**The Relationship Between Screen-Print and Printing**

**Screen printing method - The printed pattern is composed by thousands of the small holes (mesh) on screen plate. Pouring the ink on the screen plate and place the printed object underneath. The ink will go through the mesh and print the pattern on the object. It is aslo called “Silk-Screen Printing”because the screen material is silk.**

**Screen printing is a versatile printing. It can be used to print on a variety of materials such as clothes, ceramics, tea sets, electrical appliances, large billboards, plastic, metal and high-tech related products. It has become a indispensable technology nowadays.**

**Printing Platform and Jigs (Aids)**

1. **If the printing object is very thin and light, the platform with suction function is recommended. Espically for those with large printing pattern. When the pattern is big and the printed object is thin and light, the ink will stick the object toghther with the screen. The suction function is also used for the convenience of the fixed position.**
2. **Superstrength healant is commonly used to make the aids because it is done fast and convenient. Other materials like mealamine resin and epoxy can also be used.**
3. **No matter what kind of the printing metheds used, it is very important to keep the objects horizontal. However, the screen printing method is the most severe.**
4. **If the printed pattern is very close to the edge of the object, it is the best to use a pedestal and place it lower than the object to keep it fixed. In short, place the padding block and support the object for 3~5 cm on 4 sides.**
5. **If the object surface is curved shape, make the aids and object the same “center of a circle” and “radius”. It does not necessary have to be cylinder shape. The cone shape can be done as well but it it a little harder to print.**

**Screen Plate**

1. **Mesh Density – Commonly used from 50 mesh to 480 mesh. To print absorbent material such as cloth, paper and ceramic, it is better to use less mesh screen. The less the mesh, the faster the ink is effused. If the ink is more concentrated, you need less mesh screen.**
2. **Screen Material – Nylon (More stretching and elastic) & Tetoron (Less elastic) If the printed object is slightly magnituded, it is better to use Nylon cloth. If the printed object surface is flat, Dralon material is used.**
3. **Tension of the Screen – Dralon screen or the screen with high tension, the screen can be closed to the printed object. Normally, the distance is about 2~4mm.**
4. **Screen Membrane – If the membrane is thick, the printed pattern is thicker. Squeegee softness and the scraping angle also affect the thickness of the printed pattern but the inpact is not as big.**
5. **Size of the Screen – 4 sides of the screen is 5 cm more than the artwork for Hand-Print. If printing by machine, there is at least 10 cm more for each side.**

**Squeege**

1. **There are 4 types of the squeege: Rectangular Shape, Bevel Angle, Arrow Shape, U-Shape**
2. **Rectangular Shape Squeegee – It is often used on flat surface printing. The strength of scraping the paint is more powerful. Therefore, it is suitable for the pattern that is small and thin. If the pattern is more complex, using harder rectangular squeegee can make the printing more adhesive. It can also be used on curved surface.**
3. **Bevel Angle Squeegee – It is used on printed object that is having uneven surface. The strength of scraping the paint is smaller than the other squeegees. Therefore, it is suitable for larger and thicker printed pattern. It is also used on curved surface but the roundness is not so good. The bevel angle will then perform its unique function.**
4. **Arrow Shape Squeegee – Normally used on curved printed object. However, if the roundness is not good, do not use this kind of squeegee.**

**Ink**

1. **Ink – If distinguishing by drying methods, they can be divided into 3 kinds: Solvent evaporation type, UV Drying type, and water-based inks.**
2. **Solvent Evaporation Ink– The drying speed depends on ignition point of the solvent. The higher the ignition point, the slower the evaporation of the solvent. For the faster evaporation speed, it is better to use on pad-print. When printing, the ink has to be half way dry to be able to deinking.**
3. **UV Drying Ink – The drying of the ink is depending on the UV light. Therefore, the feature is that the screen will not be stuffed. Using the UV light can make the ink solidified instantly. And the degree of the hardness is a lot stronger than the traditional inks. Therefore, it is commonly used on auto machine printing. One defect is that the cost is higher.**
4. **Water-Based Ink – It is evaporated and dried naturally. You can speed it up by using the oven.**
5. **There are many different materials of the printed objects; Each object has its own adherence condition; therefore, there are many different brands of the ink and each brand has many different series in order to meet the printing requirements.**

**Fine Cause Offered Inks:**

**MARABU (Germany), RUCO (Germany), SEICO (Japan), OPS (Japan)**

**MARABU (Germany): Moderate evaporating rate. Suitable for both pad and screen printing
SR Series: Suitable for ABS, PC, Acrylic (Adding hardener is optional)
PU Series: Suitable for PU material like golf balls (Hardener is a must)
PY Series: Suitable for Metal, Coating, IC, Memory Card (Hardener is a must)
GL Series: Suitable for Glass material (Hardener is a must)**

**RUCO (Germany): Fast evaporating rate; Suitable for pad-printing
T45 Series: Suitable for ABS, PC, Acrylic
T180 Series: Suitable for Metal, Coating**

