From Practical Experience

When Micrometers Determine Print Quality

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Precision, Maintenance and Service as Key Success Factors in Modern Flexographic Printing

In modern flexographic printing, speed, automation and color management often attract the greatest attention. Yet print quality, repeatability and process stability are frequently determined by a far less visible factor: mechanical precision within the clamping system. In particular, the interface between the printing cylinder and the CFRP (Carbon Fiber Reinforced Polymer) adapter plays a critical role in print quality, register accuracy, press uptime and makeready efficiency.

SWT Services GmbH & Co. KG, based in Ilsfeld, Germany, specializes in precisely this area. As an internationally active service provider for flexographic printing, clamping technology and balancing technology, the company supports printers and machine manufacturers in maintaining peak equipment performance and maximizing operational reliability.



With modern measurement systems and software tools, SWT Services analyzes the interaction between the printing cylinder and the adapter directly on the flexographic printing press.

The Often Overlooked Importance of Clamping Technology

“In flexographic printing, people frequently talk about inks, anilox rollers or printing plates. Mechanical precision, however, is often underestimated. Even deviations of just

a few micrometers can have a direct impact on print quality," explains Jörg Ehrenfeld, Managing Director of SWT Services.

Modern hydraulic expansion clamping systems create a highly precise connection between the printing cylinder and the CFRP adapter. CFRP adapters have become an industry standard in modern flexographic printing due to their low weight, high rigidity and excellent dimensional stability. Within the clamping system, a hydraulic mechanism expands an internal sleeve in a controlled manner, ensuring uniform positioning and secure fixation of the adapter. At the same time, vibrations are dampened and peak loads are absorbed.

Although this process remains invisible to press operators, it is a decisive factor in runout accuracy, print quality and overall process reliability. Particularly in high-performance printing environments operating within extremely tight tolerances, even the smallest mechanical deviations can lead to visible print defects.

Register variations, color inconsistencies and unstable print images are often attributed to inks or plates. In reality, the root cause is frequently wear or damage within the clamping system itself.

"Many print-quality issues cannot be explained by inks or plates alone. Worn clamping surfaces or damaged expanding sleeves are often the real cause," says Oliver Pfeiffer, Managing Director and Technical Director of SWT Services.



Service technicians from SWT Services performing maintenance on a CI flexographic printing press.

Micrometers with a Major Impact

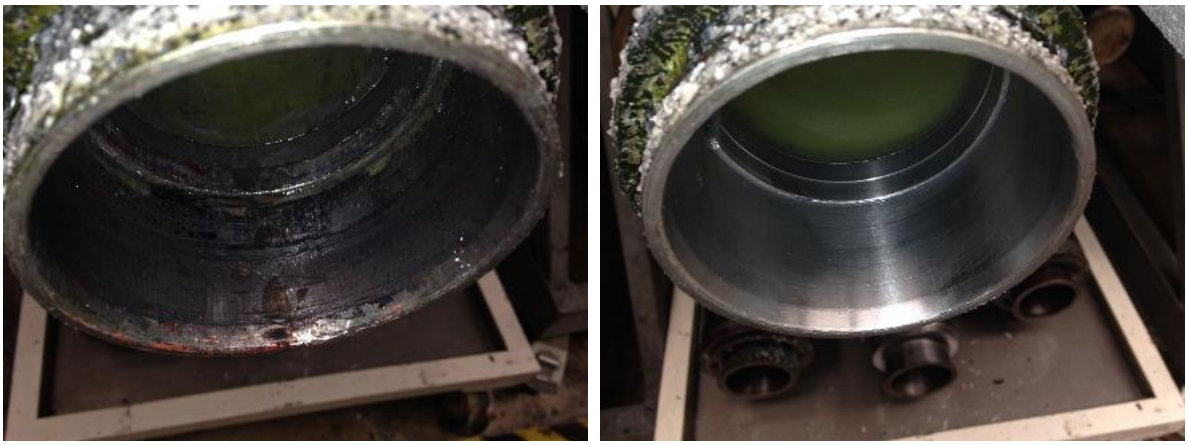
The demands placed on modern flexographic presses continue to increase. Packaging printers are expected to deliver increasingly sophisticated print quality at higher

production speeds and shorter delivery times. As a result, presses have become more sensitive than ever to even the smallest mechanical deviations.

