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Optimizing Workflow Efficiency in Digital Printing Imposition: A Visual Tutorial on Design Impact Printing Methods

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Abstract

The rapid evolution of digital printing technologies has necessitated a parallel advancement in imposition workflows to ensure maximum efficiency, cost-effectiveness, and high-quality results. The purpose of this study sought to outline a visual tutorial focused on the intersection of design impact and workflow optimization in the realm of digital printing imposition. In an attempt, the study demonstrated the benefits of template-based imposition for standardized layouts and design consistency using imposer pro software. As a qualitative research method, the study adopted case study design on a visual tutorial approach, utilizing a combination of images, diagrams, and video explanatory text to present step-by-step guides and examples. The content was structured to cover fundamental concepts, software selection, template-based imposition, automation and variable data printing (VDP) integration. The outcome of the study revealed that the tutorial's visual format effectively communicated the intricacies of optimizing workflow efficiency in digital printing imposition. The study encourages design practitioners to leverage the tutorial as a practical resource for achieving efficiency gains, reducing turnaround times, and elevating design impact in the rapidly evolving digital printing landscape.

Keywords: Digital printing imposition, Workflow efficiency, Design impact, Visual tutorial, Template-based imposition

1. Introduction

Imposition in the realm of digital printing refers to the systematic arrangement and alignment of digital pages or images in a predetermined order to facilitate the subsequent tailoring process (Collins, 2023). It plays a crucial role in the production of printed materials, ensuring that the final output is accurate, efficient, and visually appealing. In recent years, digital printing technologies have witnessed significant advancements, revolutionizing the print media industry. This evolution has brought about numerous benefits, such as improved quality, faster turnaround times, and cost-effectiveness (Fastiggi, 2023; Coble, 2023).

The emergence of digital printing technologies has transformed the way printed materials are produced (Kwon et al., 2020). Zul (2023) is of the view that unlike traditional offset printing, which involves the creation of printing plates, digital printing allows for direct printing from digital files. This eliminates the need for costly setup processes and enables on-demand printing, making it ideal for short print runs or personalized printing. Additionally, digital printing offers greater flexibility in terms of design variations, allowing for customization and personalization of printed materials (Harris, 2021; McDonald, 1999).

Lundberg and Wallin (2016) express that one of the key advantages of digital printing imposition is its ability to optimize the use of paper and reduce waste. Digital printing processes consider arranging multiple images or pages on a single sheet. Digital printing imposition maximizes the utilization of paper, minimizing the amount of unused space. This not only reduces costs but also contributes to environmental sustainability by minimizing paper waste (Martínez-Peláez et al., 2023). Furthermore, digital printing imposition allows for efficient nesting of images, ensuring that the printed materials are produced in the most economical manner (Coble, 2023; Konica Minolta Business Solutions, 2023).

Design impact has become increasingly significant in the realm of print media. With the rise of digital printing technologies, designers now have more freedom and flexibility to experiment with various design elements (Neves, 2017). Crawford (2024) shares that digital printing imposition is essential in translating these design concepts into tangible printed materials. Digital printing imposition boosts the overall design impact of printed materials by arranging and positioning digital images or pages in a visually appealing manner (Professional Graphics Inc., 2021). The visual appeal of printed materials is essential in capturing the attention of the target audience. Digital printing imposition enables precise alignment and registration of images, ensuring that the final output is visually appealing and of high quality (Ambrose & Harris, 2009). This is particularly important in industries such as advertising and marketing, where the effectiveness of printed materials in conveying messages and attracting customers is paramount. The ability to achieve accurate colour reproduction and sharp image details through digital printing imposition enhances the overall visual impact of printed materials (Ludovico, 2012).

In the dynamic landscape of digital printing, optimizing workflow efficiency in the imposition process has become a critical challenge for print professionals and businesses in Sekondi-Takoradi of Western region, Ghana. The evolving expectations of consumers and businesses for visually striking and customized print materials have intensified the need for impactful designs (Sec print, 2023). As a result, there is a growing pressure on printing companies to optimize their imposition workflows to seamlessly integrate design impact considerations without compromising efficiency. Also, imposing digital designs for printing involves a myriad of factors, including layout, colour management, and variable data printing. The complexity of these workflows often leads to bottlenecks, errors, and delays, hindering the seamless translation of creative concepts into high-quality prints (Konica Minolta Business Solutions, 2023).

Besides, the rapid advancement of digital printing technologies, coupled with the diversity of printing materials and formats, presents a challenge in integrating various tools and software seamlessly (Konica Minolta Business Solutions, 2024). Many businesses struggle with the selection and implementation of imposition software that aligns with their unique needs and facilitates a smooth workflow (In-plant impressions, 1998). The imposition stage, which involves arranging and configuring digital images for print, plays a pivotal role in determining the visual impact, print quality, and overall efficiency of the final output (McMillan, 2014). This study sought to outline a visual tutorial focused on the intersection of design impact and workflow optimization in the realm of digital printing imposition. In an attempt, the study demonstrated the benefits of template-based imposition for standardized layouts and design consistency using imposer pro software to address the intricate challenges faced by industry stakeholders in streamlining digital printing imposition workflows, with a specific focus on the impact of design choices on the printing process in Sekondi-Takoradi Metropolis - Western Region, Ghana.

2. Literature Review

2.1. Theoretical framework

The foundation of optimizing workflow efficiency in digital printing imposition lies in understanding the intricate relationship between design impact and the methods employed during the printing process (Glykas, 2004). The theoretical framework explored the underlying principles guiding the strategic choices made in imposition workflows, with a particular focus on visual impact and design considerations (Flores Ituarte et al., 2023). The study adopted the theory of Print 4.0 as the theoretical underpinning for essential in understanding the imposition methodology and its profound influence on design (Schroeder, 2014). Grounded in the principles of graphic design, the careful selection of imposition methods was pivotal in shaping the visual appeal of the final product. The study incorporated theoretical concepts such as visual hierarchy, balance, and harmony, imposition methods were strategically employed to achieve the desired design impact. At its core, print 4.0 emphasized the adaptation and amalgamation of printing procedures with digital technologies, automation, data exchange, and intelligent systems. It recognized the need for the printing industry to evolve and embrace the opportunities presented by the digital age. One of the key aspects of print 4.0 was the utilization of digital technologies in digital printing processes. This included the use of computer-aided design (CAD) software, which enabled the creation and modification of digital designs that could be directly translated into printable formats. Moreover, digital printing technologies, such as inkjet and laser printing, were employed to achieve higher precision, faster production times, and improved quality (Drupa, 2022).

2.1.1. Theoretical concepts

The study incorporated visual hierarchy, balance and harmony into the selection of imposition methods allowing the researchers to create visually attractive and impactful designs (Chapman, 2024; Interaction Design Foundation – IxDF, 2016). The researchers understood the principles of graphic design and utilizing imposition methods that aligned with these principles. The researchers effectively communicated their intended message, captured the viewer's attention, and created a memorable visual experience. Visual hierarchy, for instance, guided the arrangement of elements on a page, ensuring that the most important information stands out and captures the viewer's attention (Paland, 2023). This principle helped the researchers to prioritize content and create a clear and organized visual structure. Imposition methods took into account visual hierarchy that effectively communicated the intended message and guided the viewer's eye through the design (Ambrose & Harris, 2011).

Balance, another crucial theoretical concept, ensured that the elements within a design were distributed harmoniously (Li, 2015). The researchers considered the weight, size, and placement of elements by achieving a sense of equilibrium and stability. Imposition methods helped the researchers adhere to the principles of balance by contributing to a visually pleasing composition, enhancing the overall aesthetic appeal of the design. Harmony, on the other hand, focused on the coherence and unity of the design elements (Neves, 2017). The researchers selected imposition methods that promote harmony by creating a cohesive and visually satisfying composition. This element was achieved through the careful arrangement of colours, fonts, and images, ensuring that they work together harmoniously to convey a consistent message or evoke a specific emotion (Keung, 2023).

2.2. Workflow Efficiency in Digital Printing

The significance of optimizing workflow efficiency in the digital printing industry cannot be overstated.

Faulkner (2023) mentioned that traditional imposition workflows often present numerous challenges that hinder productivity and cost-effectiveness. Efficient workflow management plays a crucial role in the printing industry, particularly in the realm of digital printing. In the digital printing sector, streamlining workflow is of utmost importance for several reasons (Plus Technologies, 2024). Firstly, it helps to improve efficiency and productivity. This factor is achieved by eliminating unnecessary steps and automating processes. Digital printing companies have significantly reduced the time and effort required to complete a job. This allows them to handle a larger volume of work and meet tight deadlines more easily (Glykas, 2004).

Drinko (2023) discussed that streamlining workflow in the digital printing has aid graphic designers to minimise errors and improve accuracy. Manual processes are prone to human errors, such as misplacing or misinterpreting files, which lead to costly reprints and delays. Implementation of automated workflows allows digital printing companies to ensure that files are processed correctly and consistently. This process reduces the risk of mistakes and improving overall quality. Streamlining workflow in the digital printing sector enables better cost control. Digital printing companies optimise processes and reduce waste by minimising expenses associated with labour, materials, and equipment. This process leads to higher profit margins and a more competitive pricing strategy, attracting more customers and increasing market share (Lien, 2016).

However, conventional imposition workflows in the digital printing sector often face several obstacles. One major challenge is the complexity and time-consuming nature of manual imposition processes (Collins, 2023). Traditional methods require graphic designers or operators to manually arrange and position pages on a printing sheet. This method could be a tedious and error-prone task. This method does not only slow down the production process but also increase the likelihood of mistakes. Another obstacle is the lack of integration between different software and hardware systems. In many cases, digital printing companies use multiple software applications and devices for different stages of the printing process, such as file preparation, colour management, and printing. Without proper integration, transferring files and data between these systems could be cumbersome and prone to errors, leading to delays and inefficiencies (Addams, 2019).

Additionally, conventional imposition workflows often lack real-time visibility and tracking capabilities. This means that graphic designers, operators and managers do not have access to accurate and up-to-date information about the status of jobs, making it difficult to monitor progress, identify bottlenecks, and make informed decisions (Prpic, 2023). This lack of visibility hinder productivity and hinder the ability to meet customer expectations. Streamlining workflow in the digital printing sector has proven to be efficient, accurate, and cost effective. Overcoming these challenges through the adoption of automated and integrated workflow solutions greatly enhance the competitiveness and success of digital printing companies.

