INTRODUCTION

If the camera is installed outdoor or if the installation area is dusty, corrosive, explosive, etc., it is necessary to protect the recording set (camera/zoom). If we fail to do so, the video equipments will last for a shorter period of time. As a protection, a case created for this purpose, traditionally called Housing, is used. On the national and international market there are a series of housings manufactured with many different materials and with different qualities and of course different prices.
A low quality housing, made of cheap materials, is lower in price than a high quality one.
It is appropriate to underline this very simple concept because it is very often forgot that a quality product (any product) cannot clearly costs less than the low-quality model.
There are three main aspects, that directly influence the overall quality, which must be considered when a housing is designed:
- il design;
- user friendliness/reliability;
- materials

DESIGN

There is of course a wide range of different housings, made with different materials and with different quality characteristics. If we consider the aesthetics, the different solutions, the dimensions, the finishing, etc., the list is even longer.
What can look nice and proportioned to us could look unpleasant to others. It's simply a question of taste…
It can be stated without any doubt, that Italian Companies (and the Italians) can boost an aesthetical background coming from culture and traditions which differes from that of companies operating in other countries (let's think for example about painting, sculpture, architecture, fashion, industrial design, etc.). This cultural background is used also in the design and the production of camera housings and all its different accessories. We must always remember that in a CCTV System the most visible part is actually the housing, besides monitors in the Control Room.
This visibility requires these products to be made according to specific aesthetical criteria in order to be applied in most urban/architectural contests. There are also some particular environments that require the application of specific products, or the work supervision committee can require aesthetical solutions appropriate for the location/area to which the CCTV System must be adapted (e.g. museums, historical buildings, innovative design buildings, historical offices with continuous/mirror large windows, etc.). The design of Italian housings is mostly very pleasant for any application, from the more traditional ones (gate surveillance) to the most exclusive (historical building façades).
Some of the aspects that contribute to the definition of aesthetics are: fusion between shape and function, proportions of the various parts/sections, quality of the external finishing, accuracy of working metal, all those solutions that even though are not immediately visible are nevertheless integrated in the final result that must not, for any reason, invalidate its user-friendliness (specific bending radius, proportioned dimensions according to additional accessories, useful or blank areas that make operations easier, etc.).
The focus on the relationship between shape and function makes it possible to create compatible accessories both from an aesthetical point of view and from a functional point of view. This focus depends on the manufacturer's competence, and is necessary in order to solve technical/functional aspects related to the product applicability.

USE FRIENDLINESS/RELIABILITY

In addition to the use of quality materials and the particular focus on aesthetics, a housing must also be designed while bearing in mind who will have to install it (maybe on a 5mt pole) and must, therefore, be easy to use and must also enable to save time, besides guaranteeing a high level of reliability in time.
Cheap products cannot be user friendly because the following characteristics majorly influence the final price:
- upper body holding systems (in order to avoid falls);
- extractable and polarized terminal blocks;
- possible pole mount through the use of metal bands;
- screws that stay in place once they have been unscrewed and threads that do not strip;
- hidden cables and possible pipe settlement directly against the supporting bracket;
- movements that can be blocked with one single screw;
- sliding sunshield;
- Inclined cable glands to avoid water infiltrations;
- appropriate mounting prearrangements for specific accessories.

When the adopted solutions are instead user friendly, it is possible to save a certain amount of time during installation. The fact of not having to operate on the system due to problems caused by low reliability or due to unsuccessful mounting, enables you of course to save more. It is important to highlight that due to wrong evaluations it is often the case that a complicated housing is used when the most appropriate product would be a simple one instead.

Let's start first of all to explain the meaning of the different IP (International Protection) ratings. Just for information we will also indicate a third digit related to the protection against mechanical impact damage (according to French legislation).

1ª digit: protection against solid objects
IP0.. no protection
IP1.. protected against solid objects over 50mm (accidental touch by hand)
IP2.. protected against solid objects over 12mm (e.g. finger)
IP3.. protected against solid objects over 2,5mm (tools and wires)
IP4.. protected against solid objects over 1mm (tools, wires and small wires)
IP5.. protected against dust (no harmful deposit)
IP6.. totally protected against dust

2ª digit: protection against liquids
IP.0. no protection
IP.1. protected against vertically falling drops of water
IP.2. protected against direct sprays up to 15° from the vertical
IP.3. protected against direct sprays up to 60° from the vertical
IP.4. protected against sprays from all directions
IP.5. protected against low pressure jets if water from all directions
IP.6. protected against strong jets of water e.g. marine waves
IP.7. protected against the effects of immersion
IP.8. protected against long periods of immersion under pressure

