

THE INVESTIGATION OF MANUFACTURING MARKS ON NEWSPAPERS

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ABSTRACT: Casework necessitated the investigation into how pages within a tabloid newspaper could be linked conclusively to each other. An investigation was made into marks left on newspapers by the manufacturing process and the uniqueness and significance of these marks in respect of connecting pages to each other. It was determined that printing presses can leave identifying features on the paper but that this was dependent on the efficiency and maintenance of the machine. Concerning the original problem, it was established that it is possible to connect conclusively a page of newspaper, by means of a physical fit, back to the tabloid it originated from. Each page of such a newspaper will have been separated from another page within the same newspaper during the manufacturing process. Other marks left by the manufacturing process are of benefit to a greater or lesser degree.

KEY WORDS: Questioned documents; Toolmarks; Newspapers; Physical fit; Printing presses.

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INTRODUCTION – THE PROBLEM

A case was submitted to Agency which posed an interesting problem. A page of newspaper which had been used to wrap ammunition had been found in one location. It was the centre page of a tabloid newspaper – the pages numbered 35, 36/37, 38. A newspaper of the same date and issue as the single page was found in a different location and could be connected to the suspect. This newspaper was complete except for a missing centre page – pages 35, 36/36, 37. Despite the logical assumption that the centre page did indeed originate from the suspect newspaper, it was down to the Questioned Documents Section to prove conclusively that the single page originated from the newspaper. It was not possible to link the centre page to any other pages by ESDA or by offsetting of ink from one page to another. An alternative method of connecting the two items had to be determined.

RESEARCH OF MANUFACTURING PROCESS

As part of the investigation local newspaper companies were visited, one of which printed the newspaper in question. The newspaper printing presses were viewed in operation and including the placement of marks on the pages by the manufacturing processes. The machines viewed were the Goss Metro-liner and Goss Urbanite, both of which involved virtually identical manufacturing processes. A brief description of the process is as follows.

The paper webs which are the width of broadsheet newspapers are printed. They are transported on a conveyer system aided by sets of grippers along the edge of the belt. The webs are brought together, one on top of the other, the number of webs will depend on the number of pages in the newspapers. A total of 6 webs will give a 24 page newspaper, 8 webs will give a 32 page newspaper. In a process known as collect running, webs from two separate presses are brought together to produce newspapers with a greater number of pages. The webs pass through a further set of grippers which bring them to the folder which converts the webs into newspapers. At the top of the apparatus is the former, a V shaped piece of metal also called a kite because of its shape. At the top of the former is a circular blade, called a tabloid splitter. The pages are cut in half to tabloid size and move onto the former where compressed air is blown up through holes in the metal which lifts the paper as it is turned 90 degrees and brought together to form the newspaper. The web is then pulled down between sets of grippers towards the folder cylinder. The web is then pulled down between sets of grippers towards the folder cylinder.

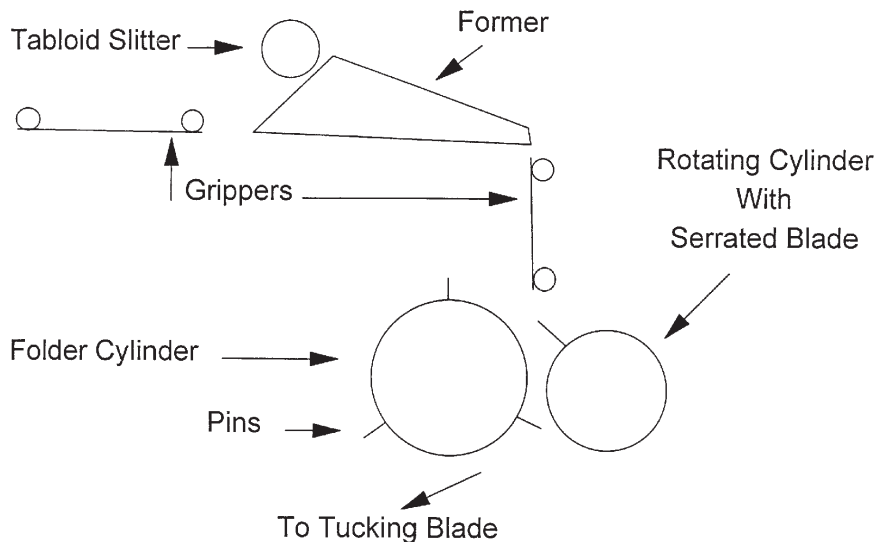


Fig. 1. Schematic diagram of printing process.