2.3. Influence of Imposition on Design

The correlation between imposition choices and design elements has been extensively explored through various case studies, which have effectively demonstrated the significant impact of imposition on the overall design. Imposition tells more about the arrangement and positioning of elements within a design layout, such as text, images, and graphics, in order to optimize the visual appeal and readability of the final product (Hass, 2023). Graphic designers carefully consider imposition choices to effectively enhance the aesthetic appeal and functionality of their designs. For instance, the placement of text and images

greatly affect the overall composition and balance of a design. Imposition choices also impact the readability and flow of information, ensuring that the intended message is effectively conveyed to the audience. Studies on digital printing have provided valuable insights into the impact of imposition on design. These studies have examined various design elements, such as typography, colour schemes, and image placement, and how different imposition choices either enhance or hinder the overall design. Through meticulous analysis and experimentation, graphic designers have been able to identify the most effective imposition strategies for different design objectives (Schifferstein, Lemke & Boer, 2022).

Furthermore, these studies have also shed light on the importance of considering the target audience and medium when making imposition choices. Different design formats, such as print publications or digital interfaces, require specific imposition techniques to optimize the graphic designer's experience and visual impact. Graphic designers understand the unique characteristics of each medium that fits their imposition choices accordingly, resulting in more impactful and engaging designs. The study posits that the relationship between imposition choices and design elements is a vital aspect of the design process (Perkhofer, Walchshofer & Hofer, 2020). Through digital printing studies, graphic designers have been able to demonstrate the significant impact of imposition on the overall design, highlighting the importance of thoughtful and strategic imposition choices. Graphic designers have considered factors such as composition, readability, and target audience effectively to optimize their designs and create visually appealing and engaging experiences (Interaction Design Foundation – IxDF, 2016).

3. Materials and Methods

3.1 Methods

As a qualitative research method, the study adopted case study design on a visual tutorial approach, utilizing a combination of images, diagrams, and video explanatory text to present step-by-step guides and examples (Glaw et al., 2017). The content was structured to cover fundamental concepts, software selection, template-based imposition, automation and variable data printing (VDP) integration. The qualitative case study research design (Creswell & Creswell, 2018) helped the researchers to delve into the effectiveness and impact of the visual tutorial approach, which covered the seamless integration of text, images, and diagrams. This approach recognized the significance of combining various mediums to enhance the learning experience and facilitate comprehension. The qualitative case study research design was used to explore the benefits and outcomes of employing the visual tutorial approach in educational settings. It was used to investigate how the integration of text, images, and diagrams influences knowledge acquisition, retention, and overall understanding of this approach on learner engagement, motivation, and satisfaction (Busetto, Wick & Gumbinger, 2020).

Qualitative data was collected through focus group, surveys and assessments to measure the effectiveness of the visual tutorial approach in comparison to traditional instructional methods Creswell & Creswell, 2018). Qualitative data was gathered through interviews and observations to gain deeper insights into learners' experiences and perceptions. The researchers also considered various factors that influence the effectiveness of the visual tutorial approach, such as the complexity of the subject matter, the target audience, and the instructional context.

The research focused on a total number of five research participants from Sekondi-Takoradi Metropolis using University Printing Press of Takoradi Technical University (TTU) as a case study, included one (1) graphic design lecturer, one (1) small scale printing press assistant, one (1) industry-based printing press assistant, one (1) graphic designer and one (1) sales personnel. These focus groups of expertise with simple

random were purposively sampled to participate in the research study (Campbell et al., 2020). These individuals were chosen based on certain criteria that aligned with the objectives of this investigation. The focus group provided valuable insights and feedback that helped the researchers gain a deeper understanding of the topic being studied.

Research ethics were strictly followed in relation to moral and reproductive rights even before the introduction of the visual tutorial method (Wiles, 2013). The ethical considerations surrounding research in this area of digital printing were paramount to ensure the protection and well-being of the participants involved. Prior to the visual tutorial method, the researchers obtained an informed consent verbally from participants, ensuring their privacy and confidentiality, minimizing any potential harm or discomfort, and maintaining the integrity and accuracy of the research findings. The implementation of the visual tutorial method did not change the fundamental ethical principles that researchers had to adhere to. Instead, it provided an additional tool to enhance the research process and facilitate better understanding and communication between researchers and participants (Weinbaum et al., 2019). The visual tutorial method allowed for the presentation of complex information in a more accessible and engaging manner, which could potentially improve participants' comprehension and decision-making abilities.

3.2. Materials and Tools

Materials with tools were employed to enhance the learning experience and provide a comprehensive understanding of the visual tutorial design development. These research materials and tools included papers, inks, laptop computer, printer, software and bandicam that were carefully selected to ensure accuracy and relevance for the research study. The visual tutorial approach involved these research materials and tools to present information in a visually appealing and engaging manner. This included the use of visuals infographics, and interactive presentations. These research materials and tools were considered to cater to different learning styles and help graphic designers or students grasp complex concepts more easily (Abdulrahaman et al., 2020).

3.2.1. Techniques and procedures

Based on the principles of industrial digital printing, the technique of template-based imposition technique was employed for the study. This technique utilized the idea of standardization to enhance efficiency. Standardization method was employed in the imposition workflow to minimize variations, increase predictability, and streamline processes. The researchers used design templates, which were pre-designed layouts for arranging and positioning content on a printed sheet, template-based imposition ensured consistency and reduced the need for manual adjustments. The standardization method also allowed for a more efficient workflow as it eliminated the time-consuming task of manually setting up each print job. The imposition procedure involved arranging multiple pages or images onto a single sheet in a specific order, ensuring that they were positioned correctly for printing and subsequent finishing processes such as cutting and folding. Traditionally, this procedure required skilled operators to manually calculate and adjust the positioning of each page, which was not only time-consuming but also prone to errors (Keif, 2007).

With template-based imposition procedure for the study, the imposition layout was predefined and stored as a template. This template contained information about the sheet size, margins, gutters, and other parameters necessary for arranging the pages. Application of standardization in the template-based imposition technique also allowed for increased predictability (Collins, 2023). The researchers used

consistent templates to anticipate the final layout and appearance of the printed sheets. This predictability was crucial for ensuring that the printed materials met the desired specifications and quality standards. Standardization method in imposition workflows helped streamline the processes by reducing the need for manual adjustments and rework. The researchers used templates to easily impose different print jobs with minimal effort, as the templates already contained the necessary layout information. This procedure eliminated the need to manually calculate and adjust the positioning for each job, saving time and reducing the risk of errors (Collins, 2023). These techniques helped to enhance efficiency, minimizing variations, increasing predictability, and streamlining processes for faster, more accurate, and more consistent production of printed materials.

4. Results

4.1 Design Development Strategy

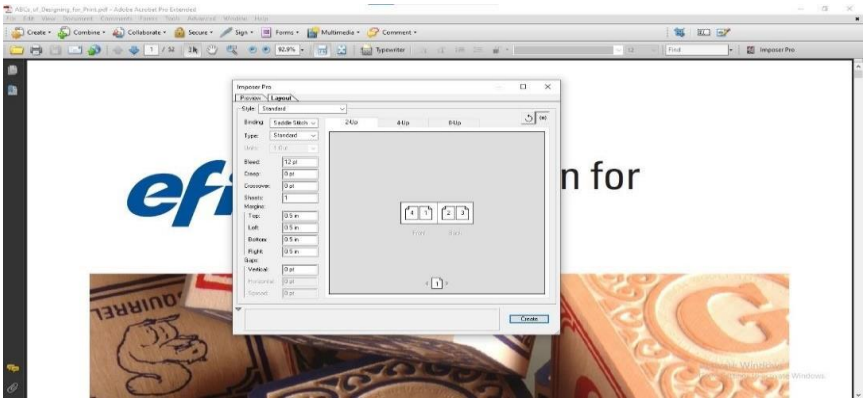
This section focused on the design objectives, exploration of the key features, functions, and techniques of Imposer Pro to efficiently impose and arrange pages for printing purposes that is the process of creating professional digital impositions, preliminary, rough and finished designs, production processes, pre-testing, evaluation/appreciation, costing and pricing.

4.1.1. Imposer Pro Software

Imposer Pro functioned as an Acrobat plug-in designed to generate a new portable document format (PDF) by imposing the pages of the original multipage PDF file into printer flats. This tool provided flexibility through three sheet types (2-Up, 4-Up, or 8-Up) and five imposition types (Standard, Work & Turn, Work & Tumble, Split Web, and Sheet Wise). Researchers had the option to select the pages for imposition and determine the number of signatures required to fulfil diverse imposition requirements. Additionally, the tool allowed the utilization of different imposition methods within the same document. Notably, Imposer Pro addressed various aspects such as bleed, creep, crossover trapping, page gaps, spread gaps, and plate margins, aligning with the specifications outlined in this study.

The plug-in had no impact on the PDF file's layout, as the imposition process generated an entirely new document without introducing additional compression. Imposer Pro, in essence, refrains from adding, rearranging, or rotating pages. Consequently, researchers did not need to concern themselves with the document's page count or its initial setup. The utilization of Imposer Pro involved the following steps:

1. Open the desired Acrobat PDF file.
2. Access the Imposer Pro dialog box through the File menu, located below the Print command.
3. Configure the imposition settings using the Layout and Preview panels within the Imposer Pro dialog box, illustrated in Figure 1.



4. Navigate to the Layout panel within the Imposer Pro dialog box. Employ the Preview dialog box to confirm that the settings you have configured for your layout align with the requirements of the job, as illustrated in Figure 2.

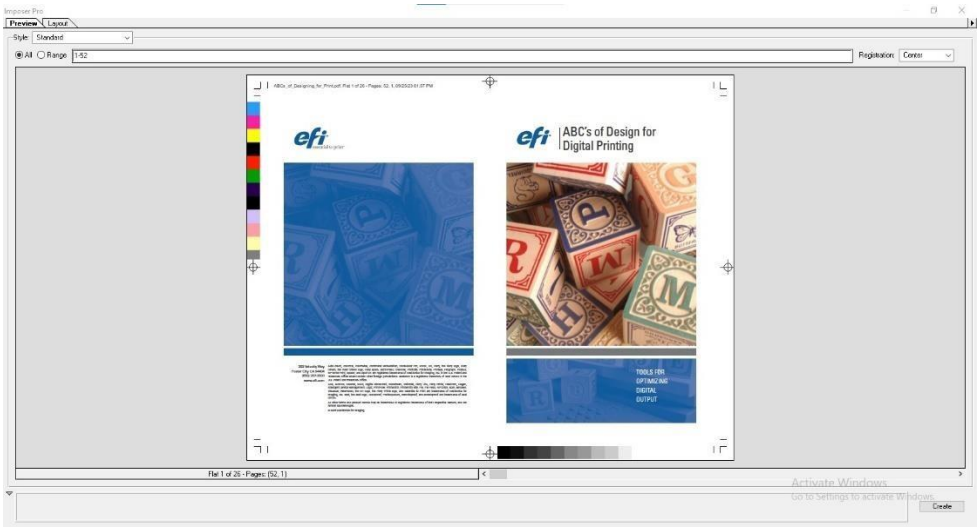


Figure 2: Preview Panel Dialog Box

5. Access the Preview panel within the Imposer Pro dialog box and select "Create" to generate a fresh PDF file featuring imposed printer flats showcasing printer's marks and detailed information for each flat. Imposer Pro includes an interactive Help section accessible by clicking on the rectangle positioned in the lower-left corner of the Imposer Pro dialog box. Hover over any item to reveal relevant information about it within the Help area, as illustrated in Figure 3.

