

# Challenger report

[Business](#), [Industries](#)



## Executive

## Summary

This Report attempts to unfold the management flaws and terrible decision making that marked the morning of the 28th of January 1986 as a terribly tragic disaster. What is sadder is that this disaster was mainly due to inhumane practices conducted by the NASA and the management bodies of companies associated with this project than natural reasons. The whistleblowing led to the loss of billions of dollars and more importantly loss of 7 innocent lives. The space shuttle was propelled by the two attached Solid Rocket Boosters (SRBs) and an external fuel tank. The SRBs were joined to the External Tank. Once the SRBs ignited, hot gases heated the rubber O rings and they eroded to seal the joints. SRB joint design had a serious flaw in it and the engineers knew it meant a catastrophe and yet they passed the design for flight.

The O rings worked only down to a temperature limit of 12 °C, but the morning of the launch saw temperatures as low as -1 °C which was much lower than the prescribed limit. Many engineers voiced to postpone the launch and wait for the weather to be stable but the management turned down these arguments and the challenger was cleared to launch at 11: 38 A. M. As the shuttle took off, the right SRB emitted puffs of smoke which meant that a gap was punched into the SRB and hot gases were escaping it. The O ring was supposed to seal the gap off but it was frozen so it failed and the secondary O ring was displaced because the casing of the SRB bent away. At about 60 seconds from take off, the smoke became a flame and damaged the external tank and 73 seconds from launch, the shuttle exploded and disintegrated over the Atlantic Ocean killing all the 7 crew members.

## Introduction

11: 39 am, 28th of January was the disgrace moment for all American and for NASA. On this date six astronauts with a schoolteacher in a space shuttle named as challenger exploded in a mid-air in front of their families and live televisions. This is first time when an NASA sends average American to the space so she can teach the lesson from the space. This mission seems very safe that's why the NASA allows an ordinary American to visit international space shuttle. The challenger taking more than 3 billion dollars of equipment and highly trained astronauts but the space shuttle challenger disaster occurred in just 73 seconds from lift-off. Due to live broadcast and public interest, the challenger publicized all over the America. Reason or Mechanical Problems

The main reason of the challenger disaster was the SRB which stands for solid rocket booster. It is a part of the shuttle that helps in lift-off. It also carries the rocket fuel and essentially powers that help shuttle towards outer space. The solid rocket booster exhausts the gasses towards earth, so that rocket moved upward. After lift-off and reaching into mid-air the solid rocket booster normally disconnected from the space shuttle and parachutes towards the earth which can be used for further launches. Solid rocket booster in the shape of cylinder. These cylinders combined with joint and protected by O-ring. These joint normally assemble in Kennedy Space centre. These O-ring made of elastic that used to expand to fill up the gaps in the joint, which can protect the space shuttle from very extreme gasses. In Challenger O-ring is supposed to seal those gaps which were not happen that day. In the result the extreme gasses leak from these gaps. So the holes

which normally protected from the seal from the high temperature, exhaust very hot gases and it increase in the size of gap which brought out the very high pressure inside right solid rocket booster (SRB). So these mechanical faults identifies in the right solid rocket booster which let the challenger towards the disaster.

#### Administrative or Management Problem

There were lots of area to be focused for the space shuttle challenger disaster such as O-ring, low temperature, solid ice on launching pad, blow holes, exhaust gasses and joint rotation. But there are some management factors are also available which responsible for the explosion of the challenger space shuttle. If the overruled with these factor might be those seven astronauts will be alive today. Those management problems are as below

#### WEATHER CONDITIONS AND DELAY

Space shuttle Challenger was firstly decided to launch on 22nd January at 2:42 pm from the Kennedy space centre space. But it is moved to 23rd January and then to 24th of January. On that day bad weather held between launch at the Transoceanic Abort Landing (TAL) site in Dakar, Senegal. So they decided to launch on 25th of January and they use Casablanca instead of Dakar as Transoceanic Abort landing. But it can't be used for night time landing so they decided to move on 26th of January. Weather on 26th was very extreme to launch so they finally predict to launch on 27th of January from the Kennedy space centre. Afterward there are more delays for the mission due to the some technical fault in exterior access hatch. So there is one more day delay in launch. On January 28 weather was extremely cold

around  $-1^{\circ}\text{C}$ . Before this no space shuttle have been launches in this extreme weather. The engineers in Morton Thiokol were worried about this weather. They knew that O-ring joints were not able to perform well in temperature below  $12^{\circ}\text{C}$ . They also knew that last night the temperature at Kennedy space centre was  $-7^{\circ}\text{C}$  and in this sense the ice would be there in launching area that may be affecting during the lift-offs. So the engineers at Morton Thiokol told the whole story to their management but they declined this and allow the launch on the scheduled. On the morning of January ice team at Kennedy space centre found that ice is began to melt so they give green signal and finally challenger ready to launch at 11: 38am.