The interface between the printing cylinder and the CFRP adapter influences not only print quality but also the overall efficiency of the production process. A properly functioning clamping system enables fast adapter changes and reduced makeready times. Conversely, contamination, material fatigue and mechanical damage can lead to delays, increased wear and reduced productivity.

A difficult adapter change is often the first warning sign. If adapters require excessive force—or even hammers and wooden blocks—to be removed, immediate action is required. Ignoring these warning signals can result in unplanned downtime, production losses and costly consequential damage.

Under ideal operating conditions, hydraulic expansion clamping systems maintain consistent precision even after thousands of clamping cycles. However, achieving this level of performance requires regular maintenance and professional refurbishment.



After cleaning the adapter bore, the adapter is fully operational again.

Maintenance as a Strategic Success Factor

Maintaining modern clamping systems involves far more than routine cleaning. It includes systematic inspection of all clamping surfaces, verification and adjustment of expansion rates, dimensional measurement of critical components and refurbishment of cylinder surfaces.

Piston bores are cleaned, actuating screws are lubricated and all functional parameters are verified. In addition, target-versus-actual measurements provide a precise assessment of system condition. This allows potential weaknesses to be identified and corrected before they lead to production interruptions.

Following professional maintenance, printing cylinders, hydraulic expanding shafts and CFRP adapters can be restored to a condition that is close to new. This not only improves print quality and repeatability but also significantly reduces the risk of unplanned downtime while extending component service life.

Service Directly on the Press

A key element of the SWT service concept is the execution of maintenance, inspection and repair work directly at the customer's facility. Field service engineers analyze the clamping system on the press itself, identify wear points and frequently resolve minor issues immediately.

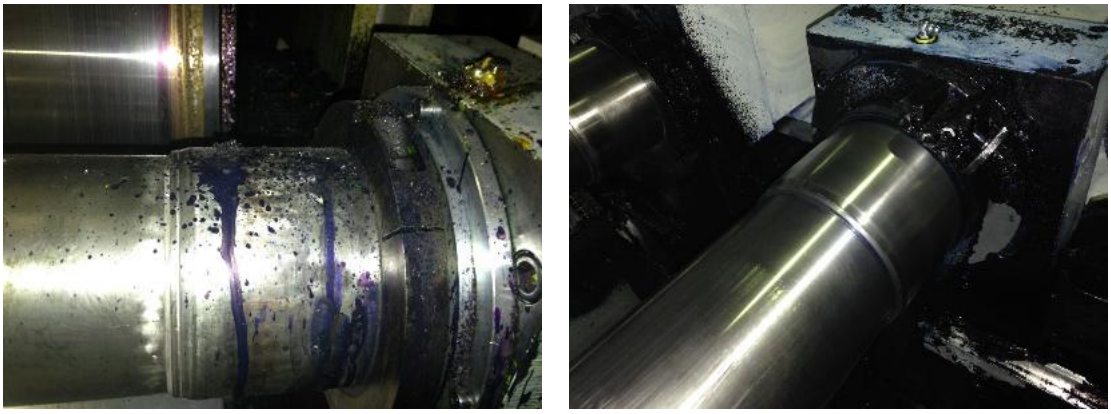


The upper four clamping shafts show heavy ink deposits and contamination after prolonged use. The two lower clamping shafts have been reconditioned by SWT Services and prepared for shipment to the customer.

This approach minimizes downtime and enables production to resume as quickly as possible. Printing cylinders and CFRP adapters are inspected, clamping surfaces cleaned, measurements performed and expansion rates adjusted with precision. Defective components can often be repaired or replaced on site.

Thanks to this full-service approach, approximately 80 percent of typical faults can be resolved during the initial service visit. For packaging printers operating under tight production schedules, this represents a significant economic advantage.

