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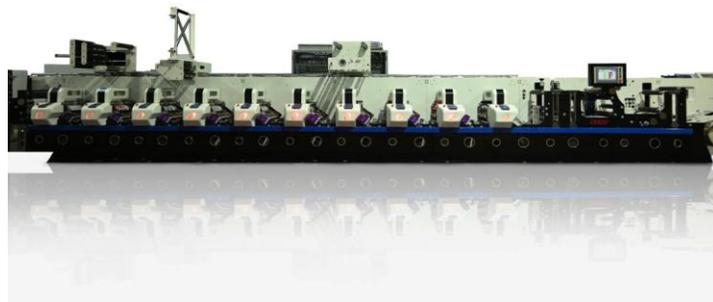
T H E P R I N T E R S H O U S E

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## OPERATION & MAINTENANCE MANUAL

### Orient X-Press Flex Series

Flexographic Printing Machine for Label & Packaging



*Orient X-Press Flex Series — Flexographic Printing Press*

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# 1. Introduction

Welcome to the Orient X-Press Flex Series Operation and Maintenance Manual. This document provides comprehensive instructions for the safe and efficient operation, routine maintenance, and troubleshooting of the Orient X-Press Flex flexographic printing machine. It is intended for trained operators, maintenance technicians, and supervisors responsible for operating this equipment.

## 1.1 About This Manual

This manual covers the complete Orient X-Press Flex series of flexographic printing machines, including the narrow web (330–650 mm), mid-web (650–1000 mm), and wide web (1000–1500 mm) configurations. The information provided herein applies to all models within the X-Press Flex product family unless otherwise specified.

Operators and maintenance personnel should read this manual thoroughly before operating or servicing the machine. Keep this manual in an accessible location near the machine at all times for quick reference.

## 1.2 About Orient — The Printers House

Orient, operating as The Printers House (P) Ltd., is a leading manufacturer of advanced printing machinery based in New Delhi, India. With decades of experience in the printing industry, Orient is committed to delivering innovative, high-quality, and customer-centric printing solutions that meet the evolving demands of modern label and packaging converters worldwide.

The Orient X-Press Flex series represents the culmination of Orient’s engineering expertise, combining proprietary technologies such as the Orient X-Gear system with precision-engineered custom cylinder assemblies to deliver exceptional print quality, registration accuracy, and operational efficiency.

## 1.3 Manual Structure

This manual is organized into the following chapters for ease of reference:

Chapter	Title	Description
Chapter 1	Introduction	Overview of the manual, company, and document conventions
Chapter 2	Safety Instructions	Safety warnings, PPE requirements, and emergency procedures
Chapter 3	Machine Overview	Machine description, key components, and working principle
Chapter 4	Technical Specifications	Detailed specifications for all X-Press Flex models
Chapter 5	Installation Requirements	Site preparation, utilities, and installation guidelines
Chapter 6	Operating Procedures	Step-by-step operation from startup to shutdown
Chapter 7	Ink & Substrate Management	Ink systems, substrate handling, and curing options

<b>Chapter 8</b>	Maintenance Procedures	Preventive, routine, and periodic maintenance schedules
<b>Chapter 9</b>	Troubleshooting	Common issues, diagnostic procedures, and solutions
<b>Chapter 10</b>	Spare Parts & Consumables	Recommended spares and consumable components
<b>Chapter 11</b>	Contact & Support	Orient service contacts, warranty, and support information

## 1.4 Document Conventions

**⚠ WARNING:** Indicates a hazardous situation that, if not avoided, could result in serious injury or death.

**⚠ CAUTION:** Indicates a situation that, if not avoided, could result in equipment damage or minor injury.

**NOTE:** Provides additional information, tips, or clarifications to assist the operator.

## 2. Safety Instructions

The safety of personnel is of paramount importance. All operators, maintenance technicians, and supervisory staff must read and understand the safety instructions in this chapter before operating, maintaining, or servicing the Orient X-Press Flex machine. Orient has designed this machine in compliance with applicable industrial safety standards; however, the safe operation of the equipment ultimately depends on the diligence and awareness of the personnel involved.

### 2.1 General Safety Guidelines

All personnel operating or working near the Orient X-Press Flex machine must be properly trained and authorized. Untrained individuals must not operate the machine under any circumstances. Only qualified electricians should access the electrical cabinet and perform electrical maintenance or repairs.

Operators must remain attentive and focused throughout the machine's operation. Distractions, fatigue, or the influence of alcohol or medication that impairs judgment are strictly prohibited during machine operation. All safety guards and protective covers must remain in their designated positions during operation. Bypassing or disabling safety interlocks is strictly prohibited and may result in serious injury.

### 2.2 Personal Protective Equipment (PPE)

The following personal protective equipment must be worn at all times while operating or working near the Orient X-Press Flex machine:

**Safety Glasses:** Protect eyes from ink splashes, flying debris, and UV radiation (when UV curing systems are in use).

**Protective Gloves:** Chemical-resistant gloves must be worn when handling inks, solvents, cleaning agents, and other chemicals. Cut-resistant gloves should be worn when handling blades and die-cutting tools.

**Safety Footwear:** Steel-toed shoes or safety boots must be worn to protect against heavy objects and spills.

**Hearing Protection:** Ear plugs or ear muffs should be worn in areas where machine noise exceeds 85 dB(A).

**Protective Clothing:** Close-fitting clothing without loose ends must be worn. Long hair must be tied back and secured. Remove all jewelry, neckties, and loose accessories before working near the machine.