#### COMMUNICATIONPROBLEM

Communication is one of the major blunders in challenger explosion. Lack of communication skills were found throughout the mission. The standard of the written and verbal communication are very low. Many people were involves in this project and many companies design the different part of the space shuttle but there is lack of communication between the different employees and with different companies. Anyhow the deaths of the seven members which board on the shuttle were due to the technical fault of O-ring but these technical faults are due to the miscommunication of the employees. Miscommunications were first start from the engineers and the people sitting in office or with the managerial people. Engineers work normally in technical field so they use their technical language to communicate with each other but these technical languages can't be understands by an average person. Engineers at Morton Thiokol knew the problem in O-ring because they check it after every use. They explained and

warn the NASA about this fault but NASA ignored it because they did not consider it as a major problem. As they don't understand the technical language of the engineers.

The manager were only looking not to delay it further Most importantly engineers are always on the field and they know how the shuttle works. The engineers aim was to launch the shuttle properly without any disturbance. But the management people really don't understand what going and they don't know how shuttle works. So when engineer at Morton Thiokol says these things to NASA they did not take it seriously. If there communication skills were better and explain the O-ring problem to their managers and take immediate action might be the Challenger becomes the successful mission.

## ORGANIZATIONAL

## PRESSURE

One of the major factors of the explosion of space shuttle challenger was organizational pressure from outside. As this is not a technical reason but this factor also played a vital hand toward the unsuccessful of this mission.

There are three main pressure organizational are as below:-

? The Military

? Congress

? Media

In past military gave air force to launch the military satellite to the space. First time they gave NASA chance to do it. So NASA want to military happy. As if they failed to do it on time they would return back this task to air force which they happily accepted. So NASA tries not to disappoint the military by delaying. As the know military is there one of the biggest and most resourceful costumer. Congress is also put heavily pressure on the NASA. As

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NASA is getting lots of lot money from the congress and they were also exceeded their budget and far behind the target which they had to achieved. So the NASA was in deep pressure to launch it as soon as possible. And in the last media was very vibrant on those days. As it was lived telecast on the TV. The media was also put pressure to launch quickly. Media anchors and analysts made jokes on NASA space shuttle program as it delays for several time. Whenever they try to launch and did not made it they put hilarious comment as these comments ruin the credibility of NASA. So NASA had lots of pressure from outside by these sources and wanted to launch space shuttle as soon as possible.

#### USING OF REUSEABLE PART

Since the Apollo era NASA is using the reusable space shuttle. NASA got this concept from aeroplane. As aeroplane took flight and can be used again after little bit maintained. This set took place by congress and the white house to made the space shuttle as a routine flight and the reduce the cost of launching because the NASA is already over budgeted. The Space shuttle consists of three main part which are as follow:- ? The solid rocket booster (SRB)

? The external fuel tank

? The orbiter

The Solid rocket boosters are those parts which give thrust to orbiter to move toward space. (Due to the technical fault on SRB challenger exploded). The external fuel tank includes the fuel which attached to the orbiter. And the orbiter is the part which took astronauts into space. It is in the shape of the aeroplane. And on returning from the space only orbiter came. The rest

of part are disconnected from the orbiter and parachuted towards the earth. Due to uses of these parts again and again could affect the challenger. If they rebuild the new SBR and tank for every time might be this explosion could not be happen.

### Recommendations

Is the challenger mission is safe? Is there any doubt about this mission? Is there is any technical fault on Challenger? These are some of those points less question asking at this stage. There is not only one problem in Challenger but there is lots of upgraded NASA have to be done if they wish to make challenger disaster will never happen again. First of all NASA need a one proper standard of the communication level in which could understand by all the employees from low level till higher level. As we know that engineering terminology is quite different from the management skills. NASA need to held the practice language and communication class in which engineer and management people where use to learn their communication skills. Moreover the engineers should also practice the pressure which the management team of NASA have to face from military , congress and media. The Engineers should have to attend the meeting with the management people regarding technical issue on going with the shuttle. So NASA allowed one department with engineering management in which the engineer freely make decision of launching the space shuttle. The engineers should allow sitting with the management people during the mission. One more thing that NASA have to considered that document were used to send the top level of people. If there is any document which is related to engineering field should be passing to the management team so they also are aware of any problem



or any upgrading. If any document are not passed out may show catastrophic results. If NASA try challenger to be launch on the summer time then there is no worries about the O-ring then might be all seven crew member are alive today. NASA has to avoid the bad weather for the sake of human lives and billions of dollars. The NASA engineer tries to design the ejected system in the orbiter. As they used in earlier flights. But after that they closed this design. As the investigate shows that three astronauts still alive after the explosion. If there is ejected seats system in challenger at least three of them should be survived but they died after hitting the earth surface. On 28th January if NASA worked on above recommendations might be challenger become the successful flight on that day.

## Conclusion

The Challenger space shuttle was launch on January 28 with seven crew members. The mission is thought to be safe that why NASA allows an average and ordinary teacher to travel with their most senior and well behaved astronauts. But the Challenger exploded just after 73 second after the lift-off. The major problem with the challenger was the technical issue.

That occurs in the O-ring. The O-ring was not work properly during the cold weather. The other problem occurs in miscommunication between the Morton Thiokol engineers and the high level of NASA management people. The manager of the NASA can't understand the technical problem of the Challenger. Moreover NASA got lots of pressure from military, congress and media. That degrades the credibility of NASA. So that why NASA don't want to delay it anymore and want to launch it as soon as possible. NASA is using

the reusable launching system to promote the routine space shuttle program and to reduce the cost.

### Bibliography

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