SEVERAL SUGGESTIONS FOR COOPERATIVE EFFORTS COME TO MIND -- A DIRECTION TO SOLVE INDUSTRY ENVIRONMENTAL PROBLEMS AS LEGISLATION BECOMES MORE STRINGENT, NOT ONLY FOR THE CUSTOMERS WE SERVE, BUT FOR OUR OWN INDUSTRY AS WELL. THREE MARKETING AREAS ARE RIPE FOR COMBINED DEVELOPMENT EFFORTS; FOOD PROCESSING, PHARMACEUTICALS AND WASTE DISPOSAL.

BETWEEN THE RESPONSIBILITIES WE HAVE AS THE TITANIUM INDUSTRY, AS WELL AS OUR TRADE ASSOCIATIONS, YOU SAY WE HAVE AN AWESOME TASK, YES I AGREE, BUT AT THE SAME TIME, DON'T YOU FEEL THAT WE HAVE NOW GRASPED THE METHODOLOGY TO REACH OUR FINAL DESTINATION:**

1. CONTINUE OUR CURRENT AGGRESSIVE APPROACH TO REDUCING RAW MATERIAL COSTS.

2. TOTALLY CHANGE OUR SALES/MARKETING DIRECTION TO ONE OF MARKET, RATHER THAN TOTAL EMPHASIS ON PRODUCT AND SHORT-TERM SALES.

3. EXPAND IMMEDIATELY OUR TECHNICAL MARKETING BASE TO GIVE US EXPERTISE IN MANY MARKETS SIMILAR TO WHAT WE HAVE IN

---

* Fig. 16
* * Fig. 17

AEROSPACE. WE MUST EDUCATE THE USERS.

4. CONTINUE TO INCREASE RESEARCH BUDGETS, NOT ONLY FOR PRODUCT, BUT ALSO FOR PROCESSING. REMEMBER, WE STILL BASICALLY PRODUCE TITANIUM WITH METHODS THAT WERE DEVELOPED IN THE 1950'S.

5. CAPITAL INVESTMENT - WE'VE MADE GOOD STRIDES THE LAST FEW YEARS. HOWEVER, CONTINUED INVESTMENT IS VITAL TO GROW PRODUCTION VOLUME, REDUCE COST, IMPROVE THE PROCESS AND UPGRADE THE EQUIPMENT.

6. EXPAND OUR DISTRIBUTION NETWORK. DISTRIBUTION NOT ONLY SUPPORTS EXISTING AEROSPACE CUSTOMERS, BUT ALSO MAKES MATERIAL AVAILABLE IN SMALL QUANTITIES TO A HOST OF NEW MARKETS AND NEW CUSTOMERS.

7. WE NEED TO EXPAND OUR THINKING TO GLOBAL MARKETS. THE U.S. MARKET WILL ONLY EXPAND TO A CERTAIN DEGREE -- THE UNTAPPED MARKETS ARE IN THE FAR EAST, THE DEVELOPING NATIONS AND THE EASTERN BLOC.

8. ENTREPRENEURIAL SPIRIT -- THE FASCINATION OF OUR MARKET IS THAT THE FUTURE IS SO UNBELIEVABLY UNPREDICTABLE. THE OPPORTUNITIES WILL BE THERE. THOSE WITH CREATIVE IDEAS -- THOSE WHO ARE WILLING TO FACE THE FUTURE WITH CONFIDENCE AND COURAGE -- THOSE WHO ARE WILLING TO IMPLEMENT RATHER

THAN PROCRASTINATE. IN OTHER WORDS, THOSE WITH OLD FASHIONED ENTREPRENUERIAL SPIRIT WILL BE THE WINNERS.