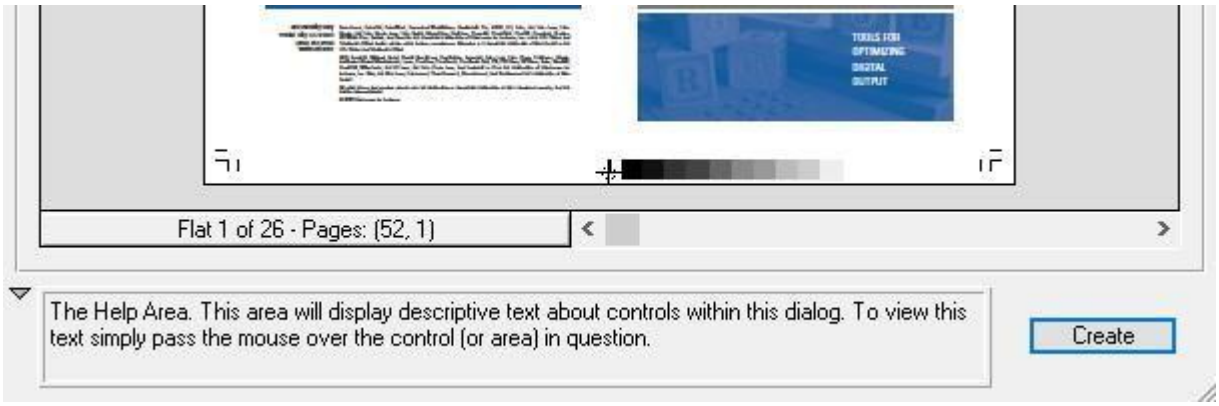


Figure 3: Help Area

4.1.2. Setting Up an Imposition Project

Step 1: Specifying a Sheet Type

The sheet type denotes the number of pages on each flat of the printer, which can be two, four, or eight pages on each side of a sheet. The choice of imposition in Imposer Pro (2-Up, 4-Up, or 8-Up) governs the available imposition options. For 2-Up, you have access to Standard imposition. Opting for 4-Up provides options such as Standard, Work & Turn, Work & Tumble, and Sheet Wise imposition. If you select 8-Up, you can choose from Standard, Work and Turn, Work and Tumble, Split Web, and Sheet Wise imposition. To specify the sheet type, navigate to the Imposer Pro dialog box and access the Layout tab. Subsequently,

click on the 2-Up, 4-Up, or 8-Up tab, as illustrated in Figures 4, 5, and 6. The tabs for 2-Up, 4-Up, and 8-Up enable you to designate the sheet type, thereby determining the available imposition options.

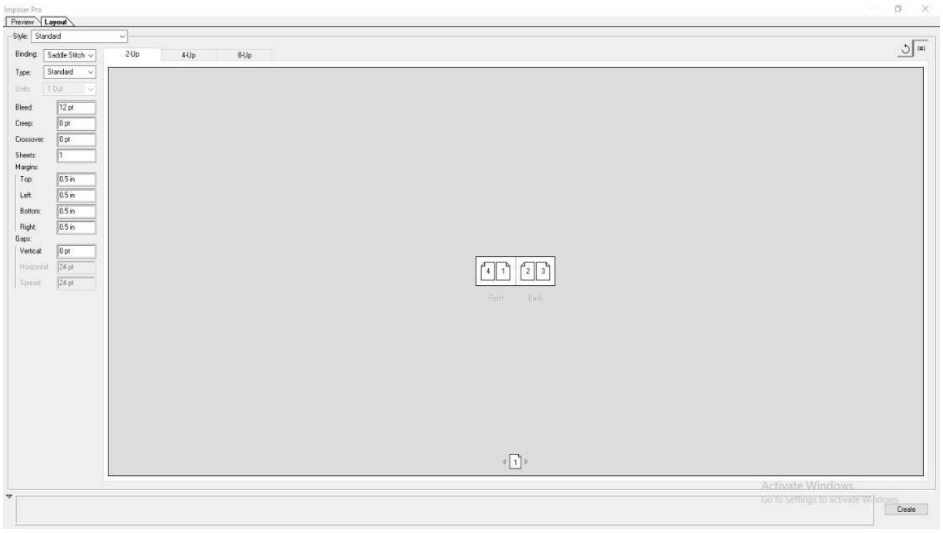


Figure 4: Two (2-Up) Tab

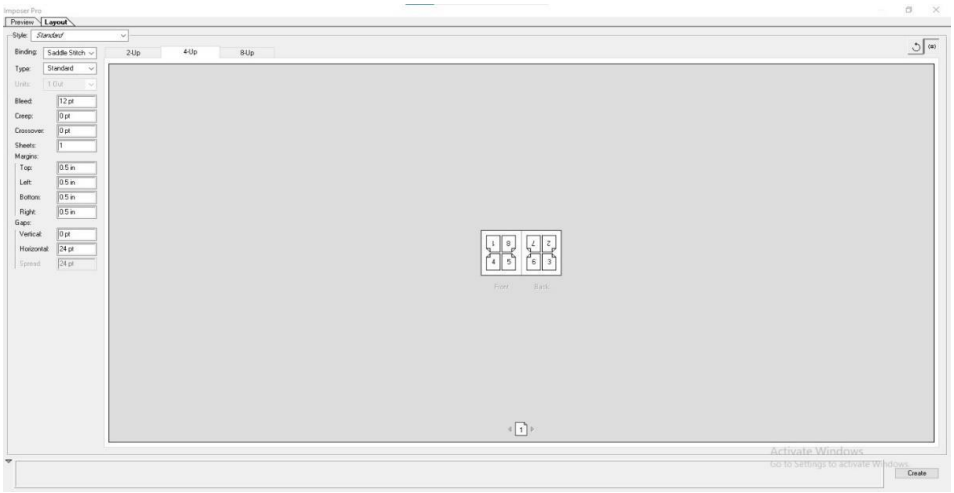


Figure 5: Four (4-Up) Tab

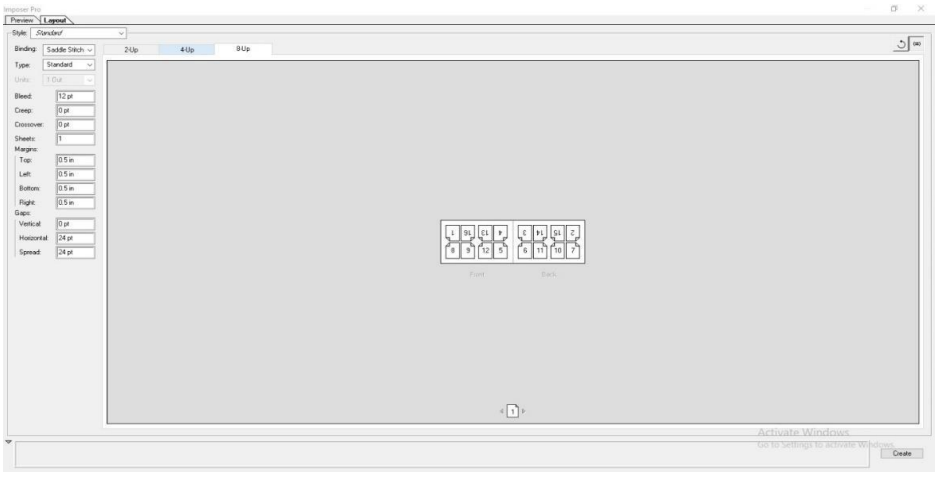


Figure 6: Eight (8-Up) Tab

Step 2: Specifying an Imposition Type

Given that the type of imposition interacts with the binding method and influences the available options, it's crucial to comprehend the functionality of each imposition type. The Standard imposition positions the specified number of pages for the sheet type on each flat: two for 2-Up, four for 4-Up, or eight for 8-Up. For instance, if you opt for 4-Up Standard, an eight-page document will produce two distinct printer flats, a 16-page document will result in four unique printer flats, and so forth (assuming Saddle Stitch or Perfect Bound binding is selected).

On the other hand, Work and Turn imposition places four (4-Up) or eight (8-Up) pages on each flat by turning the printed press sheet from left to right. In cases where Saddle Stitch or Perfect Bound binding is chosen, duplicate printer spreads will be generated, as illustrated in Figure 7. Understanding these imposition methods is vital for making informed decisions based on the desired binding and layout outcomes.

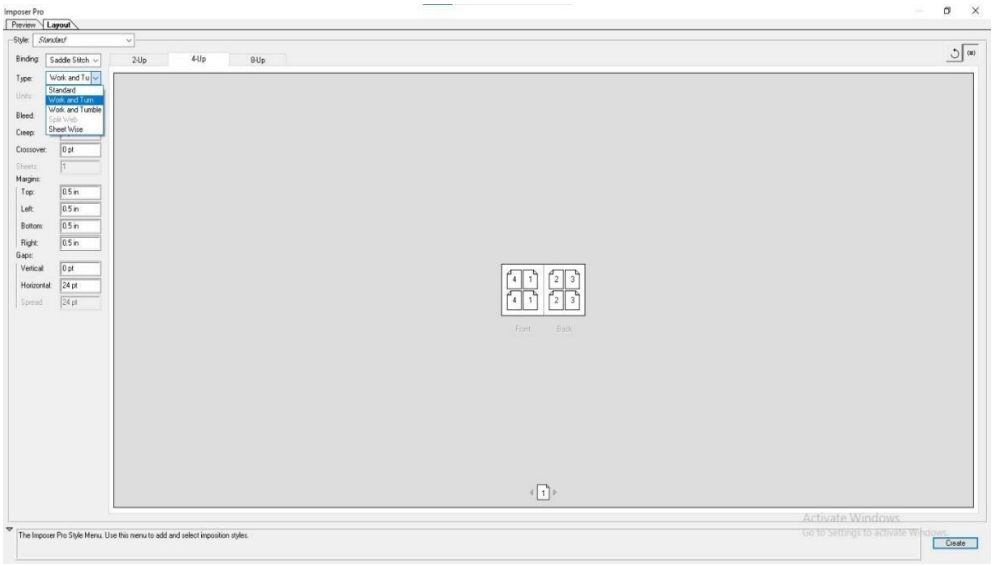


Figure 7: Work and Turn Imposition Type

The Work and Tumble method arranges either four (4-Up) or eight (8-Up) pages on a single flat surface, with the printed press sheet being flipped from top to bottom. When utilizing Saddle Stitch or Perfect Bound binding methods, distinct printer spreads are generated, and these are then replicated on both the front and back in a Figure 8 pattern.