In addition to technical support, SWT Services places strong emphasis on operator training. Employees who understand the function and importance of the clamping system handle components more carefully and are better equipped to identify potential issues at an early stage. This reduces operator errors, improves process reliability and extends equipment life.



Printing cylinder before and after maintenance.

Complete Refurbishment Instead of Replacement

In addition to routine maintenance, SWT Services offers complete refurbishment of printing cylinders, hydraulic expanding shafts, CFRP adapters and anilox rollers.

During this process, all wear-prone components are renewed while the base structure is retained. Following incoming inspection and functional testing, components are completely disassembled, cleaned and measured. Worn parts are replaced, surfaces are refurbished and hydraulic systems are refilled and recalibrated.

Comprehensive quality and performance testing is then carried out to ensure optimal functionality. The result is a component that performs virtually like new—at a significantly lower cost than replacement.

“After a complete refurbishment, the clamping systems are practically as good as new—but at a fraction of the investment cost,” explains Oliver Pfeiffer.

At a time of rising costs and increasing pressure on capital expenditure budgets, this represents an attractive alternative to purchasing new equipment.

From Specialist to International Service Partner

Since its founding in 2010, SWT Services has developed into an internationally recognized specialist in flexographic printing, clamping technology and balancing

technology. Today, approximately 60 percent of the company's revenue is generated within the flexographic printing sector, and it serves more than 500 active customers in more than 40 countries.

Its field service engineers support customers worldwide, operating throughout Europe, North America, Asia and Australia. Services include machine commissioning, maintenance, inspections, repairs, refurbishments, spare-parts supply and technical training.

"Our strength lies in combining multiple technical disciplines. This enables us to analyze complex issues comprehensively and provide solutions from a single source," says Jörg Ehrenfeld.

The combination of flexographic printing expertise, clamping technology and balancing technology allows the company to identify root causes more effectively and deliver sustainable solutions to complex technical challenges.



High-precision measurement of a clamping shaft on the operator side of a flexographic printing press.

Investing in Growth and the Future

A visible sign of the company's successful development is its new headquarters in Ilsfeld. Following groundbreaking in 2023, the new facility was occupied in early 2025.

The modern site includes approximately 300 square meters of office space and an 800-square-meter workshop. The facility provides ideal conditions for maintenance, repair and refurbishment work on large components such as printing cylinders, hydraulic expanding shafts and CFRP adapters.

To support its international service operations, the company has also invested heavily in digitalization. SAP Business One was implemented as early as 2018 and is complemented by digital documentation systems, maintenance protocols, inspection checklists and spare-parts management tools.

This infrastructure enables standardized service processes and consistently high service quality worldwide.



New headquarters of SWT Services in Ilsfeld: Following the groundbreaking in November 2023, the building was occupied in early 2025.

Precision as a Competitive Advantage

As demands for print quality, production speed and operational efficiency continue to rise, the reliability of clamping systems is becoming increasingly important. Maintenance, refurbishment and preventive service concepts are therefore evolving from technical necessities into strategic competitive advantages.

Through its specialized service portfolio, SWT Services has established a strong international market position that extends far beyond traditional maintenance services. By combining technical expertise, global service experience and close collaboration with machine manufacturers, the company helps customers improve production reliability, operational efficiency and print quality on a sustainable basis.

Conclusion

In flexographic printing, success or failure is often determined by the smallest details. The interface between the printing cylinder and the CFRP adapter is a prime example of how just a few micrometers can influence print quality, process stability and economic performance.

Regular maintenance, precision refurbishment and technical expertise are essential prerequisites for reliable production. SWT Services demonstrates how technical precision and professional service work hand in hand to maximize print quality, improve press uptime and deliver long-term operational and economic benefits.

In an industry where every micron matters, precision is not merely a technical requirement—it is a decisive competitive advantage.

Erschienen in: VerpackungsDruck & Converting, Ebner Media Group GmbH & Co. KG, Ausgabe 2026-03, Abdruck/Nachdruck mit freundlicher Genehmigung der Ebner Media Group GmbH & Co. KG