

# STUDY OF COLOR SEPERATION METHOD FOR DRY-OFFSET PRINTING FOR RIGID CONTAINERS



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# Introduction

- Dry offset printing process combining the characteristics of letterpress and offset.
- A set of special plates prints directly onto the blanket and then, the blanket offsets the image onto the substrate. The process is called dry offset because the plate is not dampened as it would be in the offset process.
- Dry offset printing is a low-cost, high-speed process, which is normally used for printing round objects, like containers, with a diameter up to 300 mm (12 inch).

Dry offset uses features of the raised surface plate of letterpress and the rubber blanket of offset lithography. In this all the colors are transferred consecutively from raised plates onto a common impression blanket and then printed on the container in one pass. The Dry offset Printing Machine is a normally nine color offset, sidewall decorator with on mandrel drying. Rigid containers enter into the printer from a pre-loader. The pre-loader loads the cups into the printer. The printer in turn uses a feeder to feed cups onto a mandrel.



# Introduction

# Contd...

Dry offset printing is used to decorate / print a diverse range of plastic containers; the main groups are described as under:

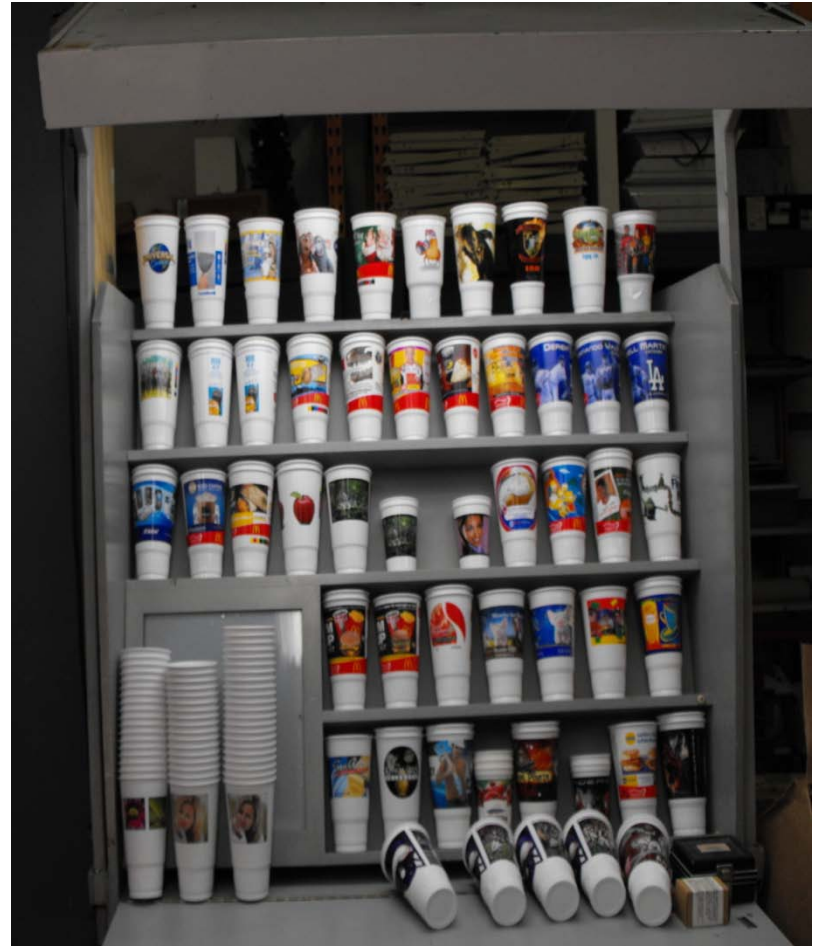
- Dairy product tubs, cups and lids containing milk, curd, cheese, and cream, etc;
- Cosmetics and toiletry tubes;
- Polylaminate (a metal and plastic laminate) tubes for toothpaste;
- Pharmaceutical containers and syringes;
- Detergent, bleach and motor oil plastic bottles;
- Beverage cups for cola and other soft drinks;
- Building trade products such as emulsion paint cans, rigid tubes for mastic and buckets and pales for adhesives;

# **Print Production of Dry Offset**

**Print production of Dry Offset Printing can be divided into five major categories:**

- Visualization & Designing
- Pre-Press Operations
  - Working on Design / Art Work
  - Color Separation
  - Film Making
  - Color Keys Preparation
  - Plate Making
- Printing Operations
- Post Printing Operations
- Quality Checks