I AM EXCITED ABOUT WHAT'S HAPPENING TO OUR BUSINESS. I LIKE WHAT I AM SEEING -- OUR INDUSTRY IS MATURING -- WE ARE MAKING THE RIGHT MOVES. OUR WORLD IS BECOMING SMALLER -- THERE IS A GREATER INTER-FACE INTERNATIONALLY WITHIN OUR INDUSTRY TODAY THAN EVER BEFORE. THIS WILL CONTINUE TO GROW AND EXPAND. YOU KNOW, EVERY MORNING WHEN I WAKE UP, I CAN HARDLY WAIT TO GET TO WORK. THE CONSTANT CHALLENGES, THE NEW OPPORTUNITIES. AS I SAID BEFORE, JUST CALL US LUCKY. WHY? BECAUSE WE HAVE A CHANCE TO CREATE SOMETHING FEW INDIVIDUALS EVER HAVE HAD DURING THEIR BUSINESS CAREERS. WE HAVE CALLED THE 1990 TO THE YEAR 2000 TIME PERIOD THE DECADE OF OPPORTUNITY. IN THE YEAR 2000 WE'LL LOOK BACK AND WHAT WILL HAVE HAPPENED? I BELIEVE TITANIUM WILL HAVE EXPANDED INTO EVERY FACET OF OUR EVERYDAY LIVING. FROM THE ENVIRONMENT TO THE MEDICAL FIELD -- FROM AEROSPACE TO THE OIL PATCH -- FROM HIGHWAY AND BUILDING CONTRUCTION TO THE AUTOMOTIVE MARKETS. IT'S THERE BECKONING -- IT'S SAYING, “YOU HAVE FORMED AN EXCELLENT FOUNDATION -- WILL YOU TAKE THE NEXT STEP? YOU BET YOUR LIFE WE WILL. IT'S OUR DESTINY.

THANK YOU.


INDUSTRY PROGRESS
1980'S
Full line customer service
Support of nonaerospace markets
Establishment of
Titanium Development Association
Improved labor utilization
Expanded global participation
Increased capital investment

Fig. 1


INDUSTRY PROGRESS
1980'S
Greater independence
Emphasis on lowering costs
Technology introduction
Increased productivity
Industry wide distribution systems

Fig. 2

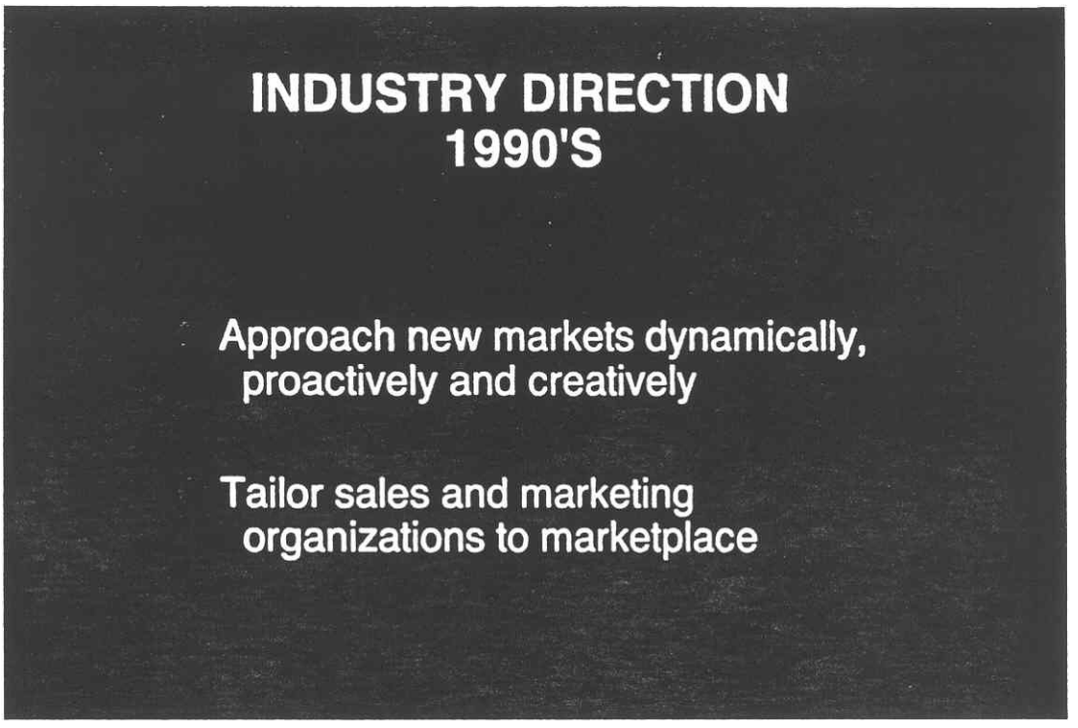
INDUSTRY DIRECTION
1990'S
Approach new markets dynamically, proactively and creatively
Tailor sales and marketing organizations to marketplace

