



**2002  
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**SETTING UP A PAD PRINTING FACILITY**

Pad Printing has been in common use in the UK for 25 years. You would have thought by now that setting up a facility would be straightforward. Well, it is if you know what you are doing. If not it can be a real pain in the backside (another one of my technical terms). There have to be more pad printing machines redundant sitting round in dark corners than Betamax VCR's. Why? Not because they are broken down. Not because there is no work for them. No, it is because when they were first purchased it was for a particular job that was a real --- (see technical term above).

You can be sure the picture of a group of people gathered round the machine all making suggestions to an exasperated operator as to how to get it to print is very common.

The MD or Production Manager was not to be seen as they had ordered the machine on the assumption that if his people could run a screen printing machine or a photocopier a pad printer would be a piece of cake. It was probably first seen at an exhibition where a smooth talking salesman was printing multi-colours onto walnuts or small plastic trays. "1500 an hour no problem" "A superb print every time". Result, frustrated operators and managers with even higher blood pressure.

Truly there is no need for all this aggravation. Like so many other production processes if you obey certain rules and reduce the variables Pad Printing is a superb and satisfying process that can earn real money.

It starts with the first question. Does the application lend itself to Pad Printing? The main criteria are. Fine detail or if necessary larger areas accepting that the film thickness is low. Fast drying inks. Wide range of ink chemistries available. In line multi-colour. Precise registration. Uneven or flat surfaces. Curved surfaces. Hand loaded or automatic feed. Pre and post treatment. Line and process colour.

Let us consider the shapes that are practical to print in one pass. Flat, Concave, Convex, Undulating, Corrugated, Angled, Spherical over 180 degrees, Stepped.

The alternative processes are: Screen printing, Hot Foil Printing, Transfers both Heat Applied and Water/Solvent Slide, Laser Marking, Ink Jet/Digital, Dry Offset. These all have their advantages and disadvantages unfortunately the Editor (Sir) won't accept the ten thousand-word article needed to explain these. Suffice it to say that Pad Printing is the most adaptable of these processes and is within the budget of most companies.

Applications from printing four colours onto rice paper balls to printing conductive tracks on solar cells is about as adaptable as you can get.

If we accept that you are intending to take up Pad Printing. There are certain criteria that you must adopt if it is to be successful.



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### **POSITIONING THE MACHINE**

The area that you wish to site the machine must be clean and well lit. There needs to be easy access to move components to and from the machine and sufficient area around it to allow for components to dry if there is no form of forced drying. It is the ergonomics of the print station that is often the limiting factor on performance. For optimum performance when an operator is constantly involved is to present the item to the operator so that all they have to do is pick it up with minimum bending place on the machine and take it off prior to inspection and putting it on an adjacent surface. These could be input and output conveyors or a box of components and a tray to place them on after printing. It may be that you will need two people one to pack and unpack and the other to print. Even with the most sophisticated systems you are going to need somebody to keep an eye on them whilst they are running. OK you can go to full automation, image recognition systems and automatic ink dispensers but you will still need a person near at hand.

### **AMBIENT CONDITIONS**

The printing mechanism of Pad Printing is based on the evaporation of solvents in the ink creating a tacky ink surface that enables the transfer of ink from the plate to the substrate. The speed of evaporation is dependent on the mix of solvents in the ink and the temperature, humidity and air movement around the machine. Ideally the machine should be operated in an air-conditioned environment at a temperature of 22°C and 55% Relative Humidity. No lower than 18°C. Of course not everybody has the luxury of air-conditioning. If you don't have this then pick as stable an environment as possible, away from outside doors and out of the blast of warm air heaters. Don't be tempted to put it on a mezzanine floor, as during the day the top of the building can get very hot. Sun shining through a window can play havoc with the print mechanism. It is better to be in an area that is colder so you can use a Thermally Modulated Air Projection Device (A hair dryer) to alter the ambient conditions right at the print interface. As the area warms up during the day you switch off the hair dryer. It sounds pretty crude but it works. It is all about your quality needs and reject tolerance. A badly sited machine can produce rejects faster than you can make components.

### **PACKAGING AND CLEANLINESS OF COMPONENTS**

#### **PACKAGING**

Most of the items that are Pad Printed are made of plastic. This means that they are double packed in a plastic bag and then a cardboard box. Unpacking takes time and Pad Printing is best carried out as a continuous process individually unpacking one component and printing at a slow or erratic pace can cause print problems. The plastic bags are normally polypropylene or polyethylene, removing them is an excellent means of generating static, which will also have an adverse effect on the print quality. Vacuum formed trays are generally the best means of store and transporting mouldings to and from a printing machine. If the component is a non-plastic material static is rarely a problem. Remember unless an ink is completely dried and cured it may still be vulnerable to scratching.