3ª digit: protection against mechanical impact damage
IP..0 no protection
IP..1 protected against 0,225 Joule impact
IP..2 protected against 0,375 Joule impact
IP..3 protected against 0,500 Joule impact
IP..4 protected against 2,00 Joule impact
IP..5 protected against 6,00 Joule impact
IP..6 protected against 20,00 Joule impact

After a first analysis it could look as if the higher rates are those that offer more guarantees. This is absolutely wrong! When using a protection (housing) against outdoor agents, it is important to establish the nature of those agents. For example: if the camera must be installed in an explosive environment, the housing will of course need to have characteristics adequate to the type of installation area. There are different levels of explosion-risk areas and therefore the housing will have to be chosen according to the area classification.
It is obvious for example that in case of underwater use, the focus would be on a sealed housing with adequate characteristics to deep sea applications.
It might sound strange, but the subject gets more complicated when it comes to standard everyday installations.
In case we need to choose a housing to protect against rain, snow, wind, temperature, etc., the one with the highest IP rate is generally preferred (IP65, IP66 or IP67) because it is considered the best choice. If we carefully read the IP rates tables, we can notice that for a standard installation (exposure to bad weather conditions) an IP44 rate would be enough for this purpose.
The higher rates must only be considered in case there are absolutely necessary. For example: if the camera must be protected against dust (due to present conditions) the table related to the first digit show an IP5 rate.

It is useless, and can even create problems, to apply housings with a high IP rate when the installation conditions do not make this requirement essential. A IP7 rate, as second digit, is useless for standard installations because if the housing is installed on a building façade (e.g. in Milan), how could it possibly be subject to the effects of an immersion? Things change, of course, if the installation is on a boat…
It is also important to bear in mind that a high IP rate housing is more expensive (e.g. underwater housings).
Another element to be considered is the importance of the first digit. The higher the first digit, the more closed the housing will be (sealed), bringing about the disadvantage of a lack of ventilation. This condition (let's take for instance an IP66 rate or higher) can cause many problems, since it strongly increases the chance of getting the front window misted up. If it is true that a IP66 housing is perfectly sealed and air, water and humidity cannot get through, it is also true that air, water and humidity cannot come out.
Note: In order to get rid of/to dry the mist on the front glass of a housing (for temperatures around 0°C and with the same U.R.%) it is unnecessary to locate the heater close to the glass because if the T° between the inside and the outside increases, the situation gets worse. The ideal solution would be to create an air circulation that bring the U.R.% level down. In case of a sealed housing (IP66), air circulation can be created only to the detriment of the IP rate, which cannot in that case be kept at the same level (this is not the case for special installations which are equipped with appropriate accessories).
In order to solve this problem, most installers simply make a hole (underneath the housing) near the front glass.
At this point the following question comes naturally: what do we need to use an IP66 housing for if a hole must be made in it?
Sealed housings are generally quite difficult to manage and, if the appropriate measures are not taken, the problems that will arise will irritate also the most patient customers. For example: 1) if the cables are not perfectly rounded, the cable glands cannot stick perfectly to the outer sheath, therefore running the risk of infiltrations; 2) if the housing is installed when it's wet outside, the humidity inside will create problems. It is essential to dry the housing completely before closing it and to add a small bag of hygroscopic salts (SilicaGel) that can absorb humidity straightaway. Every time the housing is open, the salts must be replaced; 3) as previously explained, the use of an heater does not prevent the front glass from misting up since it has a different function.
But If the installation area requires the standards offered by an IP66 rate, perhaps because of real risk of harmful dust or possible floods, the problems that might arise are nothing compared to the possible damage to the systems and consequently an uneffective surveillance. The same does not apply to housings* with IP44, IP45, IP55 and IP56 which can breathe (more or less air circulation) and can guarantee a better functioning with a higher reliability in time. These types of housings are the best compromise between quality and price.

*We would like to make clear that although it seems nonsense, it is more difficult to design housings with a minimum air circulation that are perfectly weatherproof for a standard use rather than sealed housings; it can be easier to create a totally closed case.

As far as the heater is concerned, we can generally indicate that its use is not essential if the camera is always on, since the dissipated heat can alone create and maintain a good temperature. The housing heating system is of no use as front glass anti-mist device*. Its function is to increase the inside temperature when the outside temperature is low, therefore avoiding system failures (generally beyond -10°C/15°C or if the camera is off at regular intervals).
The position of the heater near the front glass does not identify its function but it is simply a more comfortable position rather than the back one where the connecting terminal blocks, cable glands entrance, special accessories and additional heating systems are normally located.

