I'm Scott Higginbotham NASA's payload manager for the permanent multi-purpose module for many years NASA and the Italian space agency have been looking at the potential of turning one of the multi-purpose Logistics modules into a permanent module to fly and attach the station and leave behind efforts to to actually conduct the conversion got serious in the summer of two thousand nine when we started studies to understand specifically what modifications would be necessary to make the conversion from a temporary visiting
vehicle to a permanent vehicle there are three basic types of modifications that were performed to make the conversion from the MPL m to the p mm the first has to do with weight we try to reduce the weight of the module as much as possible by eliminating hardware that we didn't need for the long-duration stay on orbit to allow us to carry more useful cargo up to space on sts-133 the second type of modification was associated with trying to make the interior of the module a little bit more useful for the astronauts during its long-duration stay
so for example we have modified some of the panels inside the vehicle so that they're much easier for the astronauts to open and close during a flight and then lastly and probably most importantly we had to look at a series of changes to make the vehicle compatible for its new long-duration stay on orbit the NP lamps are really only designed to be in space for about a week and a half and now we have a vehicle that we're trying to leave in space for 10 years so we had to go back and recertify all the equipment all the
hardware to make sure that it would be compatible in space environment for that long and that involved both analysis and actually physically swapping out some parts with newer parts that would be able to last that duration of the mission and in probably most significant we had to armor the exterior of the module so that it could withstand the micrometeoroid and hypervelocity debris impacts over the 10 years that it will be on the station rather than modify the external shields which were made of metal which was going to be heavy and expensive the clever idea that both when
the Italians came up with was to install

a micrometeoroid mattress which is basically a bulletproof vest for the station that lies underneath the metallic shield and on top of the pressure vessel this mattress is made up of Kevlar and Nextel fabric woven together and attached to our multi-layer insulation that lies between the pressure vessel and external shields the majority of the modifications to transform Leonardo from an MP LM to a pmm have been performed by at Alice
alenia space this is a company in Europe

contacted by the Italian space agency
to perform the modifications