Fig. 3


AEROSPACE MARKET
Create new ideas
Respond to customers

Fig. 4

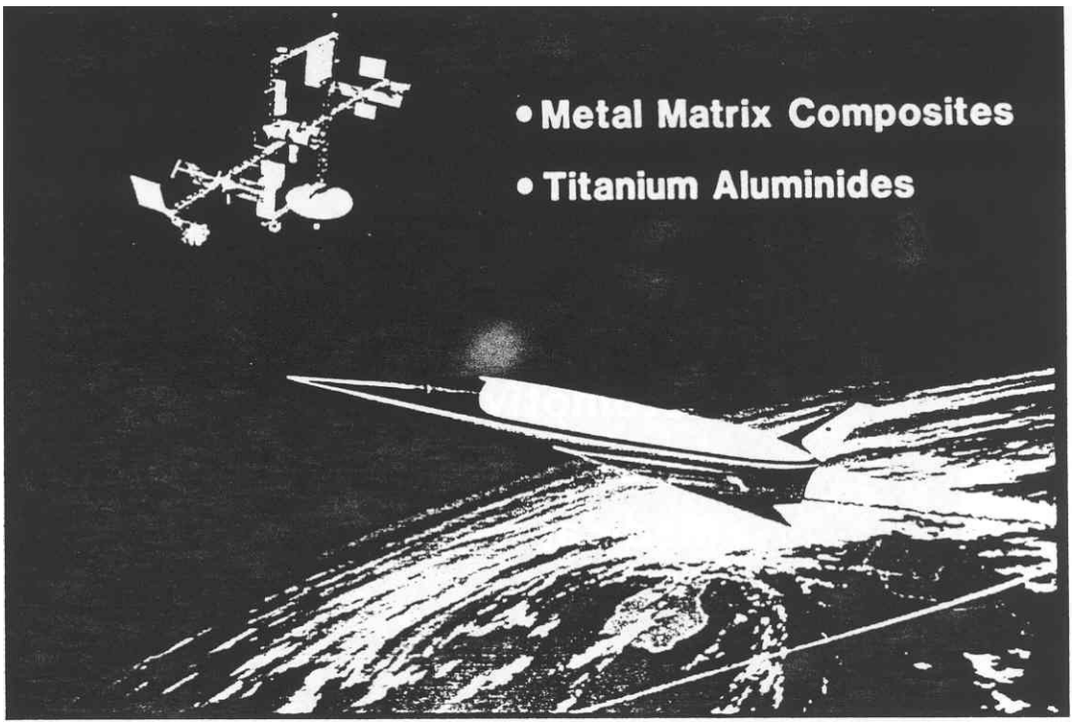

Fig. 5

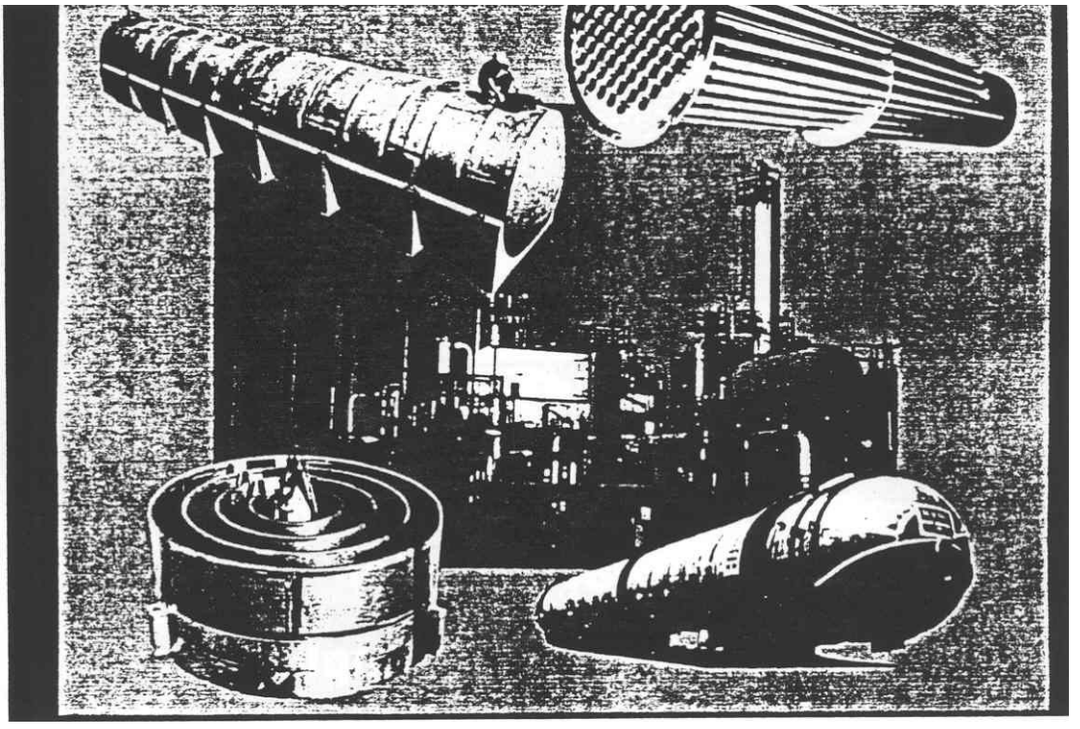

Fig. 6

