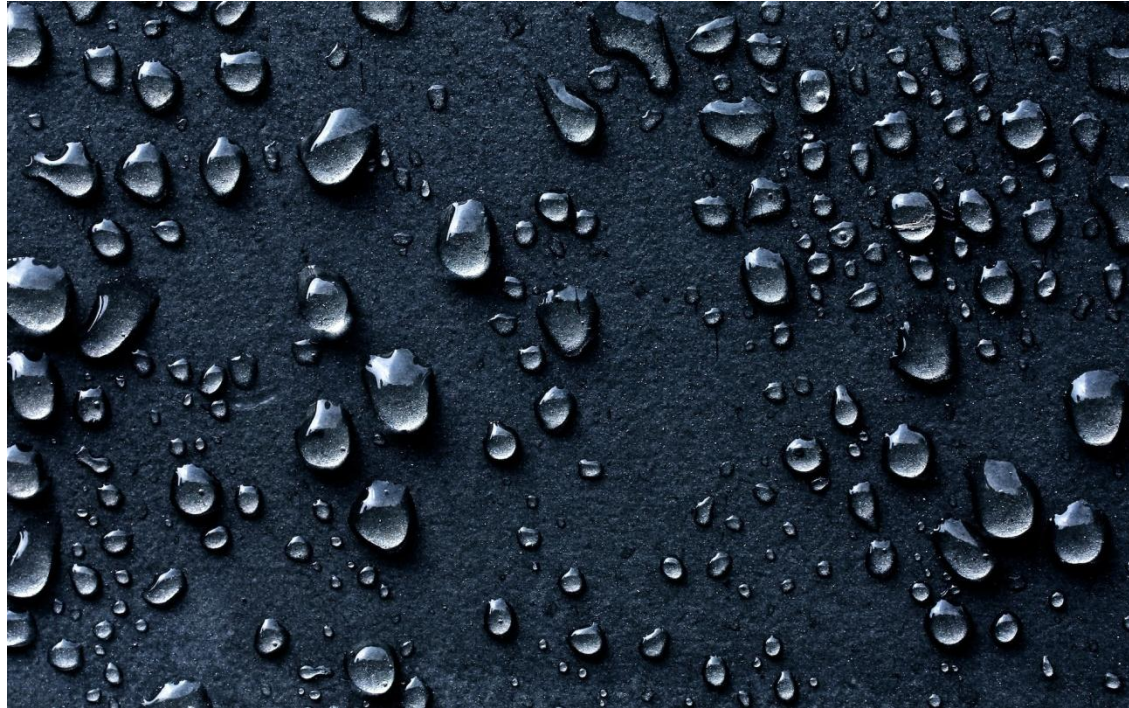
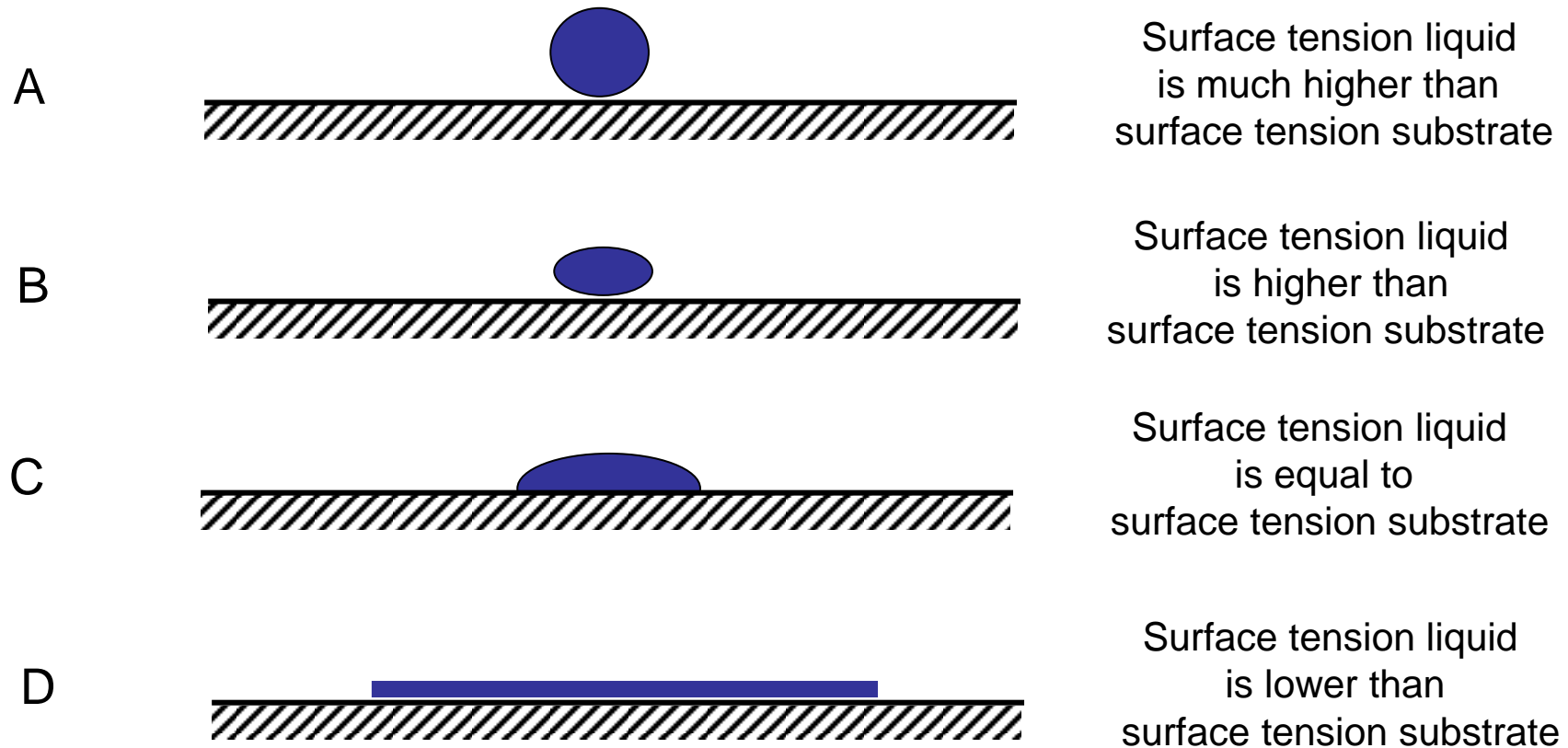


