

There are a number of methods for building Kobo based instruments and several different plastics we might use. 3D printing is becoming more and more popular but although 3D printed covers are very good in many respects the screws used to fix them are often very small. Some pilots scoff at my instruments which have tape to secure their backs but tapes have their advantages. Screws concentrate fixing forces in small areas whereas adhesive tapes distribute the same forces along relatively long edges. Tapes can be a bit messy when removed and perhaps a bit more fiddly to fix, but taped cases are very robust. I have listed the solvents which can be used to clean off residues left when tapes are removed. When using solvents do a little test on the plastic you intend to clean to make sure it does not dissolve.

Plastics

ABS- Acrylonitrile Butadiene Styrene

ABS is commonly used for boxes intended for electronic projects and some electronic and mechanical parts and is also available in other forms for modelling. It is quite tough.

PVC And UPVC - (Unplasticised) Polyvinyl Chloride

These are tough plastics. We are familiar with UPVC in our windows and doors and with PVC in wastewater pipes and guttering. Many different extrusion sections are also available as electrical trunking which can be useful for making covers.

PLA - Polylactic Acid

PLA is often the favourite material for 3D printing. It is not quite as strong as ABS but adequate for cases and covers.

HIPS - High Impact Polystyrene Sheet

HIPS up to about 1mm thick can be used to make covers by cutting a pattern with scissors and folding. This is a bit tricky as, if bent too sharply, it will crack so I fold it around a 2mm diameter rod.

Adhesives

PVC, UPVC and ABS parts can be permanently glued together using UPVC solvent glue. This “welds” parts together by partially dissolving the surfaces to make very strong joins.

PLA can be joined with cyanoacrylate glue.

I have not found a suitable adhesive for permanently joining HIPS although tapes work well.

Adhesive Tapes For Securing Kobo Cases

Many tapes are only easily and cheaply available in a width of 50mm. In the lengths needed for instruments it is easy enough to slit 50mm tape into 25mm strips or thinner.

Surfaces For Taping

When taping parts together the surfaces need to be quite smooth. Sometimes 3D printed parts have a zig-zag “staircase” surface where tapes can only stick to the edges of the “steps” making the join very weak. Sanding the surfaces smooth with emery paper will fix this.

Glass Reinforced Crossweave Tape

This tape is intended for taping large cartons. It is quite cheap, strongest of the tapes mentioned here, and will wrap around fairly sharp edges. The main disadvantage is that it has very poor UV resistance. If we are doing a lot of flying, especially in high UV environments, we may have to replace the tape during a season. The tape I use is made by Prima. Solvent is petrol or lighter fuel.

Window Repair Tape

This is intended to make temporary repairs to broken glass. It is not as strong as glass reinforced tape but is good enough for fixing back covers and much more resistant to UV. I use Ultratape Window Repair Tape. Solvent is IPA (Isopropyl Alcohol) or meths (Methylated Spirit).

“Helicopter” Tape

This is a thick tape intended for permanently fixing outdoors (on helicopters!) with an indefinite life even in high UV environments. It is very strong but because of its thickness it sometimes does not go around corners very well. I use Scotch 8671HS very sparingly and am uncertain whether the cost is worth it compared to other tapes for my applications. Solvent is IPA or meths.

Thin Double Sided Tape

This forms a non-permanent join between two surfaces. The two surfaces have to be in very close contact for this sort of tape to work but it sometimes has its uses.

Double Sided Foam Tape (Servo Tape)

This can make very strong, if slightly flexible, joins between surfaces which do not contact each other very well. The Sellotape Sticky Fixer I use comes in 1mm and 1.5mm thick versions. I often use it to mount small circuit boards and GPS modules. To mount a Bluefly module I only use 3 small pieces otherwise it is difficult to remove. Because it fixes so strongly, sometimes I remove it by slipping a thin blade between the surfaces and cutting through the foam. When the parts are separated I can remove the remaining bits of tape easily.

Sugru

Sugru is a sort of mouldable silicone rubber. Although quite expensive it is easier to use than bathroom sealant type materials and probably less toxic. It seems transparent to radio waves so is the easiest, if not neatest, way to mount a GPS module, and it will stick to some silicone rubber type surfaces to which other adhesives will not stick. It sticks fairly well to most electrical wires and cable so can be used to make cable strain reliefs. It can also be used to make things like protective buffers on the corners of instruments.

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