# Introduction – Printed Samples



# Printed Samples – Major Shapes

- The following are main category of plastics and major shapes on which dry offset printing is being done using 6-10 color printing machines.
1. Injection Molded round, Straight and Conical containers





# Printed Samples – Major Shapes Contd...

## 2. EPS Cups



## 3. Square Cups



# Printed Samples – Major Shapes Contd...

## 4. PP and HIP Thermoform printed cups



## 5. Injection Molded Containers



# Printed Samples – Major Shapes Contd...

## 6. Closure Cups



## 8. Collapsible & Injection Molded Tubes



## 7. Blow Molded Cups & Containers



# Introduction - Machine Performance

- **The print speed of the modern dry offset printing machines is relatively high, but all it depends upon various factors starting from designing stage:**
- 40,000 per hour cups double line lid printer
- 24,000 per hour cup printer (dairy products)
- 4500-8000 per hour pail printer (paint cans)

# Introduction - Machine Performance

- **The speed of the machine usually varies upon**
  - The size of the Container
  - The print area on the container
  - **No. of Color in the Print**
  - Type of Ink (Normal, process, UV)
  - Drying mechanism used in the machine
  - Substrates used for Printing

# Dry Offset Printing Machine

- Simple



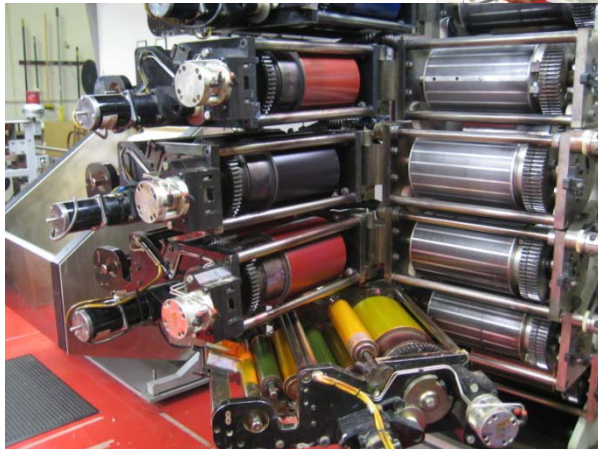
- High End

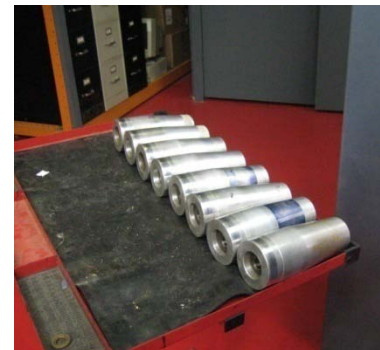


# Key Words

## Dry offset

Conical cup, taper surface, mandrel,  
dot gain







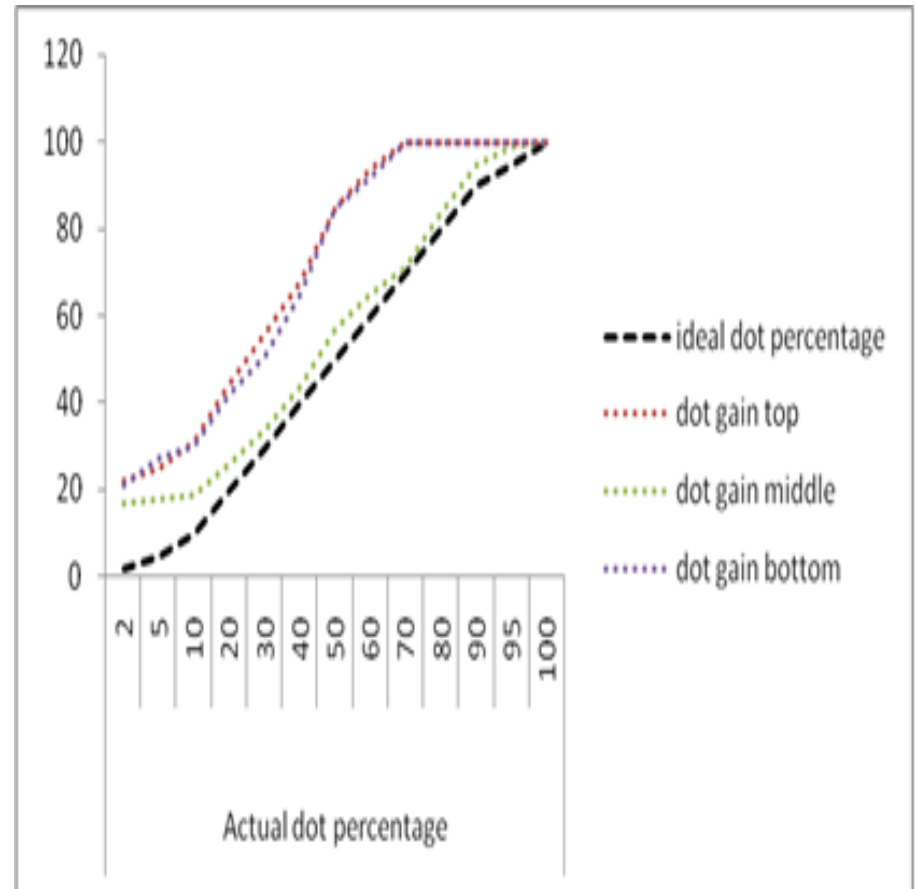
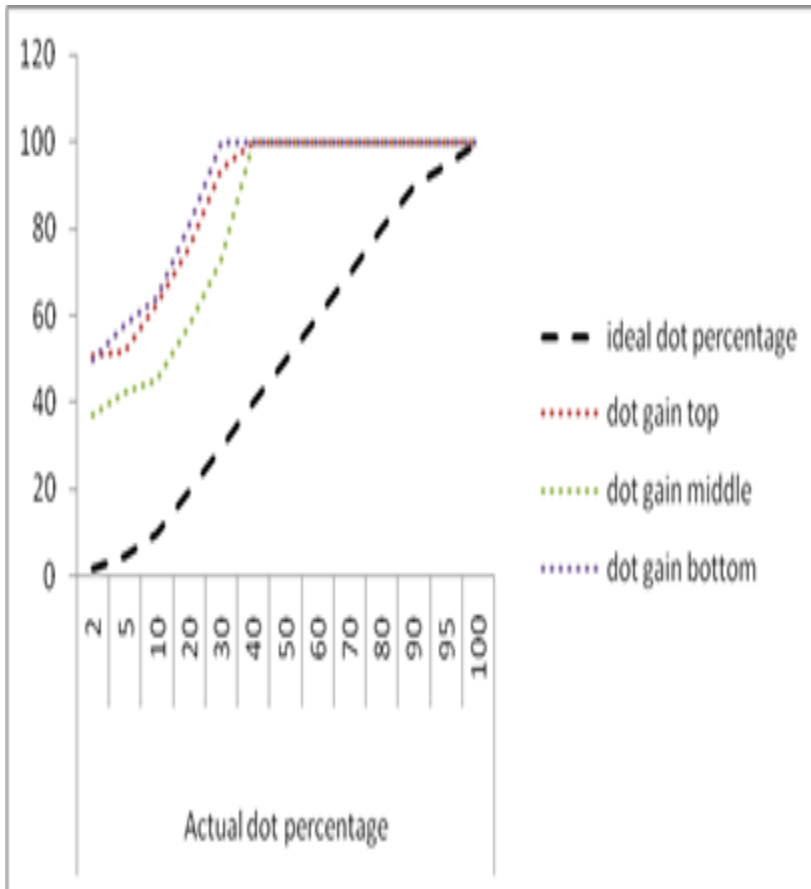
# Printing unit of Dry-offset Printing Machine