*See final note

MATERIALS: ALUMINIUM

Aluminium is one of the most widespread element on the earth, second only to oxygen and silicium. Aluminium is not present in nature in a metallic state and it is always combined with other elements (silicate and oxyte). Bauxite is the most important mineral to produce Aluminium and is rich in Aluminium oxide (aluminia) in order to enable a cheap production of this metal. Aluminium can be applied in various sectors and in the near future its use will further increase because it's light, versatile in shape and finishing, corrosion resistant and fully recyclable. These characteristics will be more and more appreciated by designers, builders and end users.
In order to manufacture standard CCTV housings the most widely used material is and is always been Aluminium thanks to its basic characteristics and its excellent aesthetics, besides the possibility of putting additives (copper, silicium, magnesium, etc.) and improving therefore its mechanic/thermal characteristics (pure Aluminium has poor mechanic characteristics but its alloys can reach very high limits, even higher than common steel).
In order to create the parts of the housing there are two procedures to be followed: extrusion and die-casting.

Extrusion is a process made through plastic deformation, generally hot-working, whereby materials are forced through a matrix in order to produce bars, profiles, pipes or wires with fixed section. The bars (average length of 6/12 mt.) can then be cut according to different measures; if necessary, the pieces are then reprocessed through other mechanical machines that can bore, tap, drill, mill, etc. In this way the most important housing parts are made obtaining high quality semimanufactured products (despite a cost increase due to additional processing). Extruded Aluminium can be anodized excellently.
Die-casting is a working process made through high pressure injection of melted metal inside a metallic mold. The obtained pieces are nearly ready to use and the additional working processes are reduced to minimum (therefore containing costs, despite the major investment for the mold itself). It is important to highlight that die casting increases the amount of air inside the mold and the obtained parts are therefore subject to a structural brittleness (due to the amount of air kept inside). There are also not indicated for anodizing (despite exceptions) but can be easily painted.

It is also possible to create some small parts through a casting process inside a mold made of different materials (wood, metal, ceramics, etc.). In this way Aluminium is gravity poured inside the mold, enabling the air to come out almost completely (since the process is slower than high pressure injection). The obtained part has a better structure than that made through die-casting but although this technique is still used, it has been mostly replaced by other processes. It is generally used for the production of few pieces (limited editions) and due to the coarseness of the mold/casting, the parts must be reprocessed again to eliminate deburrings (with a consequent cost upsurge). The imperfections that are still visible are generally covered through painting.

Most housings made of Aluminium are finished through the use of epoxy-powdered paints* (thermosetting, epoxy resins and polyesters base) or of epoxypolyester-powdered paints** (thermosetting, epoxy resins and polyesters base). Thermosetting powders are paints that do not contain solvents and are therefore 100% high solid. This technology successfully solve problems related to air immissions.

Even though painting treatments play a significant role, the final result is generally poorer than what is obtained through anodizing*** as far as finishing quality, wide range of applications, corrosion protection and atmospheric agent resistance are concerned. The coatings produced through electrolysis are better also in terms of mechanics and abrasion resistance. The porosity of the oxyde film enables also the production of colouring coatings made through the deposit of organic and metallic pigments (electrocolour treatments).
High quality housings are therefore subject to a galvanic/electrocolour treatment for the external finishing or can also be chromium-plated as the highest expression of aesthetics and quality (very high resistance to chemical and corrosive agents).

* Epoxy powder has good chemical characteristics and a good resistance to detergents, fuels and lubricants; its mechanical resistance is also good.
** Epoxypolyester powder has also a good resistance to chemical agents, besides the characteristics of epoxy powder.
*** Due to the extremely technical subject, the anodizing process is not dealt with in this article.

MATERIALS: PLASTICS

Plastic is an organic substance like wood, paper and wool. It is extracted from natural resources, mainly coal, common salt, gas and especially oil. The industrial oil treatment to obtain derivates is called cracking. In order to produce plastics there are two different processes: polymerization and polycondensation. Both processes are made through specific catalyzers. For polymerization, the monomers (like ethyl and propylene) are put together and alloyed in long chains, the so called polymers which all have different characteristics, structures and dimensions according to different types of base monomers. In order to create polymer chains and to create plastic materials there are various methods* to be used.

To obtain fully manufactured and ready to use products, additives are put inside plastic materials, which enhance or diminish their properties.