# Drip-off effect manual



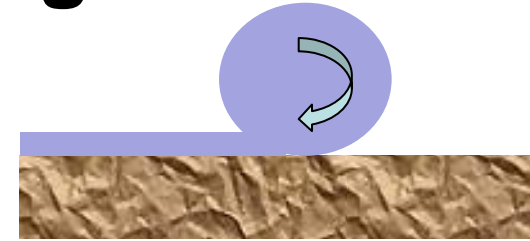
# Drip-off effect principle

- This effect is caused by the interactions between a liquid and solid surfaces.
- When the surface tension of the liquid is much higher than the surface tension of the solid layer (UV cured special primer), liquid Top coat forms small droplets.
- Initially this effect was considered as defect but later was used to create aesthetic effects on the prints.

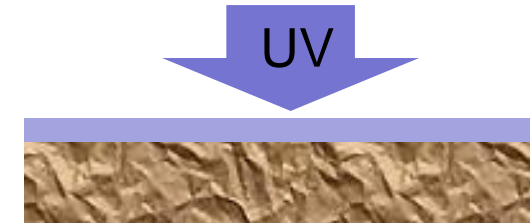


# General process stages

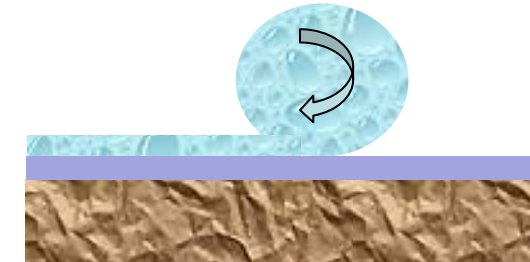
1. Application of special primer coating



2. Curing or drying to make this layer solid with low surface tension



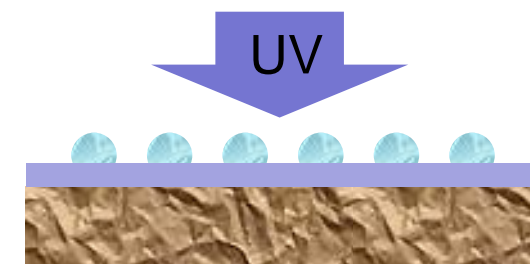
3. Application of second layer with higher surface tension



4. Formation of the droplets



5. Curing or drying of the Top coat



## Drip-off primers

- These varnishes originally are used to provide scuff, water or chemical resistance to the prints.
- They have different additives which are forming low surface tension layer after curing.

