

**ROCKETS AND SPACECRAFT
THEN, NOW &
THE FUTURE FOR NDT**

**PRESENTATION TO THE NDTMA AT THE
GOLDEN NUGGET IN LAS VEGAS ON
WEDNESDAY, FEBRUARY 12, 2014 BY
STEPHEN M. SENNE, MDTCM, ND OF
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THE BUZZ OF A BIPLANE IN 1916 WAS SO RARE THAT MY GRANDMOTHER WOULD ALLOW A RECESS FOR HER GRADE SCHOOL CLASS TO WATCH THE AIRCRAFT GO BY. FIFTY-ONE YEARS LATER, THE WORLD WITNESSED THE RUSSIAN LAUNCH OF “SPUTNIX” AS THE FIRST ORBITAL SATELLITE!

TODAY ALMOST ANYTHING YOU THROW IN THE AIR CAN FLY!

IT TOOK MAN ABOUT 2 MILLION YEARS TO LEARN TO DEVELOP SYSTEMS THAT WERE HEAVIER THAN AIR THAT COULD ACTUALLY FLY AND THEN ABOUT 65 YEARS TO GO INTO ORBIT.

IN THE NEXT TWELVE YEARS, THE UNITED STATES LANDED ON THE MOON! WOW, WHAT A TRIP!

ROCKETS AND SPACECRAFT

AS I WAS DEVELOPING THIS PRESENTATION, MY FIRST THOUGHT WAS MY THEME WAS GOING TO BE THAT:

“I STARTED IN THE PROPULSION BUSINESS AND WOULD BE ENDING MY CAREER IN PROPULSION” - THE SAME AS WE HUMANS WHO “START IN DIAPERS AND END IN DIAPERS”!

THEN I REALIZED TWO THINGS:

- 1. I NEVER LEFT THE PROPULSION BUSINESS, AND**
- 2. I STILL HAVE SOME YEARS TO GO (HOPEFULLY) BEFORE I ENTER THE SECOND STAGE.**

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**IN AUGUST OF 1965, I ENTERED THE AEROSPACE NDT BUSINESS AS MOST OF US HAVE, “BY ACCIDENT”!
BY MID 1966 I WAS RADIOGRAPHING AND/OR BEING THE FIRST AND ONLY READ ON THE SUB-ASSEMBLY DUCTING SYSTEMS OF ALL OF THE SPACE SYSTEMS ATTEMPTING TO GO TO THE MOON AND THE FUEL LINES OF INTERCONTINENTAL BALLASTIC MISSILES – AS ONE SEEMED TO NEED EACH ANOTHER!**

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BY THIS TIME WE HAD ALREADY SEEN:

- 1. SPUTNIX**
- 2. THE CUBAN MISSILE CRISIS**
- 3. KENNEDY'S ASSASSINATION**
- 4. THE U.S. FIRST MEN IN ORBIT**
- 5. THE WATT'S RIOT**
- 6. VIETNAM UNDER WAY, AND**
- 7. LAUNCHES AFTER LAUNCHES**

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MY COLLEAGUES WOULD ASK ME IN THE MORNING AFTER A LAUNCH: “DID YOU SEE IT ON T.V. LAST NIGHT?” - MY FIRST RESPONSE WAS ALWAYS “DID IT MAKE IT?” AS THERE WERE TOO MANY OF MY STAMPS RIDING ON EACH VEHICLE INTO SPACE!

BY THE TIME WE MADE IT TO THE MOON IN JULY OF 1969 – I FELL ASLEEP WATCHING THE DRAMA ON T.V. YES, WE DID MAKE IT TO THE MOON REGARDLESS OF WHAT YOU HAVE HEARD ABOUT IT BEING A MANUFACTURED, SCRIPTED PLAY FROM HOLLYWOOD!

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NOT ON OUR FIRST LANDING BUT AT ONE OF THE FOLLOWING LANDINGS, I WAS AT A COMMAND CENTER AT ROCKWELL INTERNATIONAL SPACE DESIGN SYSTEMS ON A VISIT WHEN IT WAS ANNOUNCED:

“WHAT ARE THE RUSSIANS DOING?”

THEY HAD LAUNCHED A ROCKET. I DO NOT REMEMBER THE ALERT STATUS AS THERE WAS A SINGLE LAUNCH BUT I DO REMEMBER OVER THE NEXT DAYS, WE WATCHED CLOSELY – WERE THEY GOING TO “TAKE US OUT” ON THE MOON?

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EVENTUALLY WE KNEW THE ANSWER:

**THEY WENT TO TAKE A LOOK TO MAKE SURE WE
WERE ACTUALLY THERE AND WE WERE!**

**JUST LIKE GENERAL AND LATER PRESIDENT
EISENHOWER HAD SAID ABOUT THE HOLOCAUST
PRISON CAMPS, “TAKE PLENTY OF PICTURES, AS
SOMEDAY SOMEONE WILL SAY IT DIDN’T HAPPEN!”**

**REMEMBER, THESE WERE YEARS BEFORE “PHOTO
SHOP”! YOU CANNOT BELIEVE A PICTURE TODAY!**

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YEARS AND YEARS WENT BY! AFTER APOLLO 13 AND A FEW MORE SCARY ATTEMPTS, IT WAS DECIDED TO CONCENTRATE ON A SPACE STATION. THINGS CHANGED WITH RUSSIA AND THEY DID GET MIR IN ORBIT, BUT WE HAD THE MAIN TRANSPORT AND SUPPLY SYSTEM WITH OUR SPACE SHUTTLES. THEY COULD GET THERE BY ROCKET AND WE USED ROCKETS TO GET OUR SPACE SHUTTLE THERE, BUT THERE WAS MUTUAL COOPERATION. IN THE MEANTIME, ASTRONAUTS WERE LOST!