Figure 8: Work and Tumble Imposition Type

The Split Web feature, exclusive to 8-Up sheets, arranges eight pages on each flat surface. This functionality enables the imposition of a document across multiple forms when printing on a Web press configured for multiple roll stands. To specify the number of roll stands to be configured, enter the desired value in the Sheets field. For instance, entering '2' in the Sheets field will impose two forms, constituting a single 32-page signature. Within the Layout panel, you can easily switch between the forms that Imposer Pro will generate, as demonstrated in Figure 9.

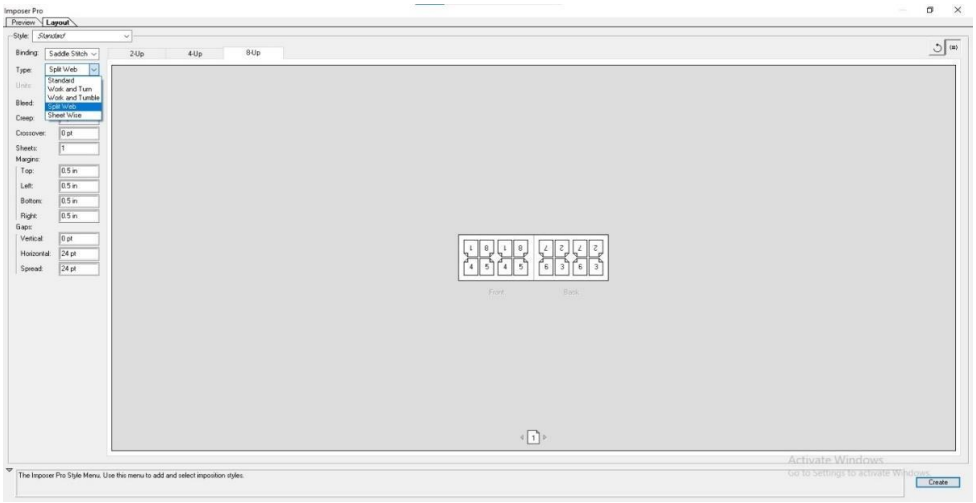


Figure 9: Split Web Imposition Type

Sheet Wise arrangement accommodates four (4-Up) or eight (8-Up) pages on a single flat surface, generating distinct plates for each side of the press sheet. This configuration proves advantageous when printing complete signatures that result in a single signature output on a Web press. When opting for Sheet Wise, the Units menu provides flexibility in determining the desired number of units to produce.

To designate a specific imposition type, the initial step involves verifying the sheet type within the Layout tab: 2-Up, 4-Up, or 8-Up. Subsequently, navigate to the Type menu to make a selection. The Type menu tailors its options based on the chosen sheet type, presenting a variety of imposition choices to align with the unique requirements of the printing project.

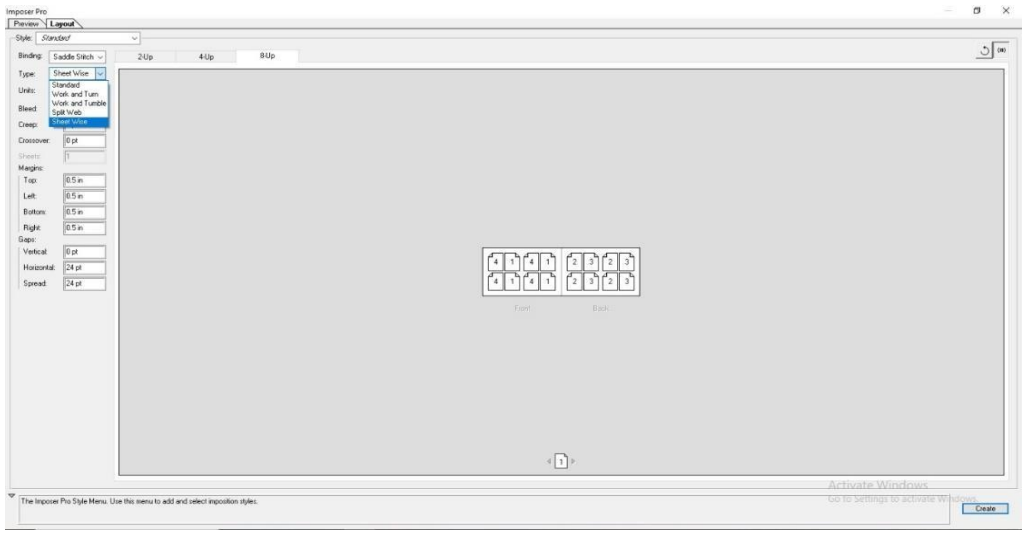


Figure 10: Sheet Wise Imposition Type

Step 3: Specifying a Binding Type

The selection of a binding method has a direct impact on the creation of printer flats. Opt for Saddle Stitch when intending to staple the pages together. If adhesive binding is preferred, Perfect Bound is the suitable choice. Stacked is ideal for scenarios involving three-hole punching, spiral binding, or comb binding. Notably, Stacked is akin to None, but it allows for the utilization of multiple masters, specifically beneficial for large format copiers.

If no binding is intended, the None option should be selected. None facilitates the offsetting of pages in configurations such as 2-Up, 4-Up, or 8-Up from the designated Start Page, a parameter specified in the Preview panel. Choosing Saddle Stitch, Perfect Bound, or Stacked activates the Signatures menu within the Preview panel, offering the ability to specify the desired number of signatures. To specify the binding type, ensure the correct sheet and imposition type in the Layout tab, and then select the appropriate option from the Binding menu. The Binding menu provides choices such as Saddle Stitch, Perfect Bound, Stacked, or None, as illustrated in Figure 10.

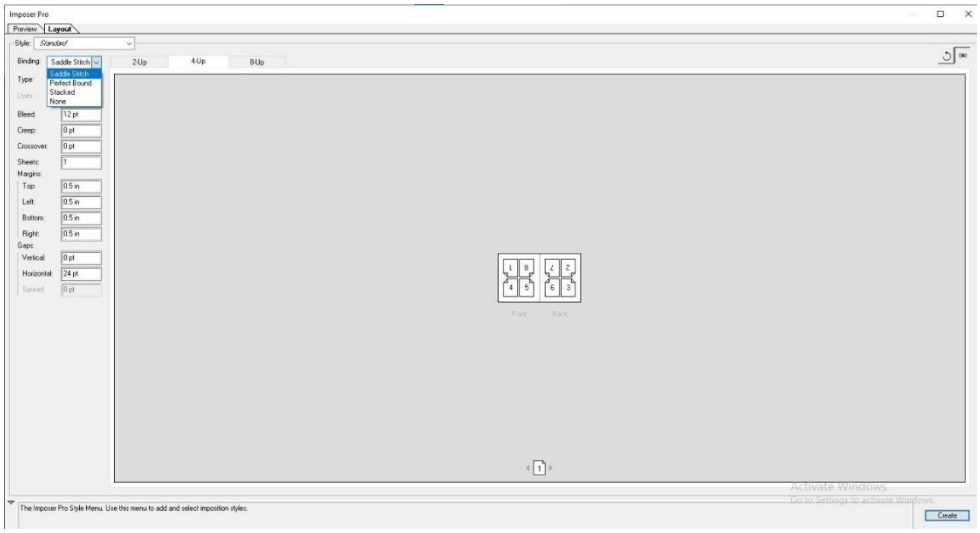


Figure 11: Binding Menu

Step 4: Flipping and Moving Pages

After arranging the pages, you have the flexibility to modify their order and determine if any pages should be flipped, such as creating a head-to-head layout. To initiate page flipping, access the Page Flipping tool located in the Layout panel. Simply click on the thumbnails to flip them; for layouts like 4-Up Standard, 4-Up Work and Turn, or 4-Up Work and Tumble, you can independently flip the top and bottom sets of thumbnails.

For reorganizing pages, utilize the Page Sequence Numbering tool found in the Layout panel. When None is chosen for the binding option, click on each thumbnail to reveal a menu. This menu provides the freedom to arrange the pages in any desired sequence. If Saddle Stitch or Perfect Bound is selected, click on a thumbnail to specify the placement of page 1, ensuring that Page 1 remains a right-facing page.

Step 5: Specifying Bleeds

The Bleed field designates the extent of space allocated for printing page elements beyond the confines of the trimmed page. Input a value ranging from zero to the smallest margin. Notably, the value entered in the Bleed field exclusively impacts the face of a flat printer—encompassing the top, bottom, and external page edges, as depicted in Figure 12.

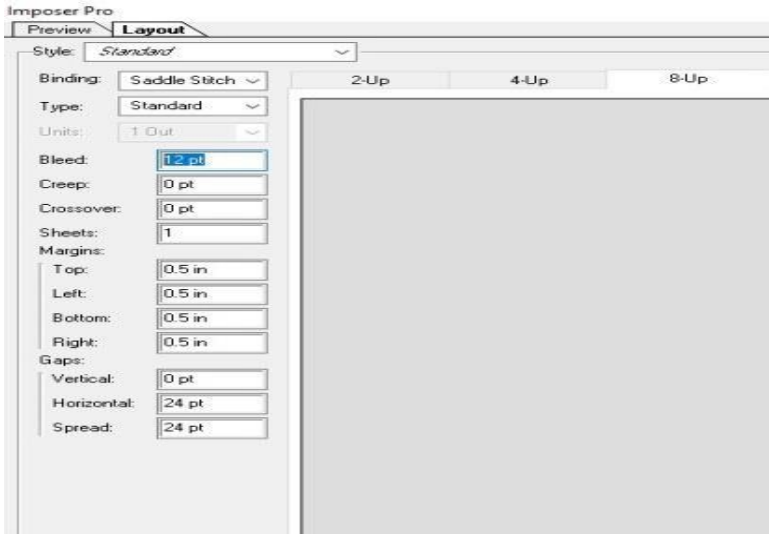


Figure 12: Specifying Bleeds

Step 6: Specifying Creeps

The Creep field holds a numerical value indicating the required space to accommodate paper thickness and folding in publications with Saddle Stitch or Perfect Bound bindings. In Saddle Stitch publications, this value determines the displacement of content, while in Perfect Bound publications, it denotes the displacement of pages concerning the spine.

How Creep is implemented in Imposer Pro

In the Imposer Pro software, the outermost printer flat in the final piece is identified as the cover, while the innermost printer flat corresponds to the centerfold. The term "sheet" denotes both the front and back of a single printer flat. To calculate the creep increment, the user-supplied creep value is divided by the total number of sheets minus one. For instance, if a 16-page PDF generates eight printer flats (equivalent to four sheets), the calculation for the creep increment involves dividing the user-supplied creep value by three (total sheets minus one). In this project scenario, considering a user-supplied creep value of 24 pts (acknowledging its extremeness), the resulting creep increment per sheet would be 8 pts (calculated as 24 divided by 3). Consequently, the imposition process ensures that the front of the first sheet encompasses the first printer flat (pages 16 and 1), while the back of the first sheet comprises the second printer flat (pages 2 and 15).