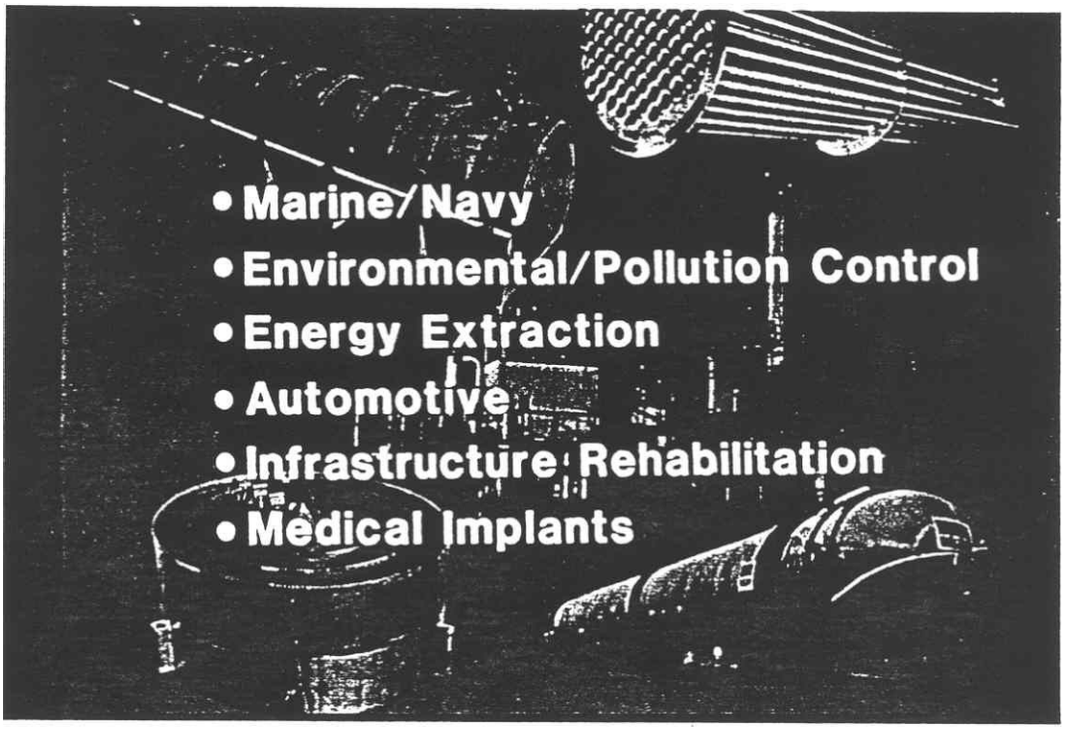
• Marine/Navy
• Environmental/Pollution Control
• Energy Extraction
• Automotive
• Infrastructure Rehabilitation
• Medical Implants