! When working with product with release additive always ensure very good mixing .

## Drip-off primers

- The layer thickness of the Drip-off primer has little effect on the drip-off effect.
- Slight changes may happen when curing is affected due to the very thick layer (flexo or screen coating)
- Irrespective of the type of Drip-off primer, they are affected by the absorption by absorbent substrates and thereby reducing the effect.

## Curing of the Drip-off primers

- The Drip-off primers become effective in reducing the surface tension only when cured enough.
- Without sufficient curing the effect may not appear.
- Curing improves the effect only to certain extent and gives no further improvement with increasing of the curing. This is how to define the correct curing dose for the release coating.

Surface tension pen over release coating with gradual UV curing dose increase





# Curing of different types of Drip-off primers

## Flexo

### How to achieve stable effect reproduction with flexo Drip-off primers:

- **Curing**
  - As seen on the previous slide after certain UV dose the effect becomes stable. Always be sure you cure the Drip-off primer enough.
  - The degree of curing will be affected by the layer thickness and the press speed.
- **Anilox roller volumes**
  - Usually we use the minimal volume of the anilox roller which provides good leveling and coverage of the given substrate.
  - When working on paper ensure fast curing to reduce the absorption. If needed increase the anilox roller volume.

# Curing of different types of Drip-off primers

## Offset

**How to achieve stable effect reproduction with offset Drip-off primer:**

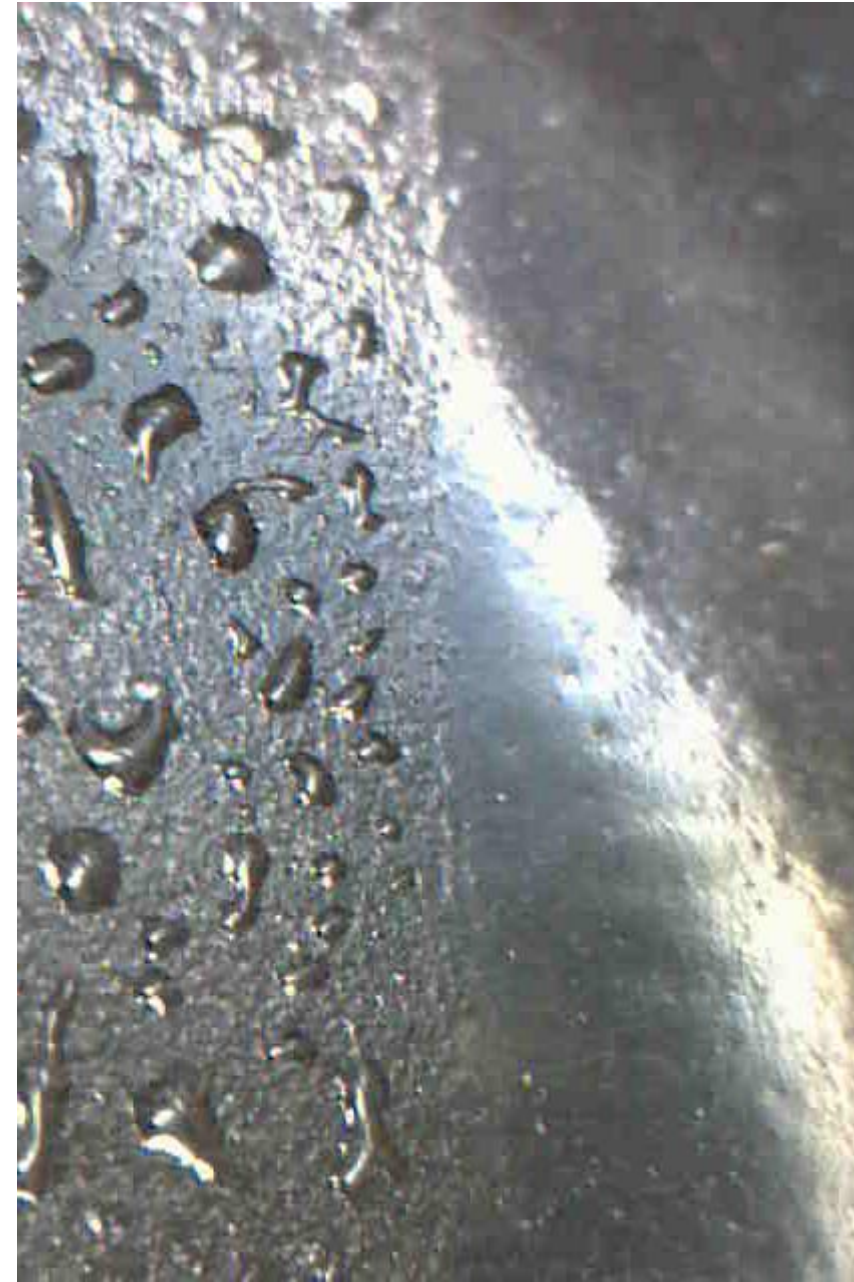
- **Curing**
  - Considering the relatively thin layer thickness offset application method it is much easier to cure it. Stable curing will give stable results.
- **Layer thickness:**
  - It is difficult to maintain the thickness of the transparent (sometimes matt) Drip-off primer.
  - One possibility is to measure the gloss on top of the paper which has to be proportional to the layer thickness of the varnish.
  - When applying the Drip-off primer inline with the Top coat is very easy to control the feeding as we see the final effect immediately.
  - Keep samples of previously run job only with the Drip-off primer to be compared with the current run.



