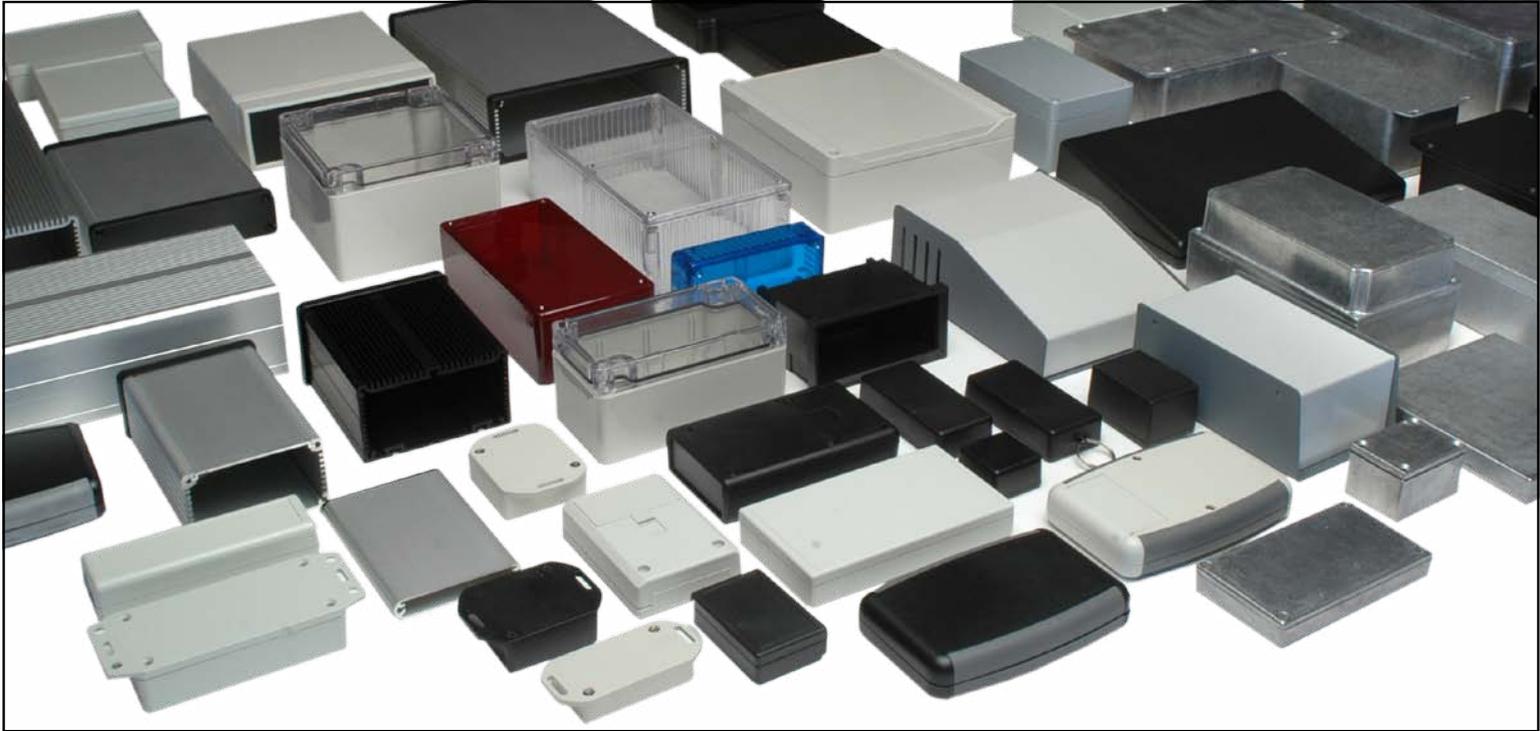




Standard enclosures: far more than simple boxes



Standard enclosures for the electronic and electrical industries are produced in a huge variety of sizes, styles and materials by many specialist manufacturers. The initial choice facing the designer is whether to commission a custom enclosure for the particular project or whether to choose a suitably sized standard one from a reputable supplier. The main advantages of standard enclosures are that there are no non-recurrent engineering and tooling charges; the majority of manufacturers keep products on the shelf, so the time to market is as low as it can be; the unit costs are attractive and the design has been field proven in many different applications. Obviously, there may have to be an element of compromise in the mechanical design of the PCB and other components to ensure that they will fit into the enclosure, but, providing the

enclosure is selected at an early stage of design process, this will not generally be a problem. In most cases, the PCB will be of a custom size and shape anyway; it is a lot easier to make the PCB fit the housing than it is to find a slightly larger version of a standard enclosure.