The folder cylinder is a large hollow cylinder which has sets of pins – 3 sets of 8 pins in the Metroliner, 2 sets of 5 pins on the Urbanite. The pins are set in cams which raise up as the cylinder rotates to meet the paper. These sharp pins cut through the paper web, grabbing it and pulling it down and round the cylinder. A second cylinder, with a serrated blade, beside the folder cylinder rotates to cut the paper. This cut serrated edge will form the outside right hand edges of the newspaper. Released from the web, the newspaper is hit by a tucking blade which folds it in two. The paper then drops onto a conveyer belt which carries the newspapers to be grouped into batches for distribution. The newspapers are supplied to newsagents where a pile of newspapers will be stacked in the sequence they are printed.

Manufacturing marks

The printing press comes into contact with the paper web through a series of grippers, blades, pins and the metal former. These features transfer markings onto the paper but these marks will not remain constant all along the web due to nature of the paper web. Following the printing process, the paper web is moist, it is in constant motion and held at a tension which may be poorly controlled. The web's motion and flexibility contribute to the variability of marks left on the paper.

Gripper marks

The web passes between several sets of rollers or grippers during its conveyance to the folder. These grippers will transfer gripper marks (known in the trade as trolley marks) onto the newspaper. The contours of the grippers will determine the pattern left on the newspaper. The most significant grippers are those between the former and folder. These will leave a distinctive pattern on the outside page and central page. The depth of impression is variable depending on the motion and flexibility of the web. Along the line of the trolley mark will be peaks and troughs in the depth of the impression. The gripper pressure makes only slight impression on the pages beneath the outer and centre pages and the effect tails off rapidly the farther into the newspaper you go. Within the newspaper there may be pages with gripper marks which differ in appearance from those found on the outside pages. These marks will have been left by grippers positioned at the edge of the web to keep it in position on its way to the former and folder.

Tabloid slitter

The tabloid slitter is a circular blade positioned directly above the former and cuts the web in two from broadsheet size to tabloid size. The cut edges will form the top edges of a tabloid newspaper. Ideally this cut should be per-

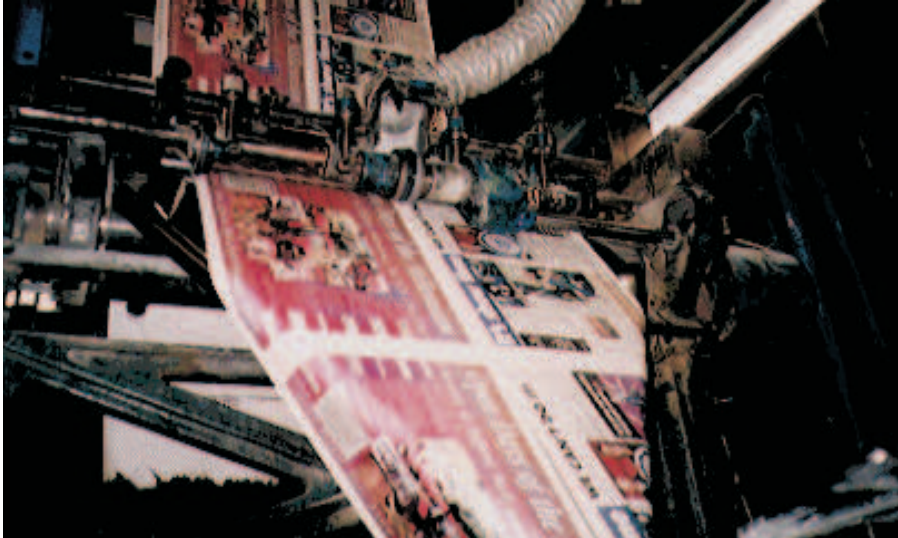


Fig. 2. Photograph of tabloid slitter above kite-shaped former.

fectly straight but in reality the cut can be quite ragged. A number of factors can produce an irregularly cut edge. Imperfections in the blade, a dull blade, an incorrectly positioned blade, the moistness of the paper, a lack of tension control in the newspaper all contribute to a cut edge with peaks, troughs, tears and nicks. As the web sheets are cut one on top of the other, the pattern of the cut on the upper page will be approximately the same on the pages below.