# TOYO INK ARETS Top coat for drip-off effect

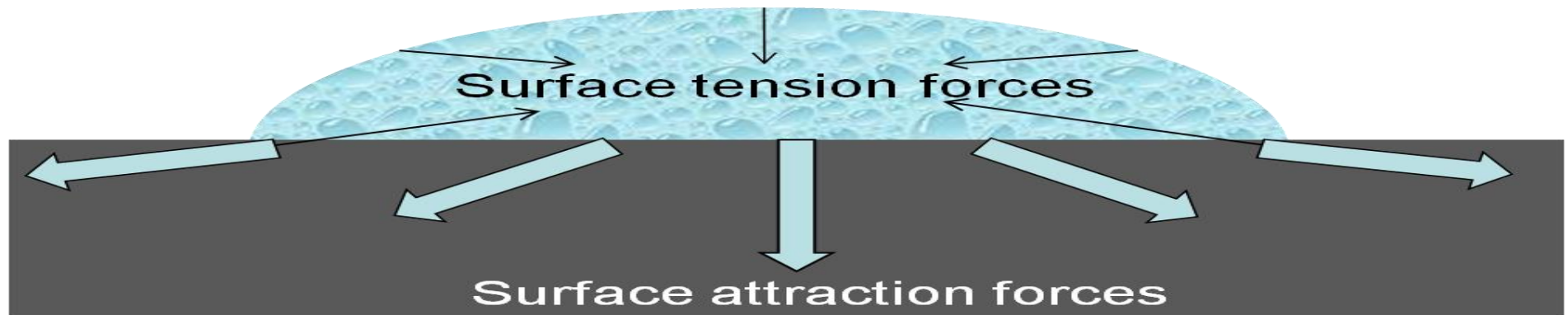
## General overview

- After curing these coatings form surfaces with relatively high surface tension.
- The Top coat can be applied with offset, dry offset, flexo or screen printing methods.
- On the areas with Drip-off primer we have the drip-off effect (on the left)
- On the areas where we don't have the Drip-off primer the Top coat is glossy. (on the right)
- Usually the Top coat is gluable and possible to be used for gluing, hot stamping and cold foiling.
- Top coat needs to be chosen considering the substrate properties: paper or foil, standard or low migration.



