2007
JANUARY

INDUSTRIAL SCREEN PRINTING

So what has The New Angel Restaurant in Dartmouth got to do with screen printing! I have to say it is becoming one of my haunts, fabulous food, excellent service, superb wine and situated in one of the most beautiful parts of this sceptered isle. No I am not getting a free meal! What you learn when eating at this establishment is the supreme process control required to achieve this gastronomic distinction. 12 staff a the kitchen and a similar number out front. The works order arrives from the front of house and "The Gaffer" John Burton Race speaks a few words of instructions to his team of chefs and within a few minutes plates appear on the serving shelf and the various chefs proceed to place the individual elements of the dishes on the plates with watch like precision. Whilst this is happening the Gaffer is overseeing every spoonful and putting final garnishes onto the dish. The efficient front of house staff whisk away the dishes, also checking that there are no fugitive splashes of jus on the edge of the plate, then to the table. As customer all our senses have to be pleased. The combination of food, wine and ambience have all been carefully considered nothing is left to chance. Before service commences all staff are briefed on dishes, tactics and the number of covers that is inevitably near 100%.

Screen printing, gastronomy? Everybody knows what their responsibilities are. They are highly skilled. They work as a team. They use the best consumables. They respect each others capabilities and most important of all the boss leads from the front and aims to continuously improve his product offering.

Bill Jordan of Jordan Print Solutions Limited in Tamworth doesn't cook like John Burton Race but he has many of his qualities. Leading a team of highly skilled staff in a very challenging sector of industrial printing. Automotive Fascias (speedometer dials to the rest of us.) As with gastronomy there is no compromise in screen printing terms the client is looking for perfection and unlike restaurateurs the customer demands and gets a 3% year on year reduction in price. Bill must be mad! No he is a business man in manufacturing, which probably is an indication of madness.

EXCELLENCE IS THE KEY

To be successful in this market the application of best practice in every aspect of production and managing the business is essential. Not only for the sake of the company but the client insists on an "Open Book" policy which means the client requires access to all your costings, production records, production methods, staffing and production capacity. They will carry out a Value Analysis/Value Engineering (Cost reduction but maintain quality) on your quotation using Quotation Analysis Forms. They can make pebbles bleed! This is a quality audit to end all quality audits and the department that deals with it are a separate entity to your customers procurement department. Having gone through all of this they will then want to be assured that you

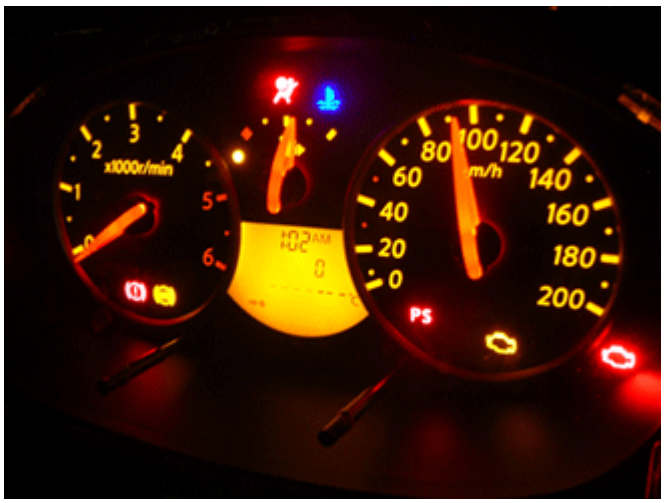
have sufficient capacity to manage peaks in demand and cope with breakdowns in parts of your production. Then of course is the famous Poke Yoke. No people that is not what it means, sit comfortably! Poke Yoke is a simple but excellent concept where elements of production require precision and certainty can only be carried out in one way. They have to be foolproof.

13 AMP PLUG POKE YOKE

A 13 amp plug is a perfect example. It will only fit one way into a socket. Jigging, register marks etc all should work on the same principle.

Accepting all the procedural strictures and cost pressures, Automotive fascias provide a whole range of challenges for the printer. 14 layers of ink is the norm. Using both UV curing inks and solvent based systems is necessary in most designs. Add to this the need to achieve a specific light output and colour and you are dealing with a complex printing problem.

ILLUMINATED FASCIA



As with all screen printing the achievement of quality starts with the stencil, no pinholes fine edge definition, controlled Rz and standardised tension are all essential. Faults in a back lit image will show up instantly and miss-registration in a 14 layer print can be a nightmare.

Another key issue is how well one layer of ink sticks to another. When printing solvent inks on top of each other, there is normally not a problem but as soon as you introduce UV curing ink in several layers the issue of wettability of previous layers becomes an issue. In theory UV curing inks cure instantly, the reality is that the cure happens over several hours and if it is left too long before overprinting then problems with intercoat adhesion can occur. Additionally several passes through a UV dryer will potentially over-cure UV Curing ink films and they can become brittle.

An important subject is the retention of solvents in the multiple ink layers. The solvents have to be removed with careful drying as the slow release of solvents whilst the fascia is mounted in the instrument cluster can cause solvent cracking of the acrylic lens covering the instruments.