ROCKETS AND SPACECRAFT

**NOW WE ARE GOING BACK TO THE MOON AND
MARS!**

**WHEN I FIRST HEARD THIS, MY RESPONSE WAS:
“WE WILL BE KILLING MORE ASTRONAUTS!”**

**WHY? BECAUSE I FELT WE DID NOT HAVE THE RIGHT
TALENT LEFT TO DO IT AGAIN. MUCH OF OUR TALENT
HAS LEFT THE BUSINESS BY DEATH, RETIREMENT OR LAY
OFFS FROM THE BIG PRIMES. WHEN WE WENT TO THE
MOON, EVERYONE WAS VERY MOTIVATED, PARTLY
BECAUSE IT WAS A CHALLENGE THAT WAS PRESENTED TO
US BY KENNEDY BEFORE HE WAS KILLED.**

ROCKETS AND SPACECRAFT

WHEN WE MADE THE MOON IN 1969, THE AVERAGE AGE OF OUR ENGINEERS WAS 23 YEARS OLD. WE DID IT WITH PENCILS AND SLIDE RULES - NOT COMPUTERS AND GADGETS. WE WERE UNDER THE THREAT OF A NUCLEAR WAR THAT COULD ERASE MANKIND AND TECHNOLOGY HAD TO KEEP US AHEAD.

WHY DO I THINK WE CAN DO IT NOW?

BECAUSE WE HAVE “SUPER SIZED” THE ENGINEERING THAT DID IT IN THE FIRST PLACE!

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A BRILLIANT MAN HAS COME UPON THE SCENE WITH A TOP NOTCH TEAM – ELON MUSK – WITH THE RESOURCES AND “SMARTS” TO MAKE IT HAPPEN! SINCE WE NOW HAVE THE ADDITIONAL THRUST WE DID NOT HAVE IN 1969, HE AND HIS TEAM HAVE TAKEN THE OLD APOLLO DESIGN AND MADE IT BIGGER. IT WILL HOLD 7 ASTRONAUTS WITH ELBOW ROOM. WE ONLY HAD 3 ASTRONAUTS STUFFED INTO THE APOLLO, BUT THE DESIGN WORKED OVER AND OVER AGAIN (EXCEPT APOLLO 13) AND THAT BECAME A SUCCESS STORY, TOO!

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FOR SIXTEEN MONTHS I WAS FORTUNATE ENOUGH TO BE “SPACE-X’s” RESPONSIBLE LEVEL III. WITH MY 8 ASNT CERTIFICATED LEVEL III’s, IT WAS “NOT ENOUGH” - AS THEY WANTED ME TO HAVE ALL ELEVEN THAT ARE TESTED BY ASNT! BESIDES ME, THEY HAD TO HAVE FOUR OTHER CONSULTANTS AS THEY ARE INTO EACH AND EVERY METHOD THEY CAN FIND TO INSPECT THE HARDWARE GOING INTO SPACE!

EACH METHOD, BY MANDATE, IS TO HAVE THEIR OWN “RESPONSIBLE” ASNT LEVEL III. MY WORK NOW IS HELPING THEM GET THERE!

ROCKETS AND SPACECRAFT

YOU HAVE TO BE A VERY GOOD CANDIDATE TO BE HIRED AND MUST BE THE BEST TO STAY THERE.

THEY ARE NOW HAVING SUCCESSFUL LAUNCHES OF NEW DESIGNS IN THE DELIVERY PACKAGES TO BE ABLE TO PLACE THE NEW SUPER-SIZED APOLLO ON ITS WAY! NASA IS ASKING FOR VOLUNTEERS TO MAKE A ONE WAY TRIP TO COLONIZE MARS. SPACE IS A HOSTILE PLACE AND THE PROPULSION BUSINESS MUST HAVE THE BEST NDT AVAILABLE TO KEEP THE ASTRONAUTS SAFE!

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THE EMPLOYEES AT SPACE-X ARE MOTIVATED. ELON MUSK HIMSELF WANTS TO GO TO MARS (BUT RETURN). AT 44 HE WILL PROBABLY BE ABLE TO DO IT WITHIN HIS LIFETIME! WATCH IT HAPPEN!

BESIDES SPACE-X, THERE ARE A GREAT MANY PLAYERS IN THE FIELD. NOT JUST TO GO TO THE SPACE STATION OR BEYOND, BUT TO PROVIDE COMMERCIAL VACATIONS, SATELLITES, TELECOMMUNICATION AND OF COURSE, MILITARY APPLICATIONS. OUR NEXT "BLOOM" IS BY GOING INTO SPACE AGAIN!