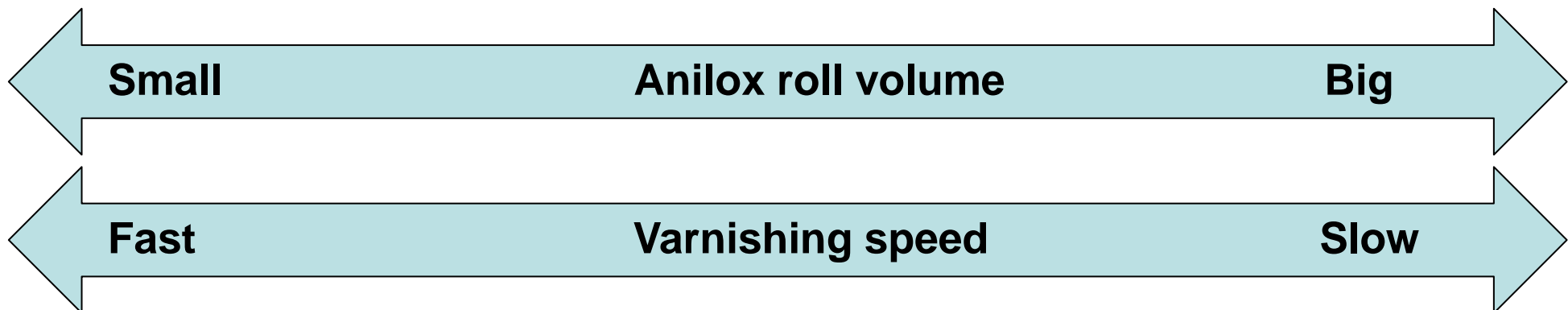
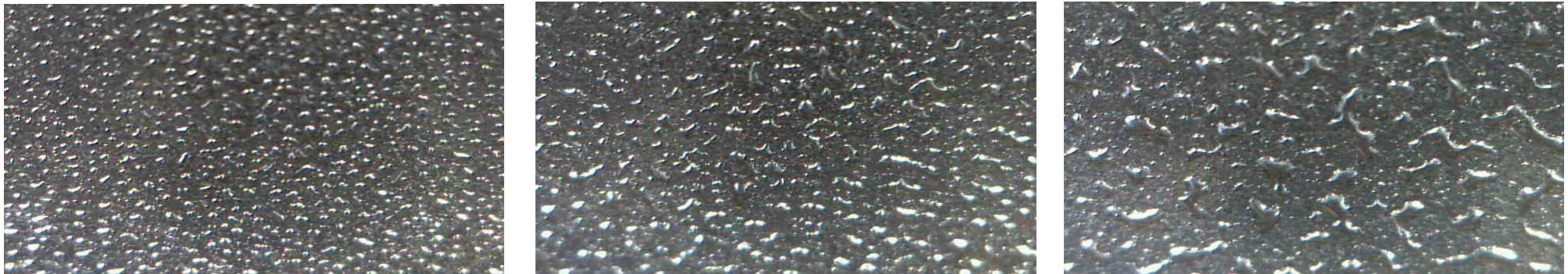
## Droplet formation static forces

- There are two competing forces deciding the size and shape:
  1. Surface tension forces of the Top coat trying to form the droplet.
  2. Surface attraction forces of the Drip-off primer trying to spread the droplet.



# Top coat application conditions

- The Top coating thickness defines the size of the drops. Applying more coating we have bigger droplets.
- Printing speed has to be maintained constant to have the same size and shape of the droplets.
- The Top coat needs certain time to reticulate from the Drip-off primer in order to form the droplets before the curing stage.



# Top coatings details

## Flexo top coatings

- The Top coat forms bigger droplets faster at higher speed if it is lower in viscosity and higher in reactivity.
- Reducing the press speed will give more time to the Top coat to form the maximum possible droplet size.

## Offset Top coatings

- Best results are achieved using low viscosity dry offset varnish from the ink duct of the wet offset press.
- To achieve higher gloss it is applied all over the press sheet with switched off dampening.