Inevitably the stencil is key to successfully printing these fascias. Working with variable quality stencils makes this application a profit killer. Correct tension, fine edge definition

and a total lack of pinholes is a prerequisite. If there is a fault in one of 14 or more layers the whole batch is ruined.

TOP QUALITY STENCILS

You may say that clean room conditions are required for such high quality stencils. The reality is that a room that is clean is what is necessary. This includes the stencil dryers that must be thoroughly cleaned inside and out every week. Vacuum blankets and glass on the exposure frames need to be in pristine condition and the simple use of a wet and dry vacuum in cleaning the mesh prior to coating will go a long way to reducing dirt contamination. Of course drying the emulsion adequately is key to the elimination of pinholes due to moisture entrapment in the emulsion coating.

For those who want to consider clean rooms as an ideal in a printing environment a Class 10000 room is the norm. This means that there are not more than 10000 particles of greater than 0.5 microns within one cubic foot of air. To achieve this the air has to be changed between 45 and 60 times a minute and filtered through HEPA (High Efficiency Particle Arrestance) filters. A Class 1000 room has 1000 particles per cubic foot. So the lower the number the cleaner the room.

A person sitting generates about 100,000 particles per cubic foot sitting down or standing up generates about 2,500,000 particles per cubic ft. Walking generates about 10,000,000 particles per cubic ft Grinding, sweeping, welding (including soldering) adds billions of particles per cubic ft. This means that for a clean room to be effective the occupants must at least wear lint free coverall clothing to arrest the contamination that is created by their skin and hair. How far do you go? That depends on the price you pay for contamination and whether the “Clean Room “ is just window dressing.

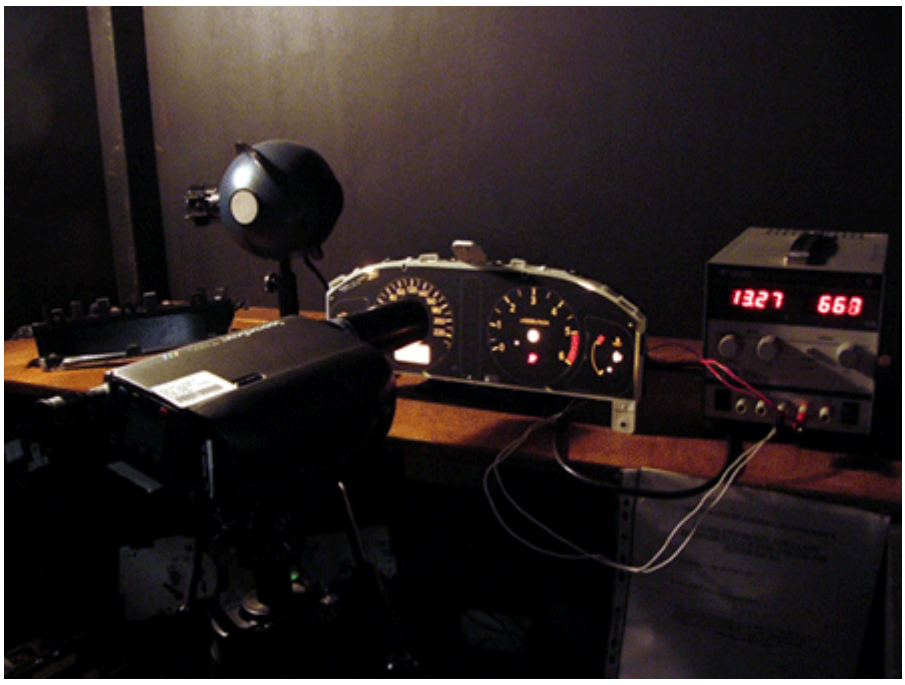
Back to Bill and his automotive fascias. As well as dealing with the challenges of printing multi-layer with varied in systems the final effect has to be carefully checked and measured. One of the main issues is the light output of the illuminated fascias.

Nowadays these are backlit by LED's and the output from these point light sources have to be diffused and measured. The diffusion is accomplished by printing a tone on the back of the facia.

TONE ON BACK OF FASCIA

To check that the colours and levels produced are to specification the output from the illuminated fascia has then to be measured with a spectrophotometer. During production densities of filters have been checked with a densitometer.

MEASUREMENT WITH SPECTROPHOTOMETER



Once printed the fascias have to be punched or cut out of the sheets. At this point if the adhesion and cure levels of the ink layers are not satisfactory de-lamination can occur. Final inspection looks for the slightest flaw as these clients insist zero defects.

So if you want to work in a market that insists on price reduction year on year on a product that tests the screen printing process to near its limits and you can accept quality auditors crawling all over your company working on an open book policy go for it. If you did and you succeeded you would be an exceptional screen printer who is just a little crazy.

KEY NOTE @ MAY 2008

Bill Jordan of Jordan Print Solutions Limited in Tamworth has now sold his very successful business and has started a new consultancy business Begera Associates Ltd