Web creasing

As the web paper passes over the former the paper edges can crease to varying degrees. This fault in the process is called web creasing and is a mechanical problem. The web may need to be reset if the creasing becomes excessive. The creasing is variable from page to page, dependent on the moisture in the paper, speed of the web and tension control of the web. Air blown up through holes in the former to lift the paper also helps to prevent web creasing. The creasing is most pronounced on the upper web which will form the centre page of the newspaper. The creases occur at random, so a newspaper page may have no creases, slight creasing or heavy creasing. The creasing will also effect the pages beneath the centre page but the creasing, although reproducing the same pattern will not be as marked. Pages further down into the newspaper will be unaffected. Most presses will have webs adjusted so that no creasing occurs in their newspapers.

Pins

The pins set into the folder cylinder should ideally be at a uniform height and sharpness. However, they can be set into the cylinder at a slightly different plane with respect to the vertical. They will also develop differing degrees of sharpness and bluntness with time; the pins can even be deliberately blunted when set in by the engineer. Cylinders which have 2 or 3 sets of pins, will therefore have 2 or 3 sets of pins with different characteristics of sharpness and vertical position. A particular pin penetrating the paper will leave an impact impression characterised by the degree of ripping and shape of cut. The impact impression of the same pin on various newspapers can be different due to the variables of web moisture content, tension and speed.

Tucking blade

The tucking blade folds the newspaper in two at the end of the process. It can be set so that it does not fold the paper exactly in half but so that the pages are folded off centre. This results in one side of the newspaper being slightly longer and at a slight angle with respect to the other side. This slight overlap allows flyers to be slipped into the middle of the paper.

Serrated blade

The serrated blade set on a rotating cylinder beside the folder cylinder cuts the web into individual newspapers. The blade leaves a serrated edge cut on the sides of newspapers pages. Each cut varies but only by a small amount.

EXPERIMENTAL

Local and national newspapers were obtained. The presence and absence of manufacturing marks were noted. The significance of each of these marks were assessed with relevance to the original problem which was a question of connecting a page back to others pages within that newspaper.

A number of newspapers were obtained of the same issues including newspapers which would have been printed sequentially. Each set of marks occurring on a page was compared with marks on other pages within the same newspaper. These were then compared with other newspapers to determine how individual these marks were to a particular newspaper. Assessment was then made as to which marks could be used to connect two pages of newspaper together. Several of the marks, such as those left by the tucking blade, serrated blade, grippers and pins, quickly established themselves to be of limited use in page comparison. The creasing caused by the

former and the ragged edge left by the tabloid slitter were marks which appeared to be of greater significance in the comparison of two pages of newspaper.

Blind trials were conducted in which the same pages were removed from up to 10 newspapers. The pages had been labelled and a scientist then attempted to match the missing pages back to their original newspapers.

RESULTS AND DISCUSSION

The assessment of manufacturing marks left on the paper established that some were more identifying than others. Certain marks in particular could conclusively establish a connection between pages within newspapers. Other marks could provide additional evidence of a connection or on their own provide some supporting evidence to connect two pages together. Each mark type will be dealt with in turn.

Gripper marks

Those marks originating from grippers within the former occur on the front and back pages and on the centre page. Their impression rapidly deteriorates with each successive page of the newspaper. The most common type of grippers produce a mark of up to 8 lines consisting of small impressed diamonds. The impression can be strong enough to cut the paper. They will be visible on the page below but will rapidly reduce in intensity on the pages below that. The irregularity of a gripper mark will give a pattern of deep impressions through to light impressions or no impression. This pattern should correspond to the pattern of deep and light impressions on the page below. The movement of the pages in the process will mean that the gripper marks may not be in exactly the same place, say with respect to the bottom edge of the paper, on two consecutive pages. Within a newspaper there could be further gripper marks which have been placed on the pages prior to them coming together at the former. Similarly gripper marks on two consecutive pages anywhere within a newspaper can be compared to note a similarity of pattern impression.

The comparison of gripper marks is a difficult process and could lead to an incorrect interpretation of the evidence. It is useful to back up more conclusive marks and comparison may be attempted in the absence of these conclusive features and may provide supporting evidence to connect two pages together. It should be noted that in the absence of a particularly striking pattern, the estimation of whether or not gripper mark patterns on two consecutive pages are the same can be somewhat subjective. Also for marks on the inner pages, two consecutive pages may have different sets of markings be-

cause they were placed on the paper prior to the pages coming together at the former.