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### **CLEANLINESS**

Once you have a need to print onto a surface the condition of that surface is crucial. It must be free of contamination that will affect the adhesion of the ink. Contamination can be as simple as a fingerprint or flow additives in plastic. Dust is a real pain. Cardboard produces fine fibres particularly if abraded by the components these settle on the surface and can ruin the print. The floor and surfaces should never be brushed near the machine; they should only be wet mopped or vacuumed. Contamination can come in less obvious forms. Items that are brought from a cold storage area into a warmer production floor will carry a layer of moisture on the surface that will only disappear when the item warms up. Printing whilst this invisible layer of water is on the surface can compromise the ink adhesion.

### **HEALTH AND SAFETY AND ENVIRONMENTAL ISSUES**

#### **USE OF SOLVENTS**

If you haven't printed before it is likely that you would not have used solvents or ink. This means you will not necessarily know the precautions you should take. Quite simply users must not come into contact with the ink or solvents. This means the use of adequate personal protective equipment and extraction of Volatile Organic Compounds (Solvents in the air) from the workplace. This can be done by extracting to atmosphere or removing solvents from the environment using activated carbon filters that draw air through them and remove the VOC's. Remember solvents are heavier than air so extraction is better below the source than above it. A hood above the machine will only draw the VOC's past the operators nose. But that is obvious, isn't it?

Disposal of contaminated wipes and ink residues comes under special waste legislation. On the shop floor they have to be kept in closed containers. As screen printers you are aware of this.

#### **MACHINE GUARDING**

Now this is an issue that is open to interpretation. There are trapping points on machines that are easily guarded but a hand fed machine needs the operator to put their hands where it is possible to have the pad come down and trap them. Except for high-powered machines the forces involved would do no more than give them a good squeeze between the pad and the jig. There are thousands of machines in use that have no guarding at this point. However it is not for me to advise. You must obtain a judgement from your friendly Factory Inspector. The recommendation may be that you need a two-button start rather than footswitch operation. This will reduce the output of the machine by at least 50% a point that must be taken into consideration.

#### **CARE AND STORAGE OF CONSUMABLES**

Pads plates, inks, doctor blades or ink cups need to be treated with care.



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**PADS**

Made of silicone rubber pads should be stored on their bases with no covering other than the protective coating sometimes supplied when new or tissue paper.

Never cover with plastic film as the silicone will absorb the plasticisers and ruin the surface. Never place other pads on top otherwise the pad surface will indent and not recover. Always clean the pad before storage; dried ink can cut into the pad when removed. Clean with packing tape, mild solvents, or soap and water. A well made pad will remain usable for years or until it is worn out.

**PLATES**

Steel plates should be coated with grease and stored in rust inhibiting paper. Photopolymer plates are easily subject to damage are ideally stored in racks rather like toast racks. Each plate must have a part number applied. This can easily done during exposure and etching process so that there can be no doubt about plate identity.

**INK CUPS AND DOCTOR BLADES**

Doctor blades can be sharp take care. It is also very easy to damage the edge. Some masking tape carefully applied will protect the edge. Unused blades should be kept in their original wrapping.

Ink cups can be very expensive £1000.00 is not unusual. Damaging the working edge will normally mean replacing the edge, which can be metal or ceramic, and you are looking at several hundred pounds replacement cost. Most manufacturers provide plastic protective covers for the working edge, always use them whilst in store.

**SERVICES**

Most machines consume small amounts of electrical power, some large units need three phase. Compressed air normally 6/7 Bar is needed for the majority of machines. If air is used as the main motive power make sure that the air is clean and the pressure is stable otherwise it will slow the machine and even worse effect stroke lengths which will create rejects.

**T-----G**

There you are you see I didn't say the word. If you have no real experience of the process and you take it on you could have a nightmare. It is not as easy as it looks. Of course you can learn by trial and error or get an idea of the process in the couple of hours button pushing instruction at installation. Investment in training is always repaid many times over with reduction in rejects and increased productivity. Pad printing will be much more stable if you follow the recommendations given above and it is highly profitable if you are trained properly.



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#### **CHOOSING A MACHINE**

New, used. Open ink well, closed cup. Pneumatic, electrical. Single colour, multi-colour. Which manufacturer? What ancillary equipment do I need? Shall I make my own plates? Steel or photopolymer or even ceramic. All the answers are there you just need to know who to ask.

#### **IN THE END YOU WILL LOVE IT**

Although the key to success is to treat Pad Printing as an engineering process achieving high quality consistently is really satisfying. You see the process everywhere. Your computer key board, mobile phone, your wristwatch, a golf ball, your beloved Harley Davison, your spectacle frames, the top of your Cola bottle, and the controls of your car. All over the place. Maybe this was the niche market you were looking for?