The choice of material is an important factor. Ignoring metal enclosures, which are normally built from an aluminium extrusion framework with sheet aluminium or steel cladding, the two main materials used for formed enclosures are die-cast aluminium and plastic. Die-cast aluminium housings are strong and robust; they do not corrode, are electrically conductive, have an intrinsically high level of electro-magnetic attenuation and are easily machined. With a suitable gasket fitted between the lid and the base, environmental sealing to IP67 can be easily achieved, and by adding inserts during the

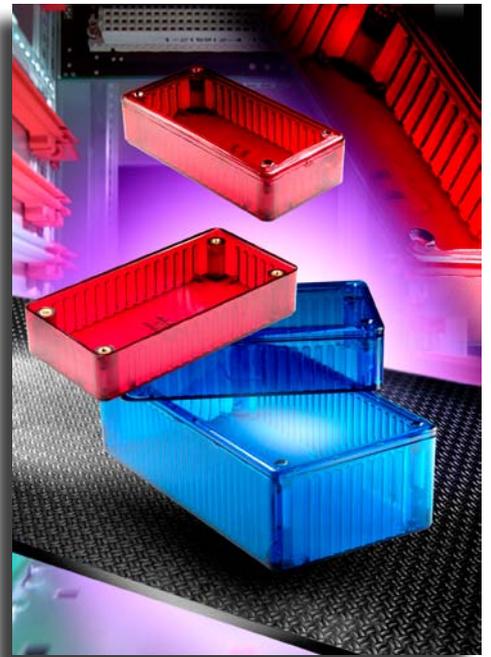
casting process, repeated openings and closures are facilitated. Such enclosures can be cast with relatively thin walls, although they will always be far heavier than the equivalent sized plastic moulded one. For applications where protection against shock damage is important, where EMC is likely to be an issue or where high temperatures, dust or water are expected to be present, the die-cast enclosure is the ideal low cost choice.

Thermoplastic moulded enclosures are typically made from either polycarbonate or ABS. Both materials are lightweight, are good electrical insulators and can be moulded to extremely fine tolerances to give good detailing on the finished product. ABS is considered superior for its hardness, gloss, toughness, and electrical insulation properties, but it is more expensive than polycarbonate. Both

materials have good shock resistance and are shatterproof. Polycarbonate has the advantage that it can be moulded in clear or translucent colours, enabling,

for example, internal displays to be seen through the case itself or infra-red emitters used in remote control applications to be internally mounted and shine through the polycarbonate material. As with die-cast aluminium enclosures, environmental sealing, typically up to IP65, can be achieved through the addition of a suitable gasket material between the apertures and the body of the unit.

Whatever style and type of standard enclosure is specified, it will have to be adapted to accept the switches, LED indicators, dials, keyboards and connectors required by the application. Typically, the enclosure will have to be machined with suitable apertures to accept the various components, it will have to be silk-screened with legends, and logos and die-cast enclosures may have to be painted. To do this, the purchaser has three choices. Standard enclosures can be purchased and subsequently modified in-house; the modifications can be carried out by sub-contractors or the enclosure can be modified by the manufacturer and supplied as a finished unit ready for the components and PCB to be assembled in to it. Depending on the manufacturing capability in house, to modify the housing as part of the assembly process may be the best way to proceed, although in most cases, more



standard units than are actually required will have to be purchased to allow for set-up procedures and wastage. The same holds true if the modification processes are outsourced, but in this case there are the additional costs and logistics complications associated with managing the process of sub-contracting, often to more than one outsourced operation. By far the best option is for the original manufacturer to provide the modified enclosure. By working with the manufacturer, the user will ensure that there are no weak spots because, for instance, holes have been drilled so closely together that there is not enough land to give sufficient strength when the switches or connectors are used. If a plastic enclosure is required in a special corporate colour, it is far better and cheaper to mould it in the colour rather than painting it and if the application requires specific mechanical properties from the enclosure, they can often be supplied by using a special blend of plastic or additives.



A superficial glance at a moulded or die-cast enclosure may give the impression that it is a simple box, but in reality it is the end result of a great deal of design effort and expertise that has been expended to create the most useful and feature-rich housing, suitable for a use in a wide variety of applications and environments. Work with the enclosure manufacturer from an early stage in the project design cycle to tap the wealth of experience behind a standard enclosure.

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Die-cast aluminium, metal and plastic enclosures



1553 soft sided

- with or without battery box
- removable front panel
- membrane keyboard recess



1594 heavy duty

- thick wall
- GP or FR ABS
- sealed to IP54



1455 extended range

- extruded aluminium
- integral PCB slots
- metal or plastic end panels



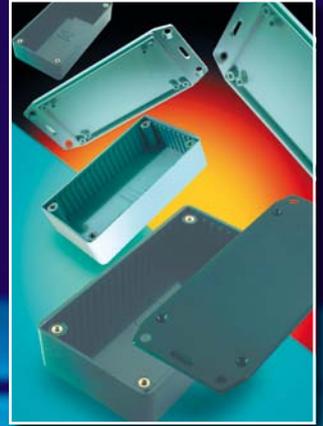
1593 hand-held

- membrane keyboard recess
- with or without battery door
- removable front panel



1551 miniature general purpose

- rectangular and square
- sealed to IP54
- flanged and plain lids



1591 general purpose ABS

- plain or flanged lid
- integral PCB slots
- tapped inserts



Eddystone die-cast aluminium

- general purpose
- entry level
- strong and robust



1590 die-cast aluminium

- plain or flanged lid
- standard or waterproof
- plain or painted finish



1590Z heavy duty sealed

- rugged thick wall
- EMC attenuation
- sealed to IP65