Tabloid slitter

The tabloid slitter cuts the web in two and the resulting cut edge forms the top edge of the pages of the newspaper. Often the conditions are such that a ragged cut is left. On new presses or well serviced presses the cut will leave a perfectly straight edge. The raggedness can be of varying degrees. It was noticed that in papers where a fairly clean cut has been made, some pages can be quite ragged, others have only slight imperfections in the straight edge and some pages will have perfectly straight edges. However, this cutting process means that every page within a tabloid newspaper has been cut from another page within that paper. The exception will be when a single page is inserted into the centre of the paper, this single page will have no corresponding partner.

If the cut edge is perfectly straight then it will usually not be possible to connect the pages. If the cut edge is ragged then it is possible to physically fit each page of the newspaper back to the page it was separated from by the tabloid slitter. If the top edges of two pages physically fit together then this would be conclusive proof that the page has indeed originated from the same newspaper. For pages with approximately straight edges, with one or two imperfections, this process of physical fit is more difficult but not impossible. If there is some doubt, then other features such as gripper marks and creasing can be considered.

If the whole newspaper is not available for comparison with the single page, then the partner of the questioned page may not be present. Another feature to consider is that pages which have been cut by the tabloid slitter whilst on top of each other will have ragged edges of approximately the same topology. These pages will end up sequentially beside each other in the newspaper. Whilst due to several factors the cut edges will not be exactly the same, they will have more or less the same gross features of peaks, troughs and cuts. A comparison of the top edges of two pages one on top of the other is necessary. If they have approximately the same gross pattern then this is very good proof that they were cut at the same time and have formed part of the same newspaper. A check should be made as to the agreement of other features such as gripper, pin and serrated edge marks which should strengthen the conclusion if they correspond closely on each page.

It was also noted that as the pages are printed in broadsheet size, there can be splashes of ink which traverse from one side of the page to the other. When cut by the tabloid slitter, the ink spot is cut in two. When attempting to physically fit two pages together, the presence of such ink spots is most beneficial. Obviously, the significance of these spots comes into play when

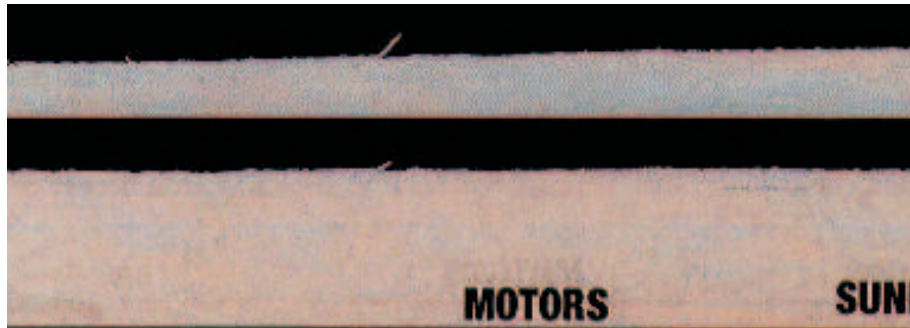


Fig. 3. Topology of two adjacent pages showing correspondence of gross features.

the top edges are straight cuts or almost straight cuts with only slight imperfections.

Web creasing

The web creasing created as the web passes over the former is most pronounced on the centre page. The creasing occurs at random and the patterns created, if sufficiently extensive, can be considered unique. It can be considered as a characteristic pattern of creases of different depths, lengths and angles. If a creasing pattern is produced on one newspaper, the papers immediately before and after it may have creasing with some similar features, completely different creasing or no creasing at all.

If no creasing occurs in the centre page then no comparison can be made. If a small amount of creasing occurs then it is possible that other papers will have been printed with similar creasing and care must be taken in attribut-



Fig. 4. Web creasing.

ing similar creases in consecutive pages as being proof that they originated from the same newspaper. However, a substantial amount of creasing can be considered to be a unique pattern. The creasing pattern on a single page of newspaper can then be compared with the creasing pattern on the other pages, which would mean the pages sequentially above and below that page. The creasing does diminish rapidly with each successive page into the newspaper. A conclusive link should only be based on a distinctive pattern occurring on successive pages. The creasing evidence can also be supported by the other marks left by the tabloid slitter, gripper, pins etc.