The outermost sheet receives a creep of 24 pts, the second sheet 16 pts, and the third sheet 8 pts. No creep is applied to the fourth and innermost sheet. As demonstrated in the example, the creep for each subsequent sheet is reduced by the specified increment. In summary, each page on the outermost sheet shifts 12 points (half of the 24-point creep value for this sheet) away from the spine. Similarly, each page on the second sheet shifts 8 points (half of the 16-point creep value for this sheet) away from the spine, and each page on the third sheet shifts 4 points (half of the 8 pts creep value for this sheet) away from the spine. Pages on the fourth and innermost sheet remain unmoved, as illustrated in Figure 13.

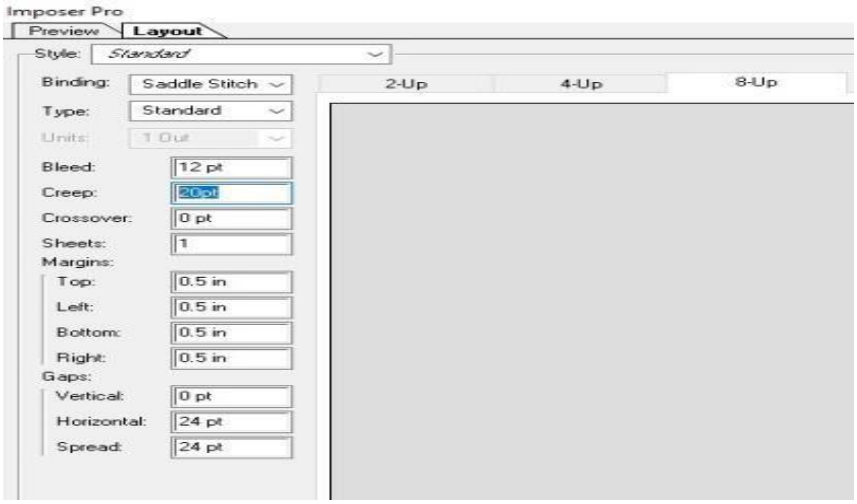


Figure 13: Specifying Creep

Step 7: Specifying Crossover

The Crossover field determines the extent of space allocated for page elements to extend into the Gap in Saddle Stitch or Perfect Bound publications. It functions akin to a bleed for the area between pages. Please input a value ranging from zero to half the Vertical Gap value, as illustrated in Figure 14.

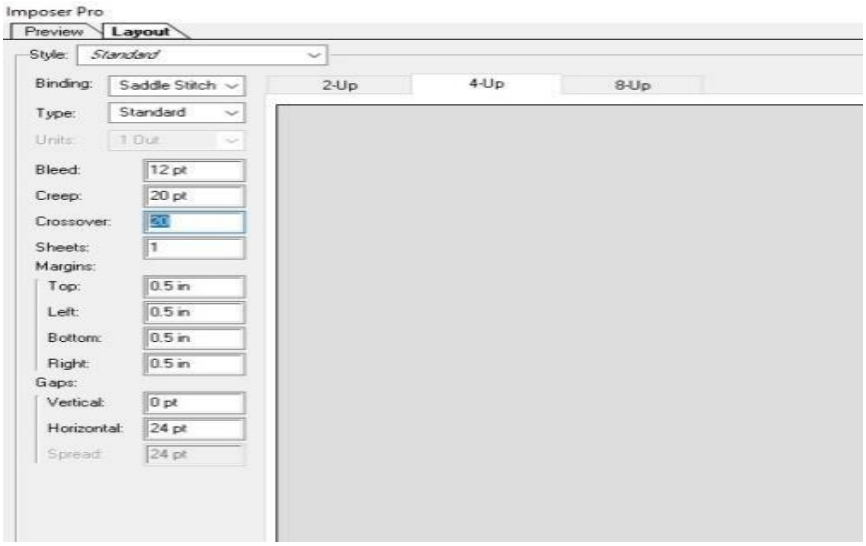


Figure 14: Specifying Creeps

Step 8: Specifying Margins

The Margins section values define the extent of space surrounding the printer flat's trim size. Input values ranging from 0 to 288 points in the designated Top, Left, Bottom, and Right fields, as illustrated in Figure 15.

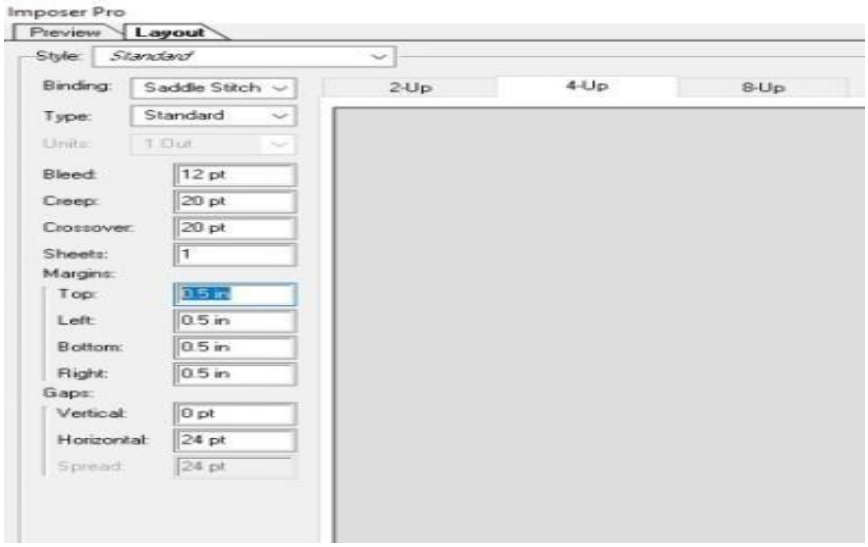


Figure 15: Specifying Margins

Step 9: Specifying Gaps

The values within the Gaps section define the space allocated between imposed pages and spreads. Input numerical values ranging from 0 to 288 points in the Vertical, Horizontal, and Spread fields. The Vertical field signifies the distance between the right side of the left page and the left side of the right page. It is essential to provide a Vertical gap value when dealing with flats containing crossovers. In the case of Perfect Bound publications, if negative values indicate a creeping effect, the minimum Vertical gap value equals the width of the Creep value.

When manually constructing signatures, such as incorporating different stocks within the same publication, you can input a value in the Vertical field to designate an initial creep for flats belonging to distinct signatures. The Horizontal field denotes the space between the bottom of the upper printer spread and the top of the lower printer spread. While a Horizontal gap value is not applicable for 2-Up flats, it becomes mandatory for 4-Up flats that extend beyond the trim area. The Spread field, exclusive to 8-Up flats, represents the vertical gap between the two sets of printer spreads. Within the Layout panel, arrows visually indicate the area influenced by the active field, with a specific focus on the Spread field.

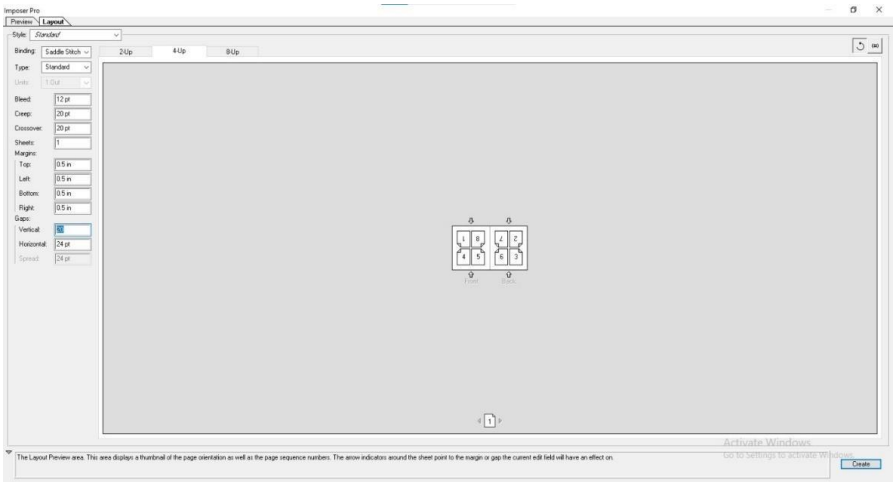


Figure 16: Specifying Gaps

Step 10: Specifying Registration Marks

Imposer Pro provides the flexibility to generate new PDF files either devoid of registration marks (if the existing PDF file already includes its own registration marks) or incorporating standard registration marks. Navigate to the Preview tab within the Imposer Pro dialog box to commence this process. Within the Preview panel, select an option from the Registration menu. For those opting to exclude registration marks, simply choose "Off" in the Registration menu to produce a PDF without these markings. Alternatively, select "Centre" or "Off Centre" to generate a PDF with Imposer Pro's default marks, encompassing four targets, trim marks, bleed marks, fold lines, a text slug, a grey bar, and a colour bar (specifically when printing separations). The precise placement of registration marks is dictated by the value input into the Bleed field found in the Layout panel.

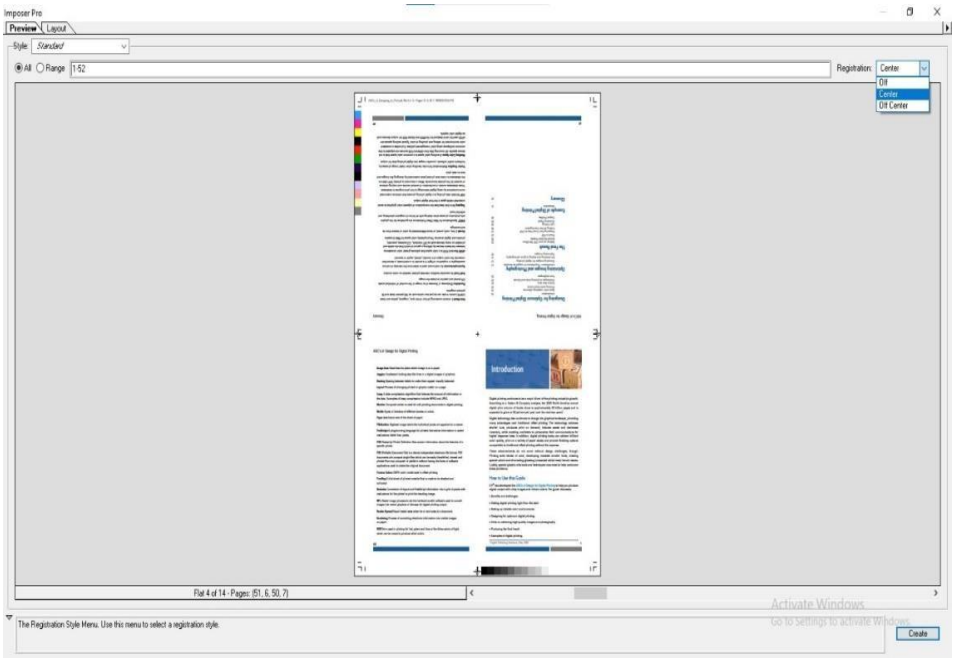


Figure 17: Specifying Registration Marks

4.1.3. Recording the Video (using Bandicam)

Bandicam serves as screen recording software, enabling graphic designers to capture high-quality videos of any content displayed on their PC screen. To employ Bandicam, simply follow these steps:

Step 1: Launch Bandicam and opt for the desired recording mode. There are three options available: Screen Recording, Game Recording, and Device Recording. For this guide, select Screen Recording mode, as illustrated in Figure 18.