Fig. 7

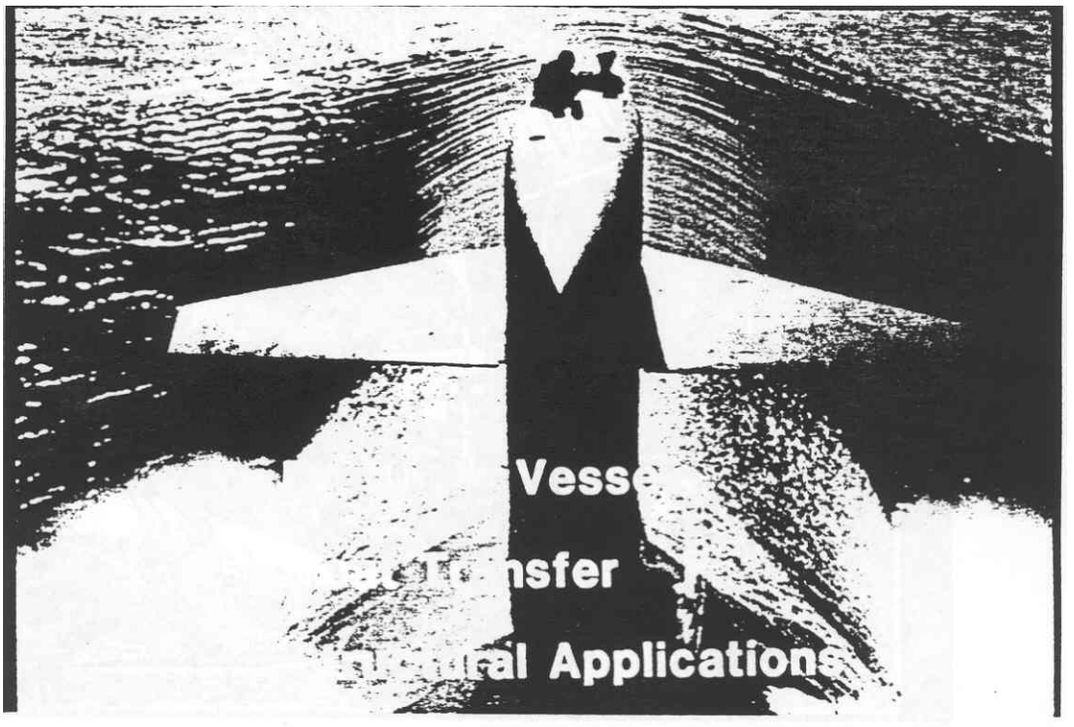
Vesse
nsfer
al Applications

Fig. 8

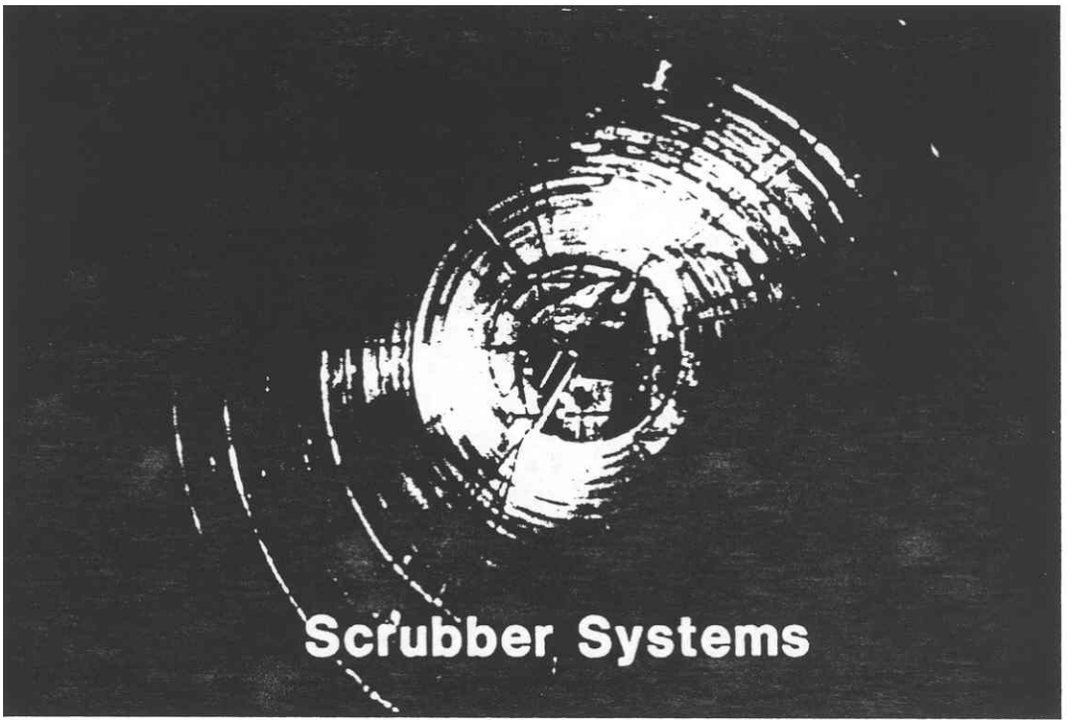

Fig. 9

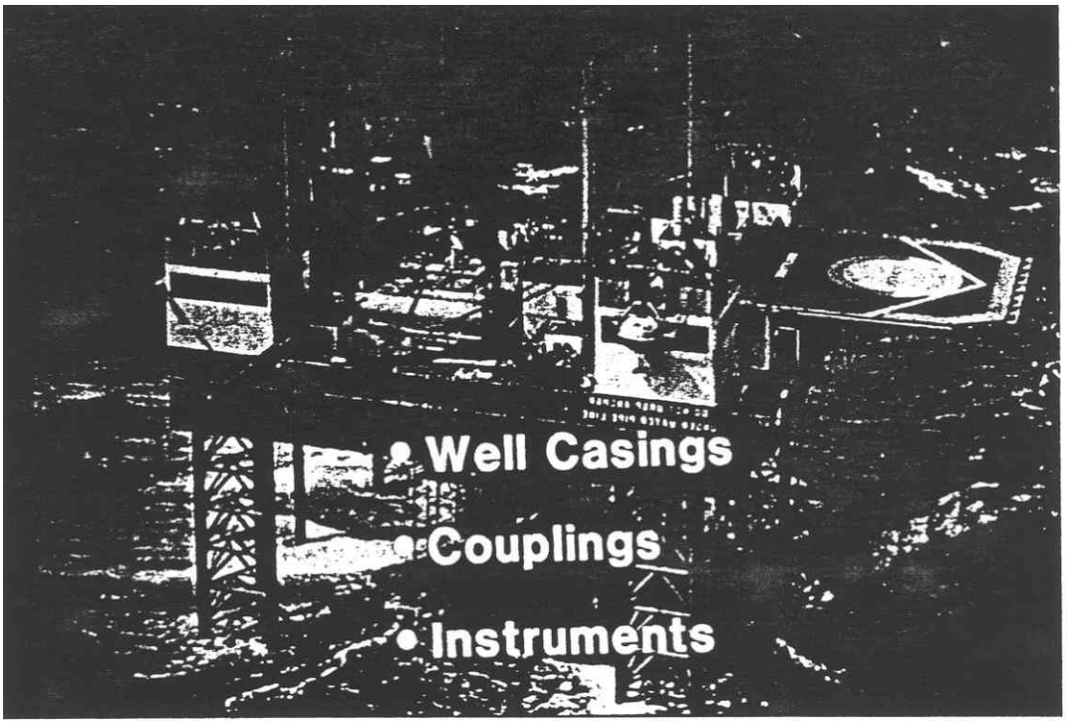

Fig. 10

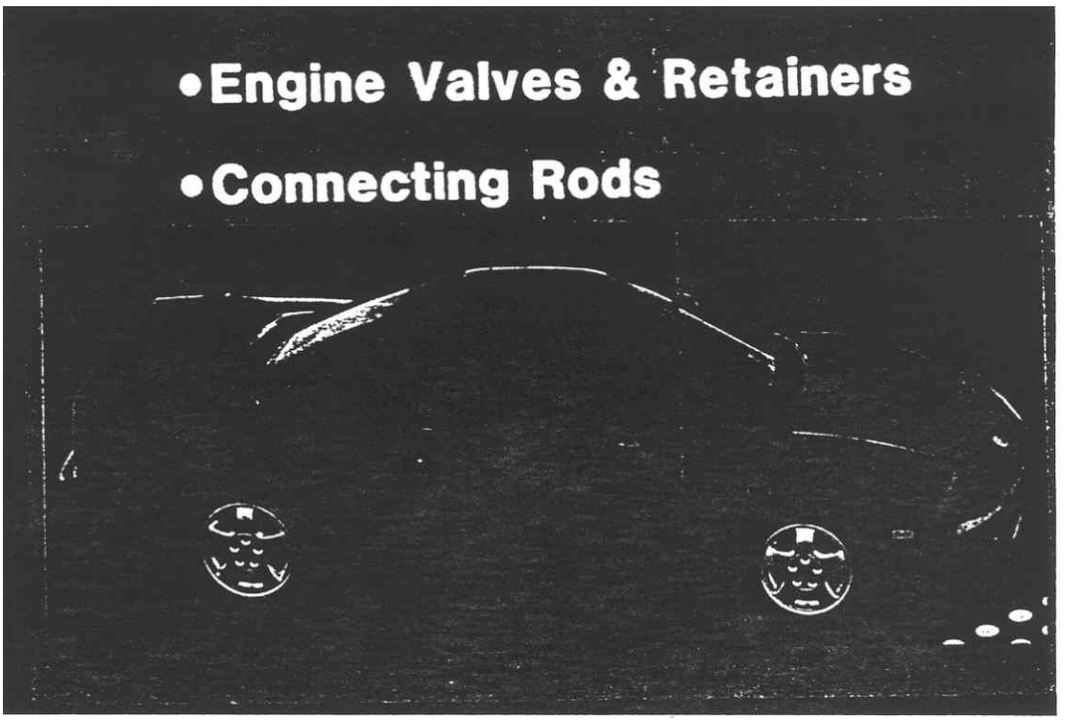

Fig. 11

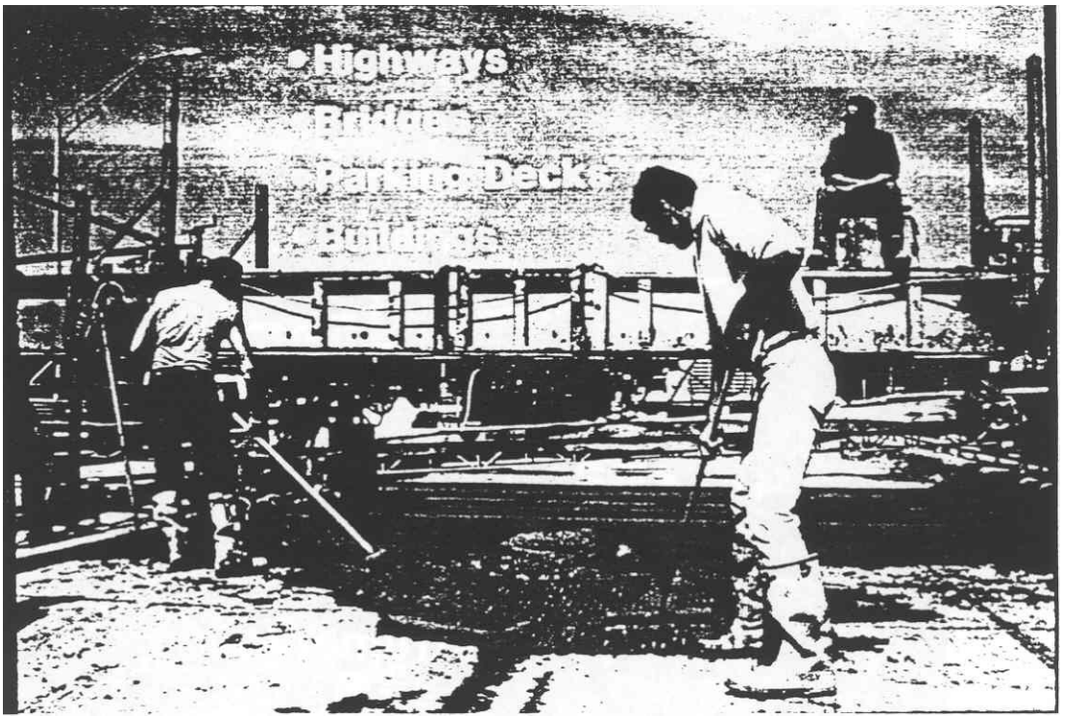