- Placement of Units
- Printing Units

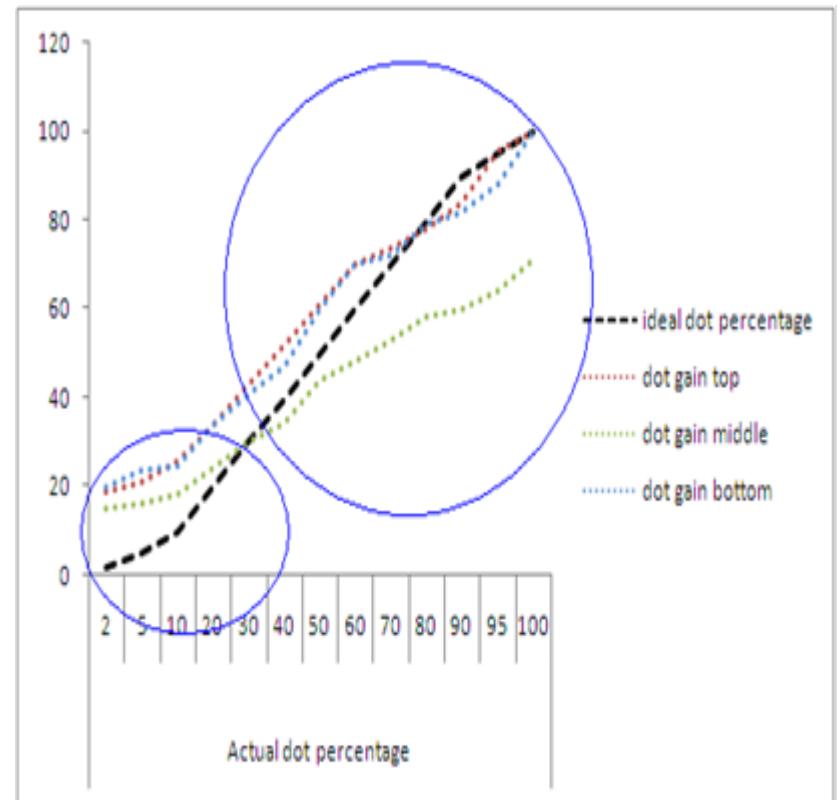
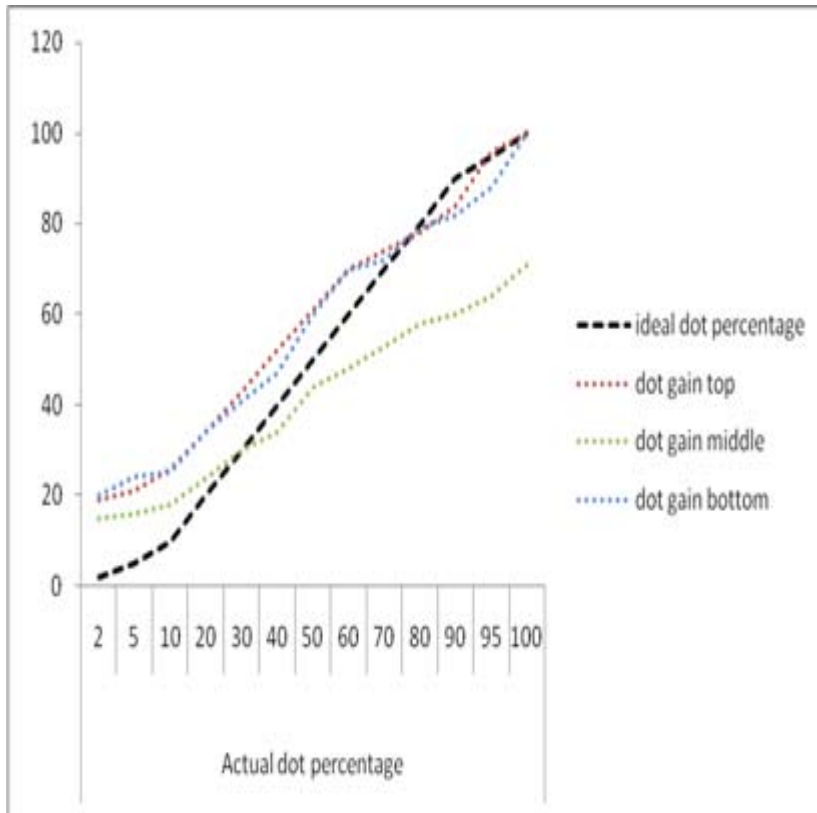