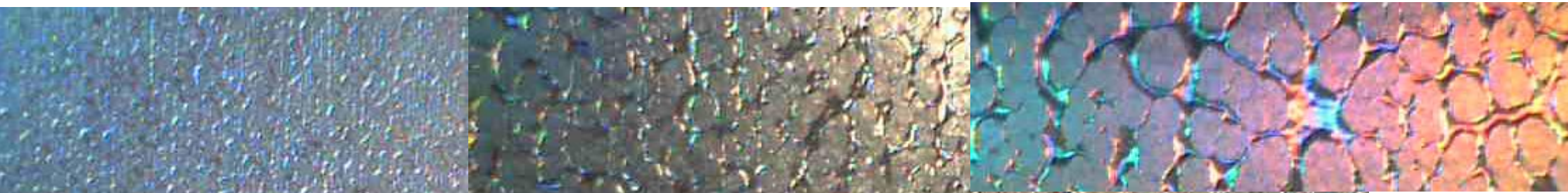
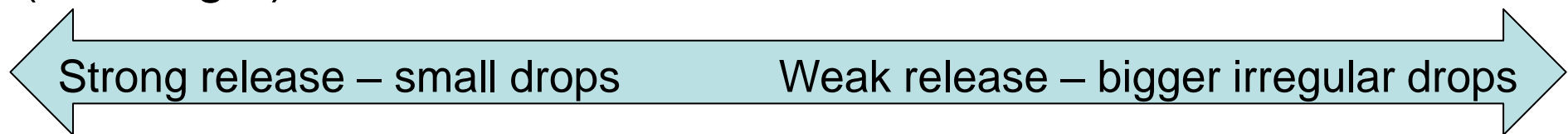
## Screen

- Screen printing is known to form the biggest relief structures. But if needed it can be used to create similar drip-off effect with small droplets like flexo or offset.



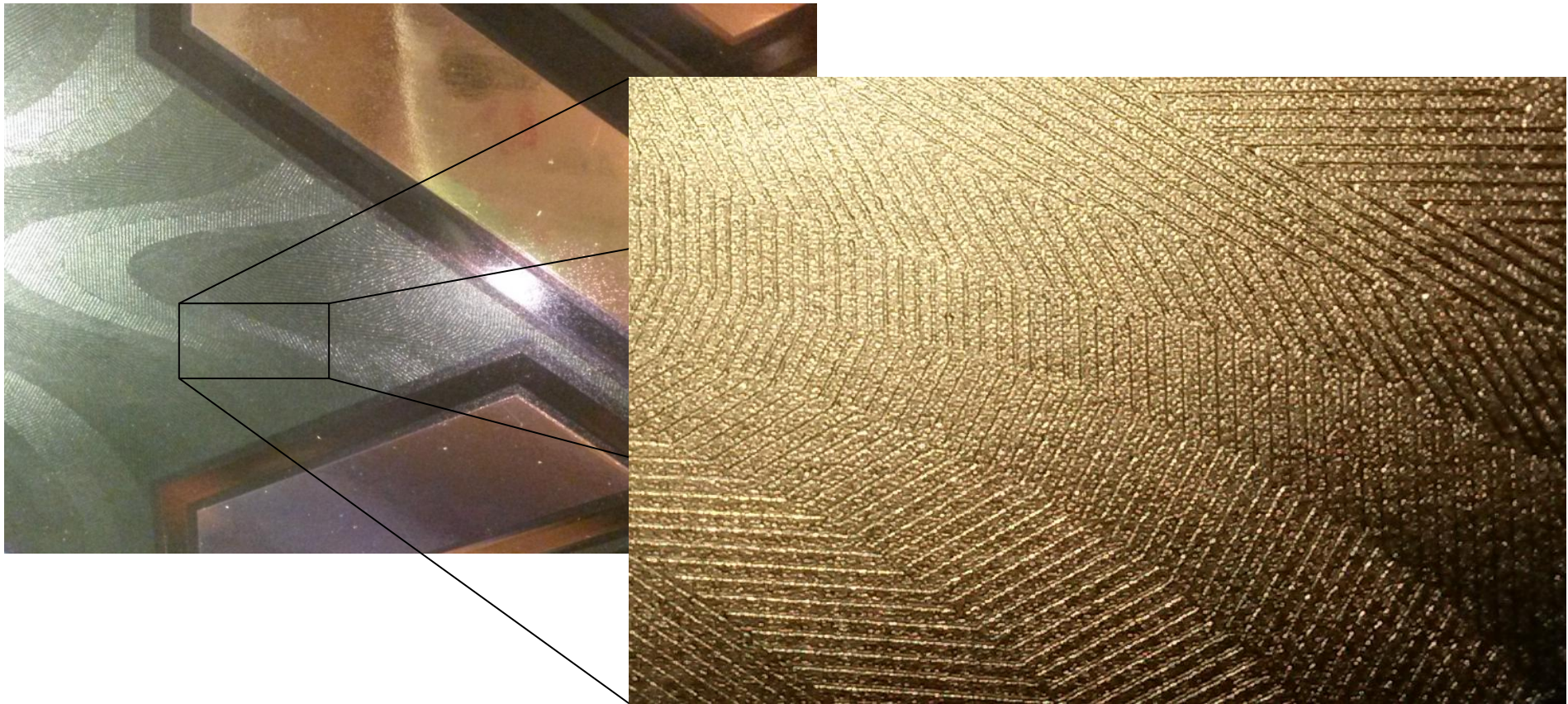
## Modification of the shape of the droplets