Plastic materials and their transformation processes (die-casting, pouring, extrusion, etc.) are the only means whereby men can obtain, with one single process, every type of objects with more uniform physical and dimensional characteristics than other materials. This concept has created the myth whereby plastics would be used only to save money. We must not forget that many things could not exist without plastics. The possible money saving and possible hundreds variations make this material incredibly requested.

It is also true that, although the variety of available materials is huge, the chance of getting more precise and reliable parts out of these materials must not always taken for granted.

Plastic materials are increasingly requested also for the creation of CCTV housings. It is not our intention to dwell on the difference between pvc, abs, teflon, polycarbonate, nylon, etc. Anyway these materials differ in terms of applications, since they all have their own characteristics which according to additives (dyes, expanders, antioxidants, antistatics, flame retardants, etc.) and especially to the precise measurements of the mold can influence the final quality level (and therefore the price).

Polyamides-pa (nylon), for instance, have very good mechanical qualities, high level of wearproof, low friction coefficient, high melting point, high crash resistance, high endurance strenght, very good resistance also to organic solvents and incredible surface shine.

Glass reinforced polymers are also characterized by high rigidity, good dimensional stability, great heat resistance up to 150°C and a good wearproof level.

At this point somebody might wonder: is it better to have an Aluminium or a Plastic housing?

Aluminium housings generally offer very good performance in terms of resistance, endurance, excellent aesthetics quality, high quality surface treatments (anodizing, chromium plating) and are on average better than plastic ones.

Plastic housings have the inevitable advantage of being cheaper but if made of low quality polymers and additives, the final result is definitely poor. It seems as if saving through to one single process is the only goal to achieve, while putting aside aspects such as shapes, proportions, finishing (design), etc (despite some rare exceptions).

This is particularly clear in case of housings (both plastic and aluminium ones) imported from countries that show a serious lack of technical know-how (essential for the creation of reliable and good quality products) and that are also not particularly brilliant in terms of design.

The use of high quality plastics in terms of mold and finishing is not only adequate for the creation of CCTV housings but it is excellent for creating some special parts and, together with Aluminium, guarantee high quality housings in terms of mechanics and design.

* Due to the extreme technical subject, the case is not thoroughly dealt with in this article.

SERINN HOUSINGS

SERINN was established in March 1992 as CCTV housings and accessories manufacturer. The primary idea was to create a product line using high quality materials and processes, together with a particular focus on design that could further enhance its functional characteristics. At that time camera housings had the simple function of cases whereas design and userfriendliness were not taken into account.

Today SERINN manufactures various types of CCTV video accessories (illuminators, amplifiers, distributors, surge protection devices, etc.) but it is still very much interested in its first products (housings).

Over the years our production and processing systems have changed but our primary goal has always remained the same: Quality.

As for today's production lines, SERINN manufactures housings for traditional cameras (various models), for board-cameras (in different versions) and tailor-made housings according to our Customers' needs. (various types).

In order to create these products the following materials/processes are applied:

- For all metal parts: anticorodal (special Aluminium alloy that offers higher performance in terms of corrosion and chemical agents resistance; anticorodal is particularly indicated for immersions.);
- For all plastic parts: glass reinforced nylon, with additives against aging and colour fading (UVA/UVB protection);
- Working processes: extrusion for metal parts (high quality semifinished products and subsequent processes on numerical controlled machines) and die-casting for plastic parts;
- Standard finishing process: anodizing/electrocolouring (better mechanic, corrosion and chemical agents resistance) and epoxy-powdered painting (thermosetting paints with good resistance level to detergents, fuels, lubricants and mechanics);
- Exclusive finishing process: chromium-plating (beautiful design and very high corrosion and chemical agents resistance; treatment indicated especially for all applications in marine environment);
- Various: stainless steel bolts and screws, extractable and polarized terminal blocks for inside connection; low consumption heating elements both in Aluminium and ceramics; sealed "O-Ring" gaskets; 45° inclined IP68 cable glands; specific optics accessories for housings dedicated to immersions; frontal glass in borosilicate; glass paste IR filters. SERINN products are all compliant with CE directives and are certified by Nemko S.p.a./Biassono (MI).

Even today we believe that a housing must not only be functional but also friendly in terms of aesthetics and use.

The continuous search for new shapes, dimensions, external finishings and therefore for a new final visible result (design) is a fundamental aspect for the creation of products that satisfy even the highest expectations in terms of effectiveness, reliability and simple mounting.

These qualities are typical of our "made in Italy" philosophy which is well known and appreciated worldwide.