Within a newspaper there can be creases on many pages. These may originate by some disturbance during the printing process, folding or handling. These creases are often horizontal compared with the more vertical creases produced on the centre pages by web creasing. As these creases could have occurred at any time it does not necessarily follow that the crease will have travelled onto neighbouring pages. Care should be taken in giving significance to small horizontal creases found within the pages of a newspaper.

Pins

The pins pierce the paper from the back page to the centre page and will leaving differing impact impressions in terms of shape of cut and tear of paper. Whilst the impact impressions made differ, the differences are small and a pattern of 5, 8 or more pins could not be considered unique to a particular newspaper. Comparing pin impact impressions between consecutive (or even non-consecutive) pages is useful in supporting other evidence that the pages did in fact originate from the same newspaper but should not be used as strong evidence on its own. If the paper has been produced by collect running, the outer pages may have a different set of pin impressions than the inner pages.

Tucking blade

When matching a page back to a newspaper, the amount and angle of overlap, if any, should be approximately the same for consecutive pages and could be noted.

Serrated blade

It is possible to compare the serrated side edges of two consecutive pages from a newspaper. If the pages are from the same newspaper, the serrated edge cuts will have almost identical patterns. However, trying to match newspaper pages by the serrated edge alone is inadvisable as the edge patterns of all newspapers are so similar that no one pattern could be considered to be unique. Mistaken matches can easily be made but the comparison may done for a totally comprehensive comparison.

Offsetting of ink

If the ink is still wet when the pages of the newspaper are brought together then ink can be transferred or offset from one page to another. The comparison of ink transference involves comparing two pages which would touch when the newspaper is intact and folded. Wet ink from one page can touch the page opposite leaving a smudge of ink which is an offset image of the wet ink area. In turn the wetting of the paper on the opposite page can cause a transfer of ink from this page back, leaving an offset image. The offset images can be compared to see if they correspond to each other. In any print run, if one area of ink is excessively wet, then the ink will be wet for a number of newspapers. Whilst ink transfer will occur at random it was noted that the same areas of ink can transfer over a large number of newspapers. Ink transfer can be a useful technique for linking two pages of newspaper which have originally been placed together but care must be exercised in interpreting the evidence.

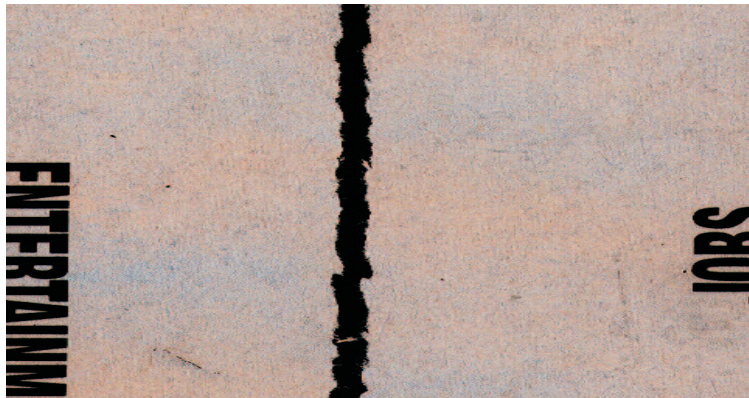


Fig. 5. Physical fit between two top edges (close-up).

CONCLUSION

In matching a missing page or pages back to a tabloid newspaper, the most beneficial manufacturing mark is that which is left on the top edge of the pages by the tabloid slitter. As every page within a tabloid has been cut from another page within the same paper, if a physical fit can be demonstrated, then conclusive proof of the pages originating from the same newspaper has been established. Not every newspaper will have a ragged top edge and in these cases, comparison of ink spots on the top edges and web creasing can be useful in establishing conclusive proof of common origin.

Comparison of the topology of the ragged edges can be useful if the whole newspaper is not available as can evidence from the offsetting of ink. Depending on how significant the scientist views the features examined will depend on whether or not they wish to offer a conclusive opinion of association.

The marks left by grippers, pins, the serrated blade and tucking blade can be useful to build up a complete and thorough picture of similarities between pages but should not be used as the basis of a conclusive link between any pages.

As a result of the investigation of manufacturing marks left on newspapers it was possible to establish conclusively (by physical fit) that the single page 36, 36/37, 38 originated from the newspaper which was missing that page and belonged to the suspect.