- Different drip-off combinations are creating different shape of the droplets.
- If needed to match certain design or improve the existing one we can change the shape of the droplets by modifying the release properties. (by adding transparent white in the release coating)
- If the Drip-off primer has strong reticulation effect (very low surface tension) the Top coat forms small relief regular round size droplets.
- When we reduce the reticulation effect the droplets of the Top coat spread more and become more irregular and bigger in size (not height)



## Relief line work using drip-off effect

- The relief effect formed by the Top coat can be used not only to form droplets but also to for various relief line work.
- For this purpose the line work is prepared for flexo / offset plate and printed with the Drip-off primer.



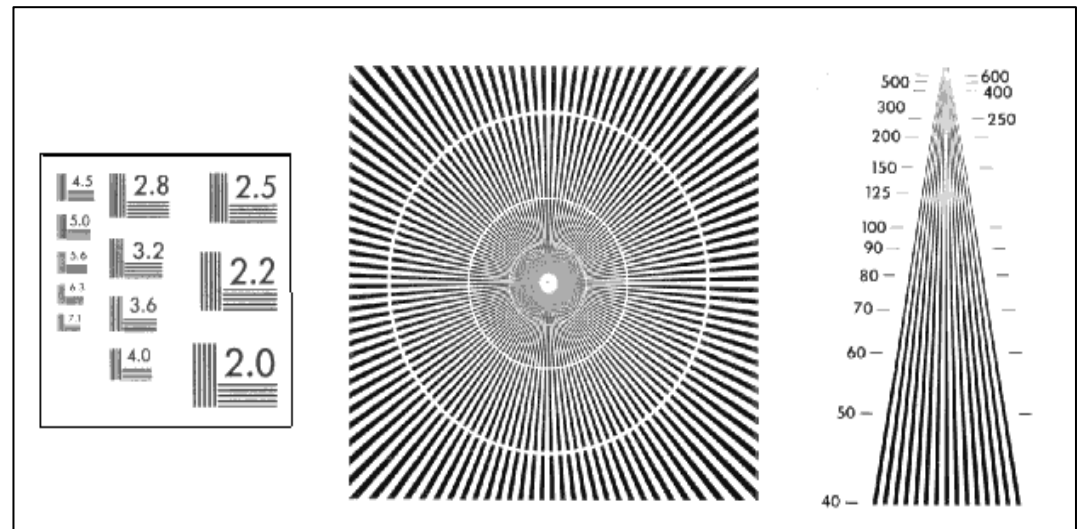


# Relief line work test

- Before preparing such effect we have to check what line sizes and pitches (line to line distance) we can reproduce with our system.
- It is recommended to make a test print before commercial runs.
- Use any available kind of resolution test pattern.
- Design with converging lines of different width will allow easily to identify what elements can be reproduced with the available print system.
- Together with the test of the release test also the combination with the coating thickness of the Top coat.

(ex. anilox roll volume for flexo)

Too thick layer will increase the relief but will reduce the resolution.



# Addition – common Toyo Arets products for drip-off

Type	Drip-off primer	Top coat
UV Wet offset + UV flexo	EXC90212	EXC90007
UV Flexo + UV flexo	EXC90010	EXC90007
UV Wet offset + UV dry offset	EXC90212	EXC90101
Conv. offset + UV flexo	V42743	EXC90007
Conv. offset + water based varnish	V42743	AQ700