Maximum pressure and maximum ink run

Minimum pressure and medium ink run



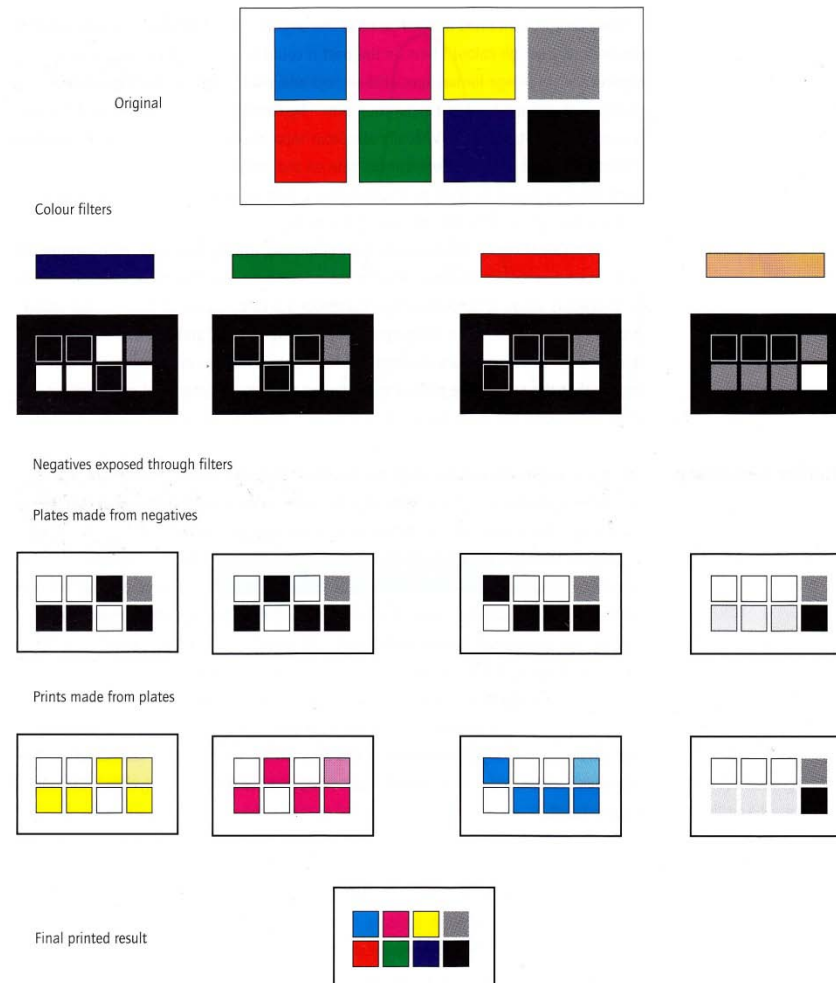
## Minimum pressure and minimum ink run



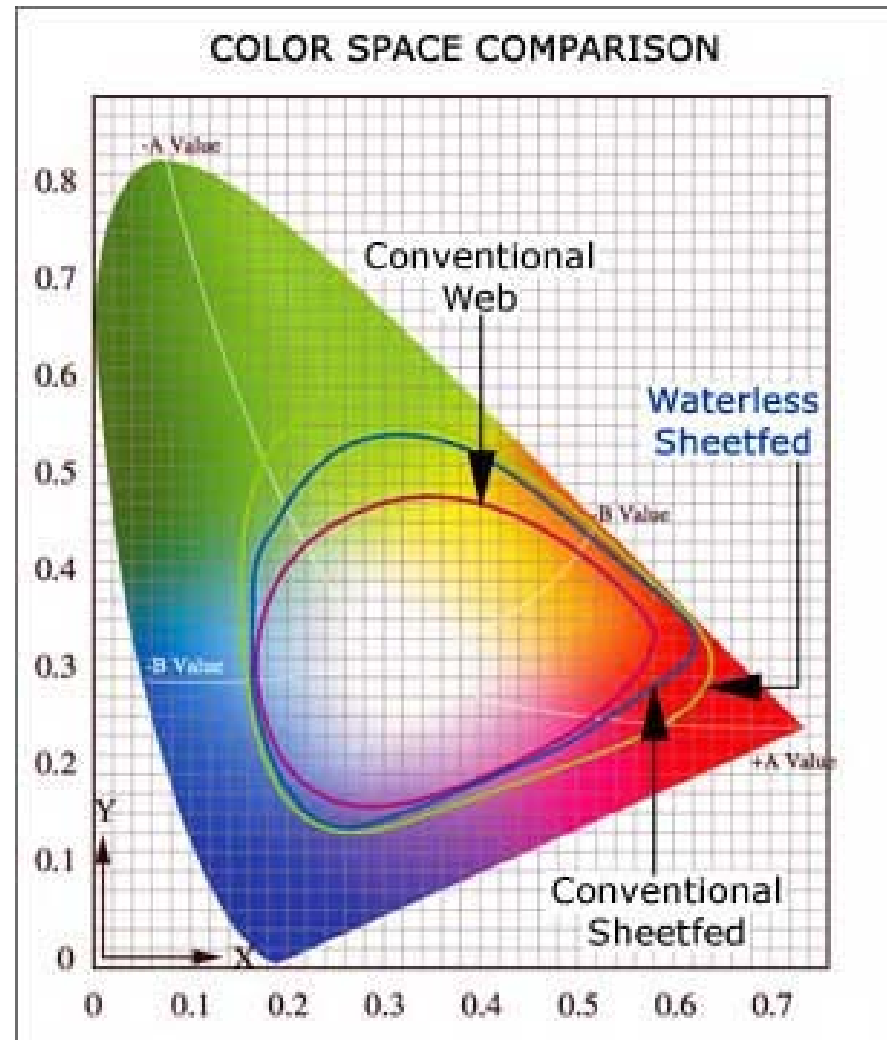
# Color Separation for Dry- Offset

- Correct Color separation is the key to success in the Dry Offset printing.
- Many times we print regular 4 color job by using 6-7 color to produce the job excellently.
- Many time dry offset printers use more colors without the permission of their clients to produce the job in similar manner.
- Normally for the black areas two blacks are used one light for face areas and another dark for text and other areas and hence it requires two set of films and plates

# NORMAL COLOR SEPERATION



# Color Space Comparison



# UNDERSTANDING PANTONE COLOR MATCHING SYSTEM





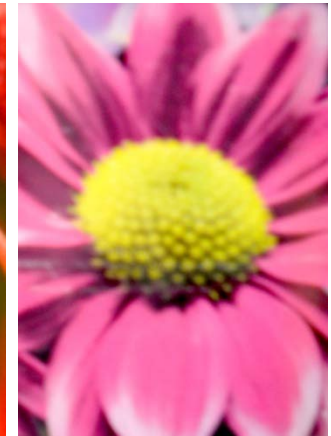
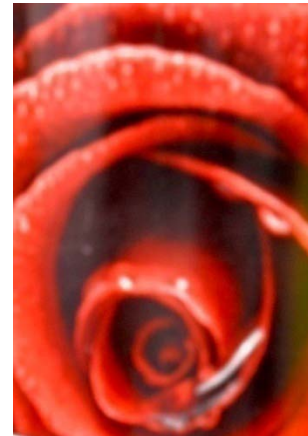
# Selection of Photographs

- The following jobs are selected for this a study in consultation with Mr. Ronner Fuller, Director, (Printing & Training), Sanden North America Inc, Lenexa, Kamsas.





# Selection of Photographs



# Job 1 (Photograph)



Initial Observation		Recommendation of Color to be printed	
Normal Separation	Dominating Color Present in the Original	Color	Pantone Details
Yellow	Blue/ Cyan	Orange	1525