Fig. 12

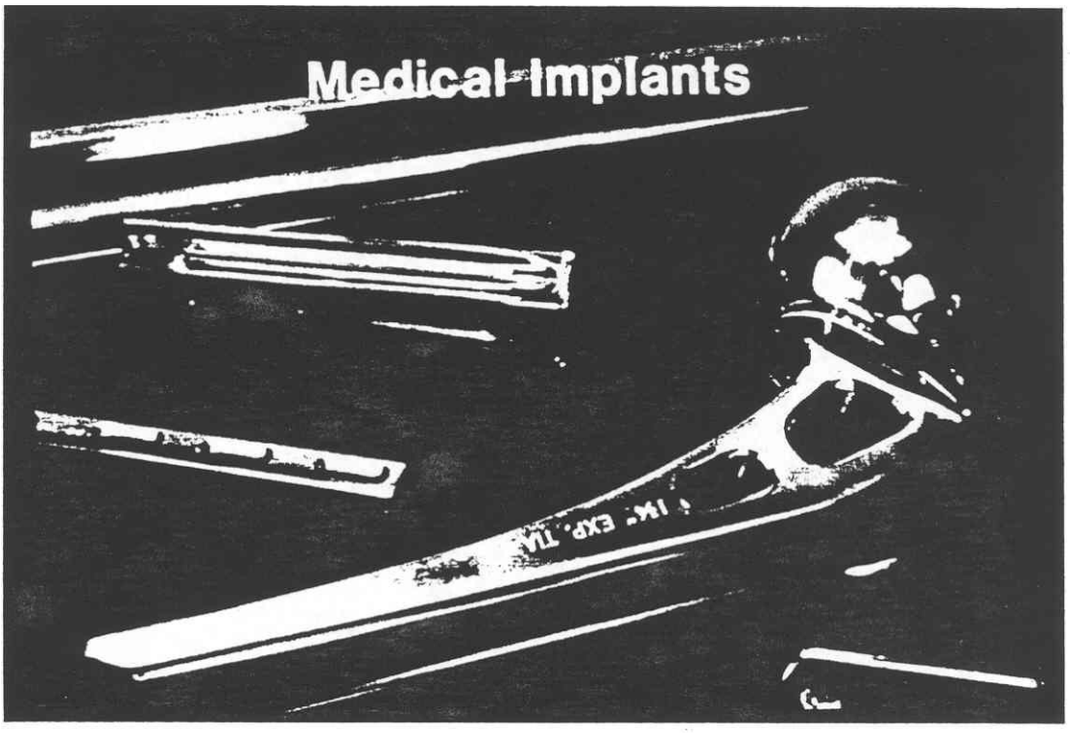
Medical Implants

Fig. 13


NONAEROSPACE MARKETS
Aggressive approach
Dedicated technical marketing
Expert sales force
Solve customer problems
Creative style
Subsidize testing
Team effort

Fig. 14

