



DC versus AC Power System Battery Life Expectations

One of the historical arguments for selecting an AC power system over a DC power system is that a DC based system shortens the life of the battery(s). The basis of this argument is that the early generation DC power systems always provided power through the battery to the system loads.

Battery life is specified as the maximum number of charge/discharge cycles or by the total amperes through the battery. Since the early generation DC power systems always required the battery to provide power to the load, they therefore shortened the battery's life in comparison to AC based systems. AC systems bypass the battery while plugged into wall power and therefore reduce the total amperes through the battery. *This is especially true if the system is more commonly plugged into a wall rather than in its mobile state.*

In designs of newer generation DC power systems this problem is resolved. While plugged into the wall, the DC power supply that is used to charge the battery also provides power for the system loads. This bypasses the battery as a source of power as an AC system will. The difference, however, is that while the AC system provides power directly from the wall by means of a bypass switch, the DC system provides power through the DC power supply. This provides the ability to "share" the total power output of the DC power supply that charges the battery. The compromise of this design is in the circumstance that both the battery and the loads simultaneously require significant power. When this happens, if the DC power supply does not have ample power, the loads, typically having priority, will absorb their power need leaving the charge function to use only the remaining power. This results in charge times of the battery being dependent on system loading characteristics. This is not optimal for charging times or for the full charge of the battery and does not provide a predictable charge time for the user.

To alleviate this compromise, HES provides two DC power supplies; one to charge the battery and one to power loads. This eliminates the compromise described above since system loading has no effect on the management of the battery charge while the architecture of the design still maximizes battery life. The HES system architecture is structured such that the battery is not in use while the power system is plugged into wall power.

HES' architecture therefore provides battery life that is as long, if not longer, than a similarly powered AC system while also providing much longer run times through improved efficiency. It also provides an exact management of the charge of the battery [through the use of a dedicated charging power supply] thereby following the optimum charge characteristics as described by the battery manufacturers. Battery manufacturers state that charging to their exact charge requirements *also* further extends the life of the battery.