Magenta	Orange	Blue	289 Blue
Cyan	Black	Black	Pantone Black
Black			

# Job 2 (Photograph)



Initial Observation		Recommendation of Color to be printed	
Normal Separation	Dominating Color Present in the Original	Color	Pantone Details
Yellow	Blue	Process Blue	Process Blue C
Magenta	Red	Rubin Red	Rubin Red C
Cyan	Yellow	Process Yellow	Process Yellow C
Black	Black	Process Black	Process Black (Plate 1 for Highlight Area)
			Process Black (Plate 2 for Shadow Area)

# Job 3 (Photograph)



Initial Observation		Recommendation of Color to be printed	
Normal Separation	Dominating Color Present in the Original	Color	Pantone Details
Yellow	Yellow	Yellow	7409C
Magenta	Red	Red	187 C
Cyan	Green	Brown	161 C
Black	Black	Green	Pantone Green C
		Black	Process Black

# Job 4 (Photograph)



Initial Observation		Recommendation of Color to be printed	
Normal Separation	Dominating Color Present in the Original	Color	Pantone Details
Yellow	Pepsi Blue	Color	Pantone Details
Magenta	Pepsi Red	Pepsi Blue	Special Color
Cyan	Black	Pepsi Red	Special Color
Black	Orange	Skin Tone Black (Black 1)	Process Black
	Yellow	Orange	159 C
	Green	Yellow	Process Yellow
		Rubin	Rubin Red C
		Alltel Blue	Special Color
		Second Black Shadow Black (Black 2)	Process Black
		Green	1467 C

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# Job 5 (Photograph)