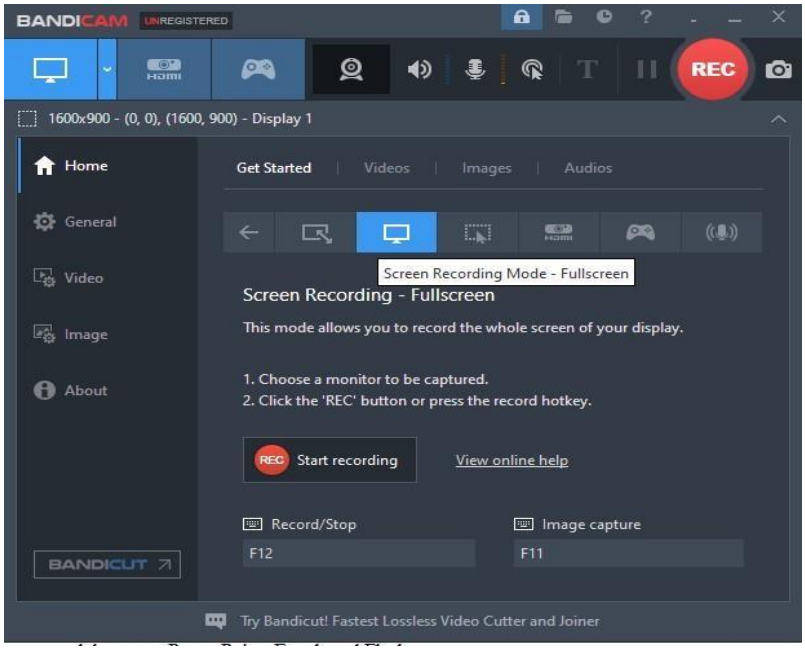


Figure 18: Choose Recording Mode

Step 2: Adjust the video and audio configurations within the Format Settings window. Modify the video size, frames per second (FPS), codec, bitrate, and quality settings as illustrated in Figure 19

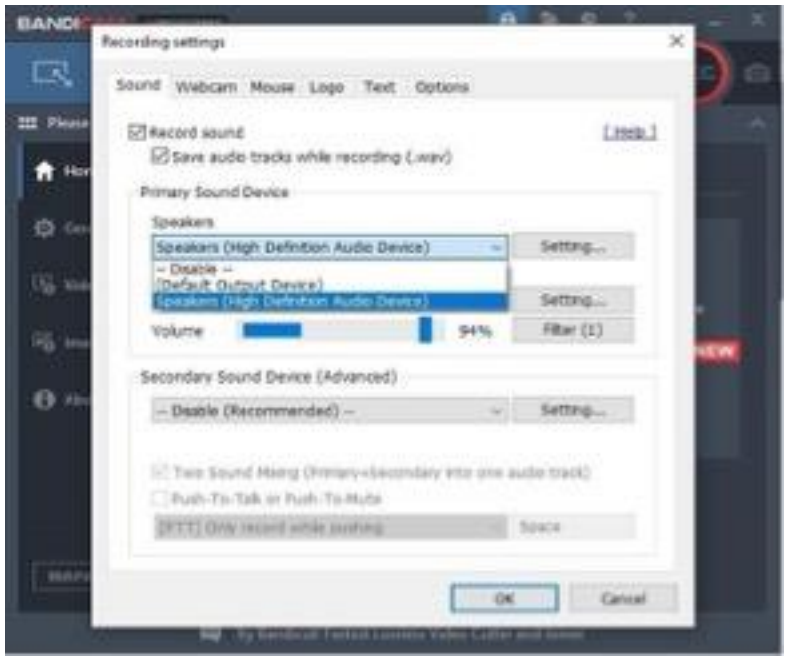


Figure 19: Choose Recording Mode

Step 3: Click the Record button or press F12 to start recording as shown in Figures 20 and 21.

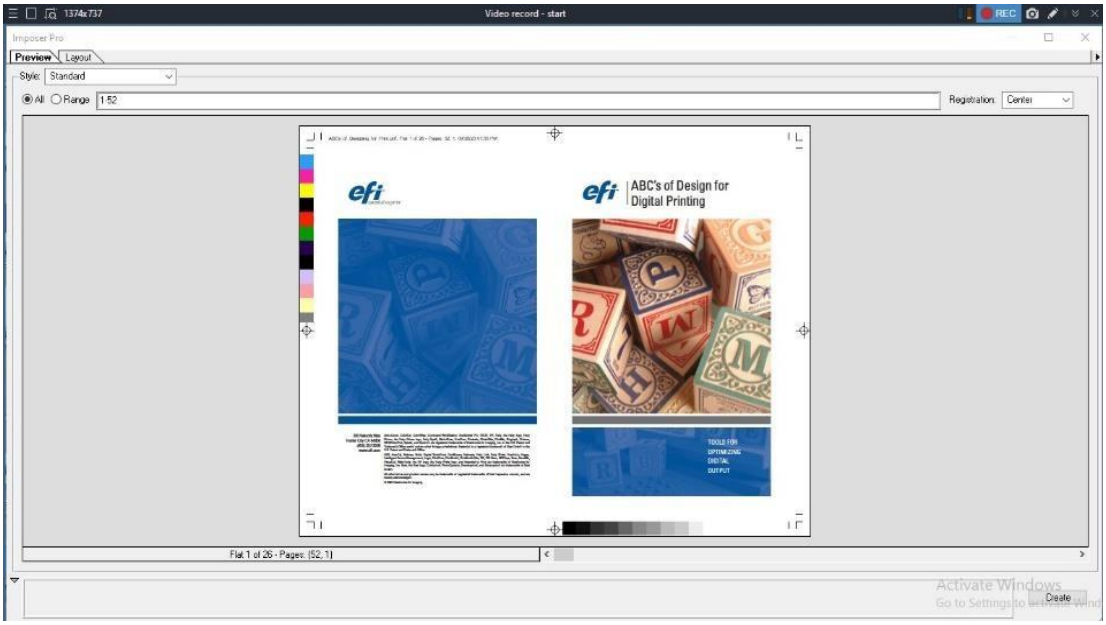


Figure 20: Start Recording

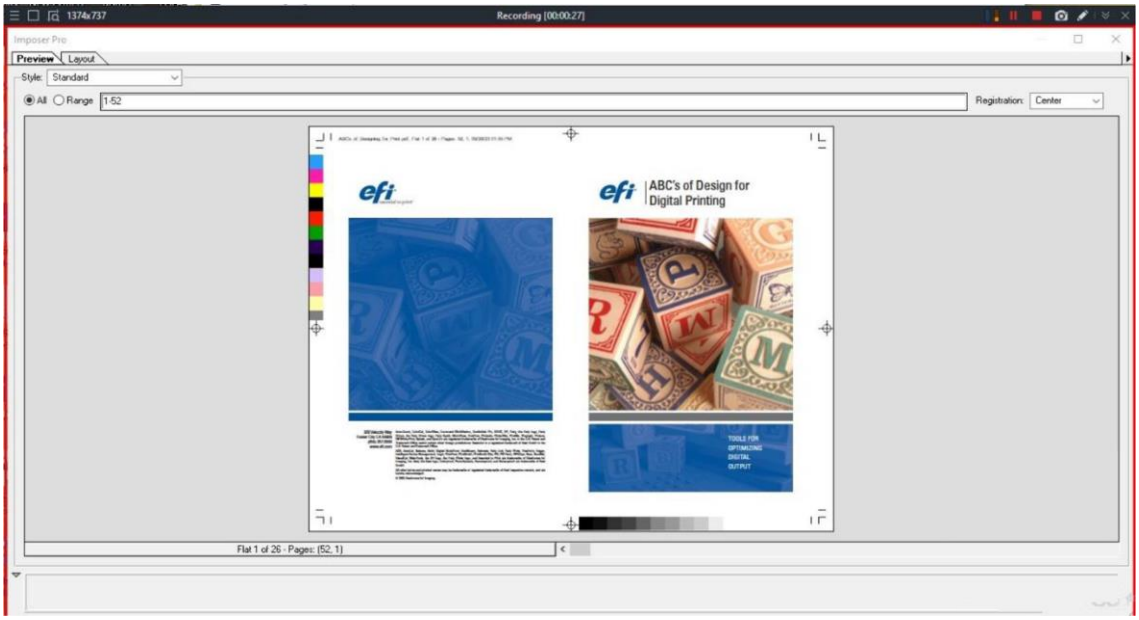


Figure 21: Recording

Step 4: When finished recording, click the Stop button or press F12 again to stop recording as shown in Figure 22.

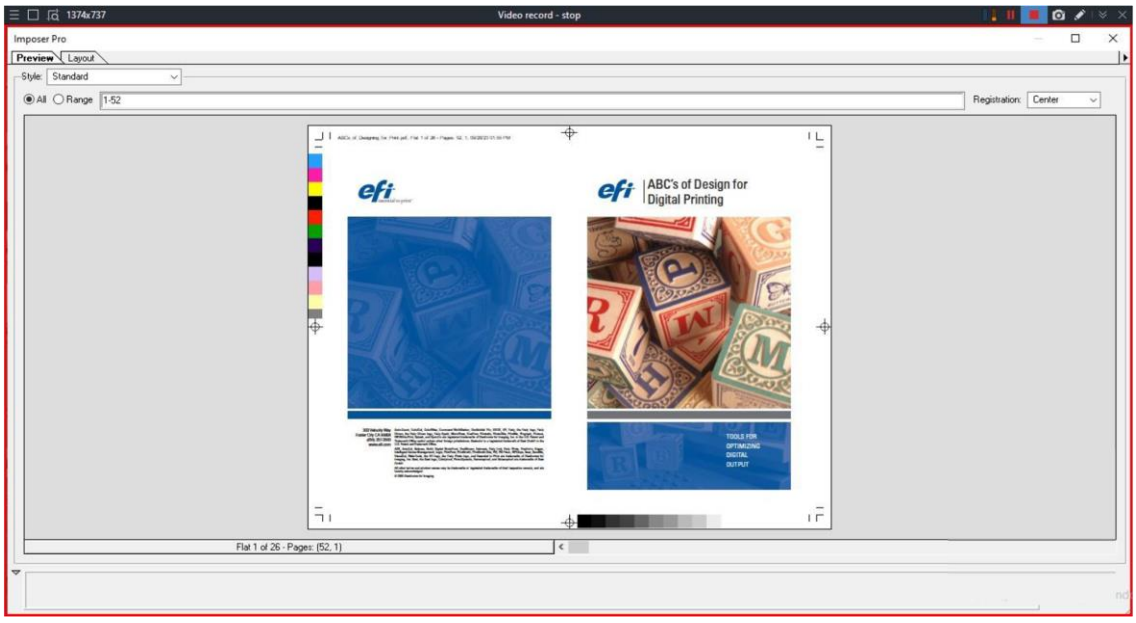


Figure 22: Stop Recording

Step 5: Save your recording in the desired format and location as indicated in Figure 23.