**SEIKO (Japan): Moderate evaporating rate. Suitable for both pad and screen printing
Fine Cause Stock: EPOXY1300, EPOXY1000, VIC
EPOXY1300 Series: Used on metal, coating and glass. Need high tempture baking at 170 degree/30minutes to adhere the ink on object.
EPOXY1000 Series: Used on metal, coating and glass. Need high tempture baking at 120 degree/30minutes to adhere the ink on object. (Hardener is a must)
VIC Series: Used on ABS, PC, Acrylic (Hardener is optional)**

**OPS (Japan): Moderate evaporating rate. Suitable for both pad and screen printing**

**OPS Series: Suitable for PP material (Such as Syringe). Not ALL PP material is workable. Best to test it first.**

**Find Cause WK: Moderate evaporating rate. Suitable for both pad and screen printing. Suitable for ABS, PC, Acrylic**

**Solvent**

1. **Extra Slow Evaporating Solvent: Suitable for screen-print to prevent the stuffed-up.**
2. **Slow Evaporating Solvent: Normally used on screen-print to dilute the ink. Add the solvent at about 5%**
3. **Standard Solvent: Normally used on pad-print to dilute the ink.**
4. **Fast Evaporating Solvent: Normally used on pad-print to dilute the ink.**
5. **Extra Fast Evaporating Solvent: Normally used on pad-print to dilute the ink. Accelerating the evaporation will enhance the deinking effect.**
6. **Ink Cleaner: Used to clean up the printing defects. When wiping the products, it’s not damaging the surface of ABS, PC or Acrylic.**
7. **Cleanup Solution: Used to clean screen/steel plate**

**Additives**

1. **ST1 Extender Base:**

**Suitable for both pad and screen printing. It is used to reduce the viscosity of the ink. It is recommended to add it at about 10%.**

1. **Condensing Agent:**

**Used on screen printing to prevent ink diffusion. Adding 10~20% the condensing agent into ink can slow down the evaporating of the ink. It can reduce ink viscosity to prevent the ink flow in order to increase resolution of the printed pattern. Normally, it’s used for small design, line or the printed object with rough surface. It is also suitable for pad-print. The only concern is that it may reduce the concentration of the ink color and loss of the surface smoothness if it is used in excess.**

1. **VM1 Flow Agent:**

**Suitable for both pad and screen printing. The flow agent can increase the flow of the ink. It can also eliminate the problem of the ink causing bubbles or pinpoints on the printing surface to make the surface smooth and pretty. Adding the flow agent no more than 5% to prevent the printed pattern diffusin.**

**Operation Steps (Screen Printing Machine)**

1. **Close the Pneumatic Valve. Normally, there is a sliding switch at the entrance of the air compression valve called Pneumatic Valve.**
2. **Lock the jig on the platform at the correct place and direction.**
3. **Placed the printed object and have it fixed on the jig.**
4. **Make the screen plate fixed on the screen folder.**
5. **Adjust the height of the screen folder (1.5 ~4mm higher than the printed object) and lock it with the screw. If it is curved object printing, remember to adjust the tooth bar underneath the T-shape bar.**
6. **Adjust the printing position. For this, we need to check the position of the screen plate and the printed object (Look from the top) and then lock the screen folder tight.**
7. **Adjust the height and horizontal level of the ink-scraping knife. Make the knife just a bit higher than the screen and parallel to it.**
8. **Adjust the height, angle and horizontal level of the squeegee and make it touched the printed object and parallel to it. (The straighter the angle of the squeegee is, the better the exaustion. However, it is no good for uneven surface ).**
9. **Adjust the distance of the right-hand side sensor (S3) and make the ink-scraping knife position over the printed pattern.**
10. **Adjust the distance of the left-hand side sensor (S4) and make the squeegee position over the printed pattern for about 10mm. This is to prevent bad printing caused by buffer pads on 2 sides.**
11. **Turn on the Machine power and open the Pneumatic Valve.**
12. **Pour the ink, press semi-auto switch and start printing.**

**Printing problems**

**Q1: Unable to print out the pattern or the pattern printed is incomplete.**

**A:**

1. **Not enough compressing depth**

**If the compressing depth of the squeegee is not enough, the remaining ink will be found on the screen.**

1. **Dense Ink**

**If the ink is too thick, part of the pattern cannot be printed out and will have ink-drawing.**

1. **Bad squeegee levelness**

**If the levelness of the squeegee is not good enough, you will find that one side of the pattern can not be printed out.**

1. **Ink dried too fast**

**This result of this is similar to “Dense Ink”. If you check the ink having good fluidity but still cannot print out the pattern, it is very likely that the ink dries too fast. It happens a lot on small and thin pattern.**

1. **Not start printing instantly after filling the ink. This is causing the stuffed-up mesh.**

**Q2: The printed pattern shows overflow ink**

**A:**

1. **Ink is too thin**
2. **Wrinkles on the surface of the printed object (Using harder squeegee, fasten printing speed, using high-density ink or adding condensing agent can solve this problem)**
3. **Scraping speed is too slow**

**Q3: The printed pattern shows double shadow**

**A:**

1. **Printed object is too close to the screen plate**
2. **Printed object is moving when printing**
3. **If it is curve-screen-print, make sure to adjust the tooth pole under the T-shape metal base so that printed object is in the center with squeegee contact line.**
4. **Check to see if the squeegee bounces when pressing and lifting it.**