Initial Observation		Recommendation of Color to be printed	
Normal Separation	Dominating Color Present in the Original	Color	Pantone Details
Yellow	Green	MacDonald's Red	Special Color
Magenta	Black	MacDonald's Blue	Special Color
Cyan	MacDonald's Red	Orange	157 C
Black	MacDonald's Blue	Blue	Process Blue
	Orange	Green (367 C)	Yellow + Process Blue
	Blue	Yellow	Process Yellow
	Green	Rubin Red	Rubin Red
	Yellow	Black 1	Process Black
	Rubin	Black 2	Process Black
		Purple ( 258)	Process Blue + Rubin

# Job 6 (Photograph)



Initial Observation		Recommendation of Color to be printed	
Normal Separation	Dominating Color Present in the Original	Color	Pantone Details
Yellow	Magenta	Magenta	Process Magenta
Magenta	Yellow	Yellow	Process Yellow
Cyan	Purple	Grey	247 C
Black	Black	Purple	2715 C
		Black	Pantone Black
		Black	Process Black



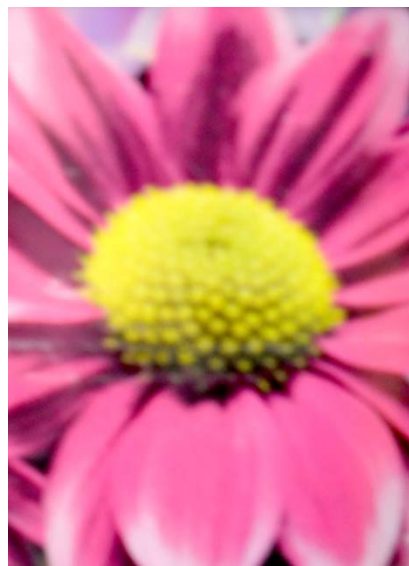
# Job 7 (Photograph)



Initial Observation		Recommendation of Color to be printed	
Normal Separation	Dominating Color Present in the Original	Color	Pantone Details
Yellow	Yellow	Yellow	Process Yellow C
Magenta	Brown	Brown	161 C
Cyan	Grey	Orange	157 C
Black		Grey	427 C



# Job 8 (Photograph)



Initial Observation		Recommendation of Color to be printed	
Normal Separation	Dominating Color Present in the Original	Color	Pantone Details
Yellow	Yellow	Yellow	Process Yellow C
Magenta	Black	Red	Process Magenta C
Cyan	Blue	Red	Rubin
Black	Red	Black	Pantone Black
		Black	Process Black
		Cyan	Process Cyan C

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# Job 9 (Photograph)



Initial Observation		Recommendation of Color to be printed	
Normal Separation	Dominating Color Present in the Original	Color	Pantone Details
Yellow	Red	Yellow	123 C
Magenta	Yellow	Cyan	Process Cyan
Cyan	Green	Blue	300 C
Black	Blue	Brown	478 C
	Black	Orange	715 C
	Cyan	Black	Process Black
	Brown	Red	032 C
		Green	360 C





# Job 10 (Photograph)










Initial Observation		Recommendation of Color to be printed	
Normal Separation	Dominating Color Present in the Original	Color	Pantone Details
Yellow	Yellow	Macdonald Red	201 C
Magenta	Red	Macdonald Yellow	110 C
Cyan	Blue	Black	Process Black
Black	Black	Blue 1	Process Blue
		Blue 2	2726 C

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# Results & Discussions


	Job1	Job2	Job3
			
	Photo Job	Group Photograph	Natural Fruits
<b>Colours Suggested with Pantone Details</b>	Orange 1525 Blue 289 Pantone Black (K)	Process Blue C Rubin Red C Process Yellow C Process Black 1 Process Black 2	Yellow 7409 C Red 187 C Brown 161 C Pantone Green C Process Black (K)
<b>Colors Sequence / Summery</b> 	3. Pantone Black (K) 2. Blue 289 1. Orange 123	5. Process Black 2 4. Process Black 1 3. Rubin Red C 2. Process Blue C 1. Process Yellow C	5. Process Black (K) 4. Brown 161 C 3. Red 187 C 2. Pantone Green C 1. Yellow 7409 C