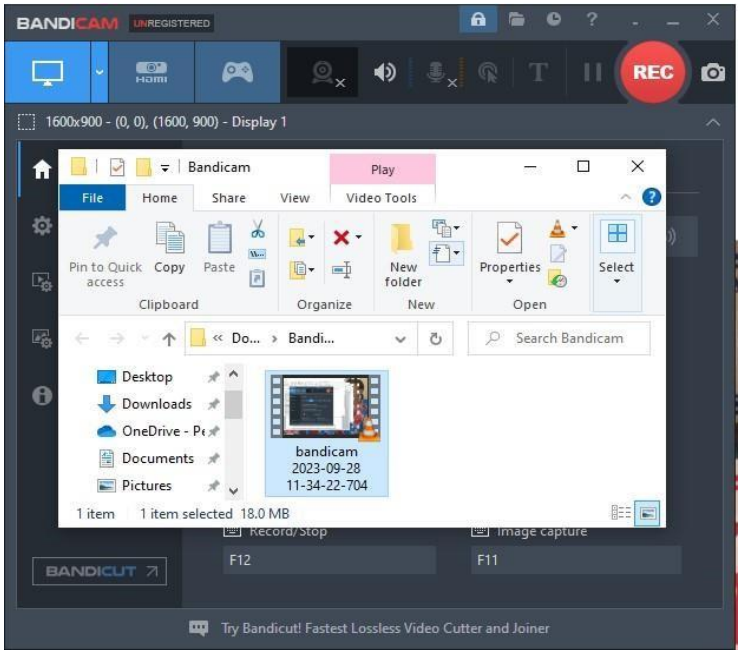


Figure 23: Save Recorded File to Output Folder

4.1.4. Designing the Compact Disc (CD) Label

In order to make the project complete, the researchers decided to package the CD in a well-designed CD label. The layout for the label was executed in three stages: Preliminary sketches, rough visual and Final Rough were done in pencil and scanned before arriving at the Final design label.

4.1.4.1 Preliminary Sketches

The preliminary sketches are the preliminary drawing stage indicating all the necessary elements to be placed on the label. These elements include text and images. The preliminary sketches were done on paper with pen as shown in Figure 24.

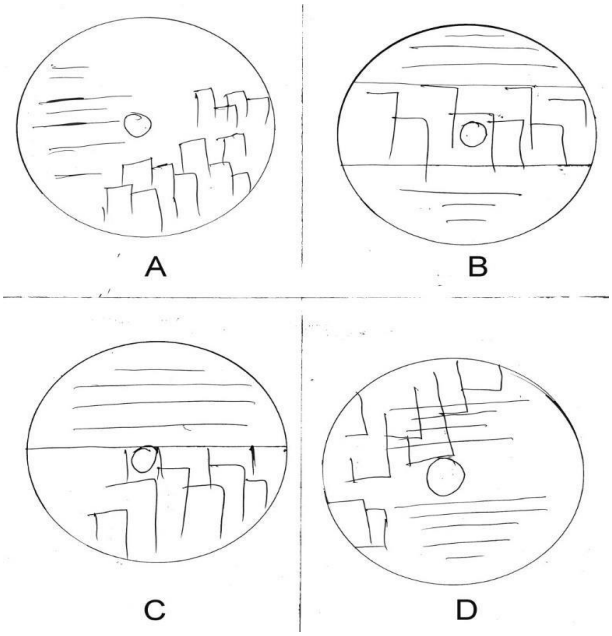


Figure 24: Preliminary Sketches

4.1.4.2. Selected Rough

The selected rough which is technically called blue print, is the satisfactory stage of the rough visual, which must look like the completed work as shown in Figure 25.

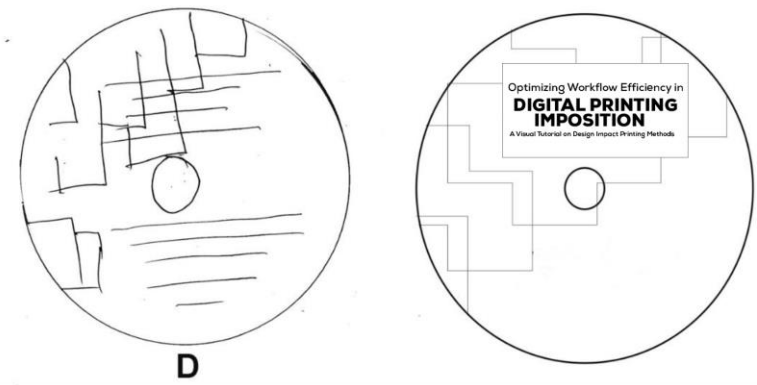


Figure 25: Selected Rough

4.1.5 Final Design Label

The finished design label is the final stage of the CD label design after which production of the design can commence. It is also known as production layout. The back of the CD and its label carry the inscription "Optimizing Workflow Efficiency in Digital Printing Imposition: A Visual Tutorial on Design Impact Printing Methods" with some images reflecting the content of the video. The design was achieved using Adobe Photoshop CC 2019 program. Adobe Photoshop CC 2019 program was used to design the texts and the arrangement of the various elements by adding varieties of colours and fonts as shown in Figure 26.

Figure 26: Final Design Label

4.1.6. Steps in Designing the CD Label

1. Click on Adobe Photoshop CC 2019 icon on the Task bar to open software window.
2. Click on file and go to new. Set canvas size for CD cover (4.5" × 4.5") inches or (11.43 ×11.43) centimetres and click on OK as illustrated in Figure 27.

