

Final Results of Shuttle MMOD Impact Database

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The Shuttle Hypervelocity Impact Database documents damage features on each Orbiter thought to be from micrometeoroids (MM) or orbital debris (OD). Data is divided into tables for crew module windows, payload bay door radiators and thermal protection systems along with other miscellaneous regions. The combined number of records in the database is nearly 3000. Each database record provides impact feature dimensions, location on the vehicle and relevant mission information. Additional detail on the type and size of particle that produced the damage site is provided when sampling data and definitive spectroscopic analysis results are available. Guidelines are described which were used in determining whether impact damage is from micrometeoroid or orbital debris impact based on the findings from scanning electron microscopy chemical analysis. Relationships assumed when converting from observed feature sizes in different shuttle materials to particle sizes will be presented. A small number of significant impacts on the windows, radiators and wing leading edge will be highlighted and discussed in detail, including the hypervelocity impact testing performed to estimate particle sizes that produced the damage.