	Job4	Job5	Job6
			
	Pepsi Job	McDonald Job	Beautiful Lady Job
<b>Colours Suggested with Pantone Details</b>	Special Color (Pepsi Blue) Special Color (Pepsi Red) Process Black (K) Orange 159 C Process Yellow (Y) Rubin Red C Special Color (Alltel Blue) Process Black 2 Green 1467 C	Special Color (McDonald's Red) Special Color (McDonald's Blue) Orange 157 C Process Blue Yellow Yellow + Process Blue (Green 367 C) Pantone Rubin Process Black 1 Process Black 2 Process Blue + Rubin (Purple 258 C)	Process Magenta Process Yellow Grey 247 C Purple 2715 C Pantone Black Process Black
<b>Colors Sequence / Summery</b>	9. Process Black 2 8. Process Black (K) 7. Rubin Red C 6. Green 1467 C 5. Special Color (Alltel Blue) 4. Orange 159 C 3. Process Yellow (Y) 2. Special Color (Pepsi Red) 1. Special Color (Pepsi Blue)	8. Process Black 2 7. Process Black 1 6. Pantone Rubin 5. Process Blue 4. Orange 157 C 3. Yellow 2. Special Color (McDonald's Red) 1. Special Color (McDonald's Blue)	6. Process Black 5. Pantone Black 4. Purple 2715 C 3. Grey 247 C 2. Process Magenta 1. Process Yellow

	Job7	Job8	Job9	Job10
				
	Bubble Job	Flower Job	Art Work	McDonald Job
<b>Colours Suggested with Pantone Details</b>	Process Yellow C Brown 161 C Orange 157 C Grey 427 C	Process Yellow C Process Magenta C Rubin Red Pantone Black Process Black Process Cyan C	Yellow 123 C Orange 1525 Process Black Blue 298 C Blue 300 C Brown 483 C Green 375 C Red 485 C	Special Color (McDonald's Red) (201C) Special Color (McDonald's Blue)(110C) Process Blue Process Black Blue 2726 C
<b>Colors Sequence / Summery</b>	4. Grey 427 C 3. Brown 161 C 2. Orange 157 C 1. Process Yellow C	6. Process Black 5. Pantone Black 4. Rubin Red 3. Process Magenta C 2. Process Cyan C 1. Process Yellow C	8. Process Black 7. Red 485 C 6. Brown 483 C 5. Green 375 C 4. Blue 300 C 3. Blue 298 C 2. Orange 1525 1. Yellow 123 C	5. Process Black 4. Blue 2726 C 3. Process Blue 2. Special Color (McDonald's Blue)(110C) 1. Special Color (McDonald's Red) (201C)

# Results & Discussions

In case of dry offset printing, as there is no fear of emulsification of ink and only difficulty is to transfer all the color one by one on common blanket, therefore it is advisable to start printing from light color if two or more light colors are there, it is tried to separate similar hues with different hues. From this study a general order of color sequence is derived as follows:

Colour Summery		Printing Unit
8.	Black	
7. PMS 183	Brown	
6. PMS 300	Blue	
5. PMS 485	Red	
4. PMS 357	Green	
3. PMS 298	Blue	
2. PMS 125	Orange	
1. PMS 123	Yellow	

# Results & Discussions Contd...

- **Apart from above colour summary. The printing recommendations like.**
- Type of ink used.
- Blanket thickness, hardness, compressibility.
- Pre-treatment instructions if any.
- A special suggestions regarding ink and running condition of printing machine.
- Must be mentioned to get similar results at various locations and printing machine.



# Key to Success in Dry-Offset Printing

- **Applying low pressure.**
- **Controlled ink flow.**
- **Using more colors than Process.**
- **Using two Blacks (One for skin tone & other for solid Black areas & text.)**
- **Using spot color (Pantone Book).**
- **Controlled open flame treatment of substrates before printing to accept the transferred ink in proper way.**
- **Heat treatment after printing for drying of ink on substrate.**
- **Availability of 3-D Registration system in ptg. Machines.**

# CONCLUSION

**This Study can be concluded point wise as follows:**

- Originals are same for any printing process.
- Separations are also same for majority of printing process which deals with process colors.
- The simple originals become complex for high quality printing with dry offset multi-head printing unit upto nine colors.
- Such jobs need attention for logo colors & Special colors
- Selection of dominating colors is usual but selection of appropriate shades is very crucial.
- As the color sequence is follows in four color printing, therefore it becomes very sensitive in case of dry offset printing.

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### Our Trainers



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