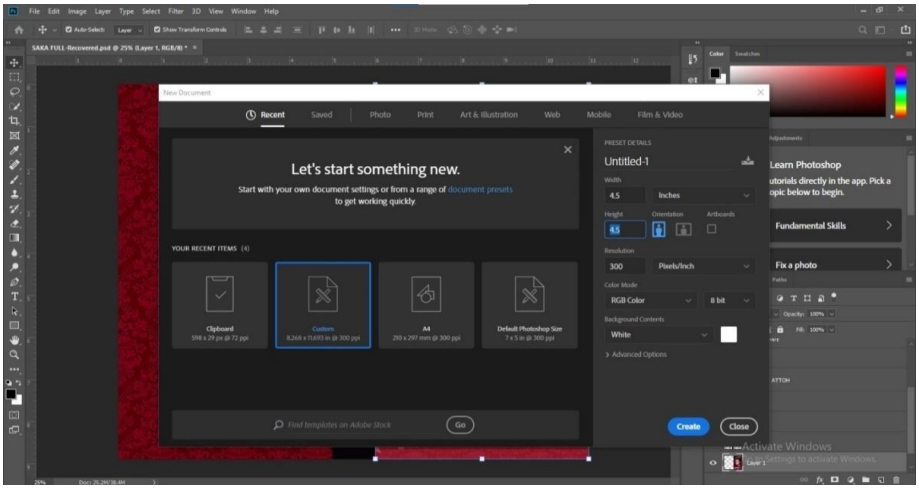


Figure 27: Setting Canvas size for CD Label Design

3. Import background image from folder as illustrated in Figure 28.

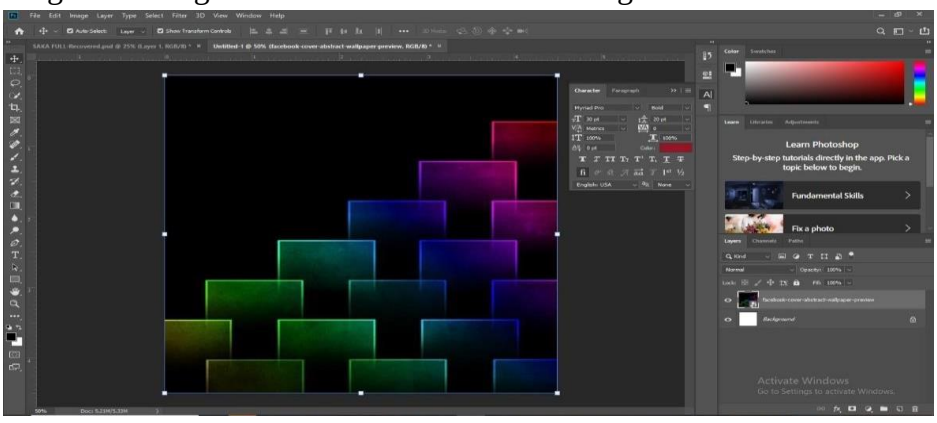


Figure 28: Import Background Image

4. Use type tool to type text on image as indicated in Figure 29.

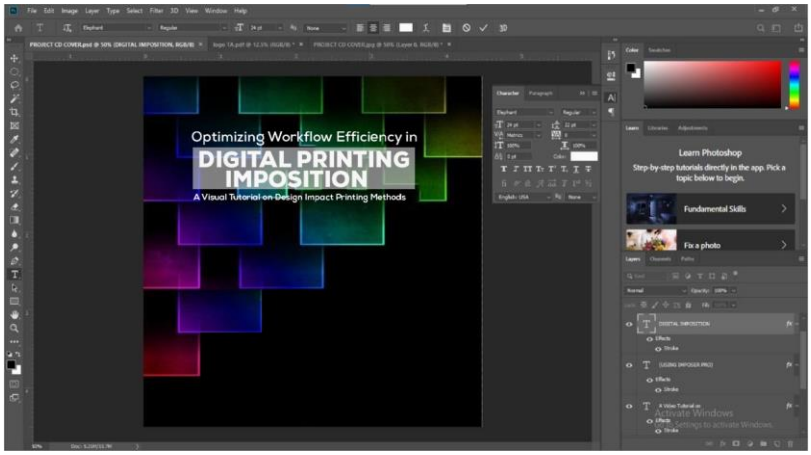


Figure 29: Using Type Tool

5. Select type layer and apply layer style as shown in Figure 30

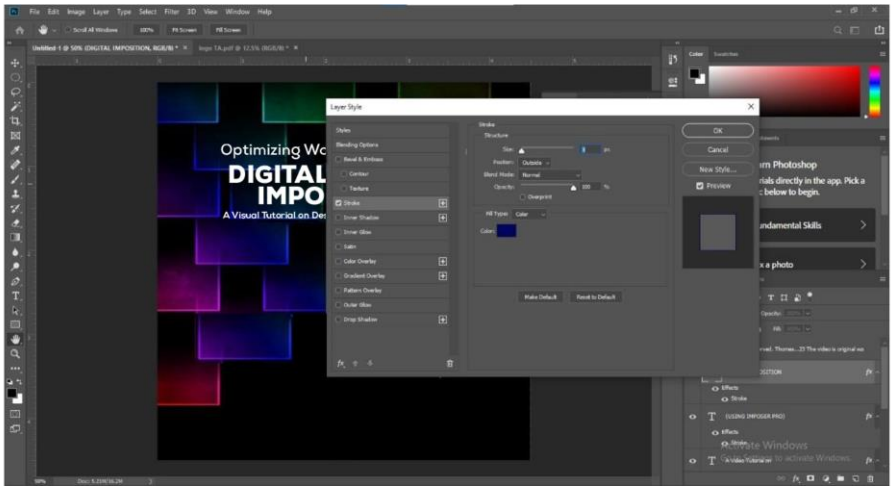


Figure 30: Apply Layer Style

6. Select elliptical marquee tool from tools menu and create a selection as shown in Figure 31.

Figure 31: Create Selection with Elliptical Marquee Tool

7. Click on Ctrl+Shift+I to inverse selection as shown in Figure 32.

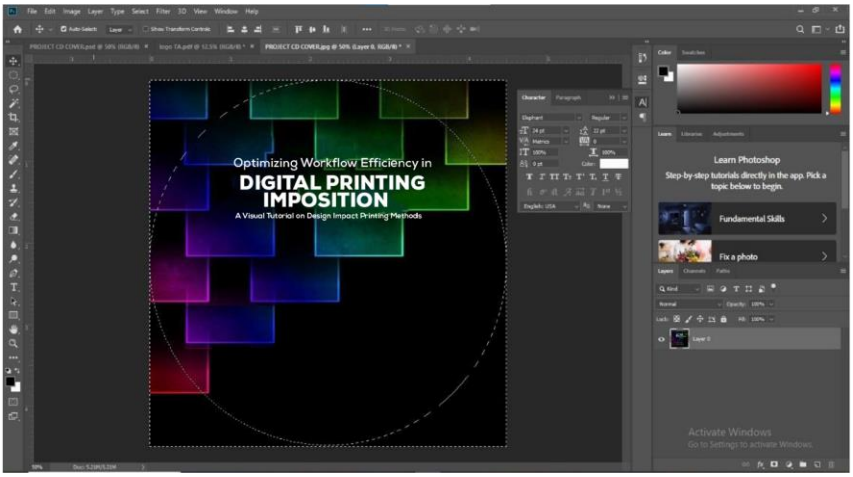


Figure 32: Inverse Selection (Ctrl+Shift+I)

7. Delete selection as indicated in Figure 33.

Figure 33: Inverse selection (Ctrl+Shift+I)

8. Open file on menu bar and select save as. Select location to save file, choose JPEG and click on save.

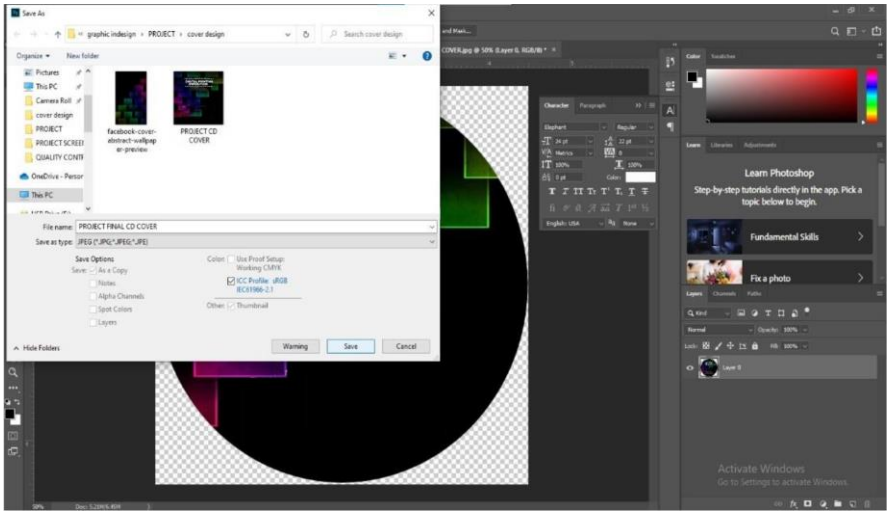


Figure 34: Saving File

4.1.7. Writing the Project onto the CD

Finally, the video file on the computer was electronically transferred onto the CD with the help of CD burning software (Ashampoo Burning Studio). During the writing, one of the researchers chose the option to burn it as a video file. A writing speed of 12 was used to write so that the CD could be easily accessed in all DVD and VCD players.

4.1.8. Printing of the CD Label

A special printer for printing on the back of CDs was used to print on the CD. However, the label in the CD case was printed from an HP Photo Printer on a Glossy Photo paper and then folded.

4.2 Pre-Testing and Evaluation

The video was pre-tested to identify any issues that might arise throughout the current study. Prior to the release of the final video, pre-testing was done to determine the usability of the video and to help improve and modify it as necessary. The researchers pretested the visual presentation to research participants who were experts in graphic design industry to share their responses.

4.3. Costing and Pricing

Table 1: The table shows the Total Cost of Production of items' description and their corresponding cost.

Items Description	Cost
Research Work and Transportation	GH¢640.00
Printing and Binding	GH¢250.00
Post Production (Packaging)	GH¢300.00
Miscellaneous	GH¢500.00
Total	**GH¢1,690.00**

5. Discussion

5.1. Design impact and workflow optimization in digital printing imposition

On of interactive previews in the imposition workflow allowed the researchers and participants to visualize the final print layout before production. This method enabled the researchers to make informed decisions and provide feedback, resulting in a more accurate representation of the final product and reducing the likelihood of design errors (Konica Minolta Business Solutions, 2023; Drinko, 2023). The study indicated that optimized imposition workflows enabled printing presses to scale their printing operations efficiently. It was realized that by standardizing templates and automating repetitive tasks, this process helped in handling larger volumes of print materials without sacrificing quality or increasing production time, resulting in improved efficiency and cost-effectiveness.

One of the key findings in the realm of workflow optimization for digital printing imposition of this study was the importance of seamless integration with other printing processes, specifically binding and finishing. This finding highlighted the critical role that interoperability and compatibility play in achieving a cohesive and professional end product. This observation stems from the fact that workflow optimization facilitated and enhanced collaboration between different stages of production. Imposition processes seamlessly were aligned with binding and finishing, ensuring that the overall workflow functions as a

synchronized and integrated system (Drupa, 2022; Addams, 2019). Seamless integration minimized bottlenecks and potential delays between imposition, binding, and finishing. Its visual approach was a well-orchestrated workflow to ensure that each stage of production seamlessly hands off to the next, reducing the overall time required to produce the final printed materials. The finding suggested that the streamlined workflow contributed to consistent print quality throughout the production chain. This integration ensured that design elements, imposition settings, and finishing details were preserved accurately, resulting in a polished and uniform end product (Neves, 2017).

The enhancement of workflow efficiency in digital printing imposition was identified through practicality in the field of printing technology. This result had revolutionized the way digital printing was carried out by some print presses in Sekondi-Takoradi Metropolis-Western Region of Ghana, leading to significant improvements in productivity, cost-effectiveness, and overall quality of printed materials (Coble, 2023). The study revealed that one of the key design impact and workflow optimizations in digital printing methods is the development of advanced software solutions that automate the imposition process (Lien, 2016). Imposition with this method helped in the arrangement of pages on a printing sheet in a specific order to optimize paper usage and minimize waste. Traditionally, imposition is a manual and time-consuming task, requiring skilled operators to manually arrange pages and calculate the most efficient layout. However, with the advent of sophisticated imposition software specifically using Imposer Pro, this process was automated to save valuable time and resources (Drinko, 2023).

Other findings from the study indicated that the integration of digital printing imposition with other prepress and post-press processes was seamless. This was realised by connecting imposition software (Imposer Pro) with other software tools such as colour management systems, proofing solutions, and finishing equipment. The entire printing workflow was streamlined and optimized. This integration allowed for real-time communication and data exchange between different stages of the printing process, eliminating the need for manual data entry and reducing the risk of errors (Collins, 2023). Furthermore, the advanced algorithms and optimization techniques greatly improved the efficiency of digital printing imposition. These algorithms were analysed using various factors such as page size, orientation, bleed, and trim margins to determine the most optimal layout for a given print job. It was considered that these factors and automatically adjusting the imposition layout could significantly reduce paper waste, improve print quality, and enhance overall productivity (Konica Minolta Business Solutions, 2023).

5. Conclusion

The digital printing imposition has revolutionized the printing industry by significantly enhancing workflow efficiency. Through the development of software solutions, integration with other prepress and post-press processes use algorithms and support for variable data printing. Variable data printing allowed for the inclusion of unique information, such as names, addresses, or images, on each printed piece. The study integrates the variable data printing capabilities with imposition software to automatically generate imposition layouts that accommodate personalized elements and further enhance workflow efficiency by enabling mass customization. This visual tutorial development as the study's realization with digital printing imposition has demonstrated that optimizing workflow efficiency in digital printing imposition is faster, more cost-effective, and capable of producing high-quality printed materials. It was evident that the visual tutorial on design impact printing methods in digital printing have not only improved the efficiency of printing operations but has also opened up new possibilities for personalized and customized printing.

6. Implication for Future Research

The conclusion emphasized the importance of implementing the discussed strategies to enhance digital printing imposition workflows. It encouraged practitioners to leverage the tutorial as a practical resource for achieving efficiency gains, reducing turnaround times, and elevating design impact in the rapidly evolving digital printing landscape. The following recommendations are drawn:

1. Future research should focus on examining how digital printing imposition techniques can improve production efficiency in print houses. This could involve studying the time and cost savings achieved through the implementation of digital imposition software and comparing it to traditional imposition methods.
2. With the advancements in artificial intelligence (AI), it would be beneficial to explore how AI can be integrated into digital printing imposition processes. This could involve developing AI algorithms that can automatically analyze print files and determine the most optimal imposition layout, taking into account factors such as paper size, print quality, and finishing requirements.
3. Future research should also focus on evaluating the impact of digital printing imposition techniques on print quality. This could involve conducting comparative studies between different imposition methods to determine their effect on factors such as colour accuracy, registration, and image sharpness.

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