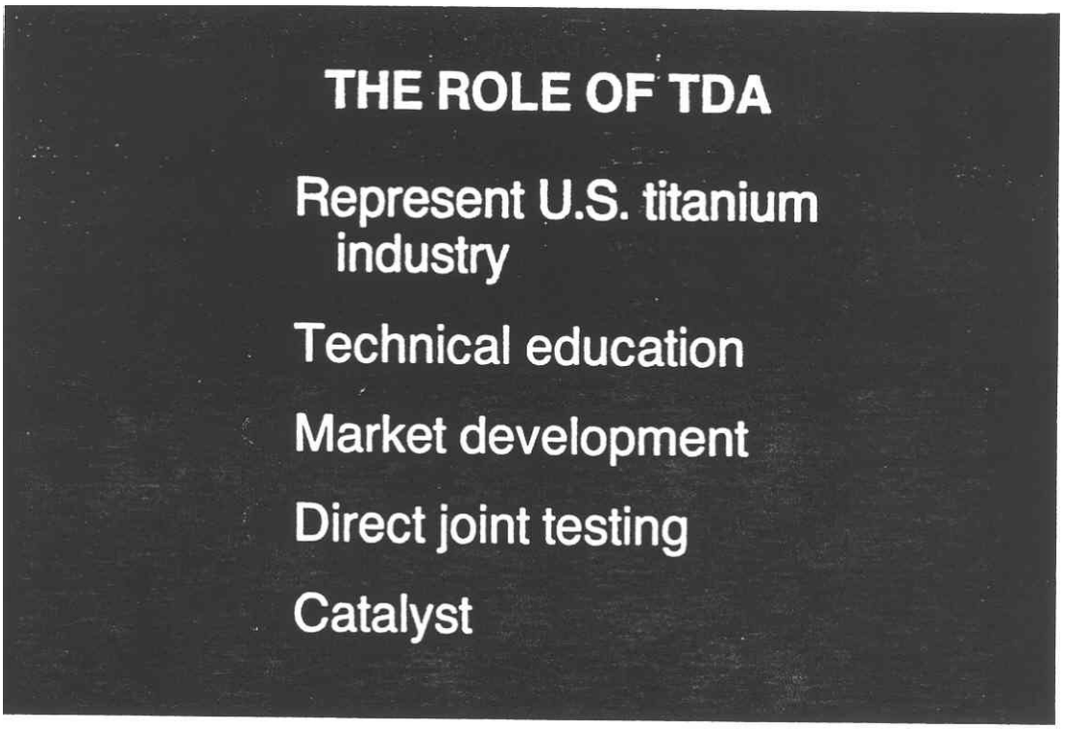
THE ROLE OF TDA
Represent U.S. titanium industry
Technical education
Market development
Direct joint testing
Catalyst

Fig. 15


TDA AND JTS
COOPERATIVE EFFORTS
Welcome new members worldwide
Address industry environmental problems
Develop new markets

Fig. 16


INDUSTRY METHODOLOGY FOR THE 1990'S
Reduce raw material costs
Emphasize new markets
Educate users
Increase research budgets
Continue capital investment
Expand distribution system
Reach global markets
Create an entrepreneurial spirit

Fig. 17