### 2.3 Emergency Procedures

The Orient X-Press Flex is equipped with emergency stop buttons located at strategic positions along the machine frame. In the event of an emergency, press the nearest emergency stop button immediately. This will bring the machine to an immediate halt.

**⚠ WARNING:** Never attempt to clear a web break, remove jammed material, or access moving parts while the machine is running. Always activate the emergency stop and wait for the machine to come to a complete standstill before intervening.

### 2.3.1 Emergency Stop Locations

Emergency stop buttons (mushroom-head, red) are located at the following positions on the machine: the unwind section (operator side), each printing station (at the station control panel), the die-cutting section (operator side), the rewind section (operator side), and the main HMI control panel. Operators should familiarize themselves with the exact locations of all emergency stop buttons before commencing operation.

### 2.3.2 Fire Safety

The machine operates with flammable inks, solvents, and substrates. Appropriate fire extinguishers (CO<sub>2</sub> and dry chemical type) must be kept within easy reach of the machine at all times. In the event of a fire, activate the emergency stop, evacuate the area, and alert the facility's fire response team. Do not attempt to extinguish a large fire without proper training and equipment.

## 2.4 Electrical Safety

**⚠ WARNING:** The machine operates at voltages up to 415V. Contact with live electrical components can cause fatal electric shock. Only qualified and authorized electricians may open the electrical cabinet or work on electrical components.

Before performing any electrical maintenance, ensure the machine is completely isolated from the power supply using the main disconnect switch. Apply lockout/tagout (LOTO) procedures as per your facility's safety protocols. Verify the absence of voltage using a calibrated multimeter before touching any electrical components.

## 2.5 Mechanical Safety

The Orient X-Press Flex contains numerous rotating shafts, rollers, gears, and nip points that present crushing and entanglement hazards. Never reach into or near rotating components while the machine is in operation. Always use the provided tools and procedures for loading plates, anilox rollers, and die-cutting cylinders.

**CAUTION:** When loading or unloading heavy rollers and cylinders, use appropriate lifting equipment. Manual handling of heavy components can result in musculoskeletal injuries.

## 2.6 Chemical Safety

Printing inks, solvents, cleaning agents, and adhesives used with this machine may contain hazardous substances. Always refer to the Safety Data Sheets (SDS) provided by the chemical manufacturers before handling any chemicals. Ensure adequate ventilation in the work area, particularly when using solvent-based inks. Store chemicals in approved containers in a designated chemical storage area, away from heat sources and ignition points.

## 2.7 UV and LED Curing Safety

**⚠ WARNING:** The UV LED and UV lamp curing systems emit ultraviolet radiation that can cause severe burns to the skin and permanent damage to the eyes. Never look directly at the UV curing lamps during operation. Ensure all UV shielding guards are in place before activating the curing system.

## **2.8 Safety Signage**

All safety labels, warning signs, and instructional placards on the machine must be kept clean, legible, and in their original positions. Damaged or missing safety labels must be replaced immediately. Contact Orient Technical Support for replacement labels.

## 3. Machine Overview

The Orient X-Press Flex is a state-of-the-art in-line flexographic printing machine designed for high-quality label and packaging printing applications. Available in narrow web, mid-web, and wide web configurations, the X-Press Flex series delivers exceptional print quality, registration accuracy, and production efficiency across a wide range of substrates and applications.



Figure 3.1 — Orient X-Press Flex Series — Full Machine Overview

### 3.1 Machine Description

The Orient X-Press Flex is built on a robust, precision-engineered frame that provides the stability and rigidity required for high-speed, high-quality flexographic printing. The machine features a modular design, allowing customers to configure the press with the optimal number of printing stations, die-cutting units, and finishing options for their specific application requirements.

Key design principles of the X-Press Flex include: a compact footprint with efficient web paths to minimize substrate waste; full servo-driven technology for precise control of all axes; the proprietary Orient X-Gear system for outstanding registration accuracy; and a user-friendly operator interface for simplified setup and operation.

### 3.2 Key Components

#### 3.2.1 Unwind Section

The unwind section is located at the infeed end of the machine and is responsible for feeding substrate material into the press. It is equipped with a pneumatic shaft system that supports large diameter rolls. Automatic web tension control ensures consistent tension throughout the printing process, which is essential for maintaining print registration and quality.



Figure 3.2 — Unwind Section with Roll Shafts

### 3.2.2 Printing Stations

Each printing station is an independent, servo-driven unit that performs the actual flexographic printing. The stations feature a chamber doctor blade inking system that provides consistent, uniform ink transfer to the anilox roller. The anilox roller meters a precise amount of ink, which is then transferred to the flexographic printing plate mounted on the plate cylinder. The plate cylinder transfers the ink image onto the substrate as it passes between the plate cylinder and the impression roller.



*Figure 3.3 — Printing Stations — Individual Servo-Driven Units*

Each station is equipped with its own touchscreen control panel that displays station-specific parameters including impression pressure, registration values, ink fountain settings, and curing system status. The Orient X-Press Flex features the proprietary Orient X-Gear system, which uses precision-ground helical gears to ensure smooth, backlash-free power transmission for exceptional print quality.

### **3.2.3 Ink Delivery System**

The machine utilizes a chambered doctor blade system for precise ink metering. This enclosed system minimizes ink exposure to air, reducing ink drying on the anilox roller and maintaining consistent ink viscosity throughout the print run. The chamber doctor blade system also significantly reduces ink waste compared to traditional open fountain systems.

### **3.2.4 Drying and Curing Systems**

The Orient X-Press Flex supports multiple drying and curing technologies to accommodate different ink systems. Options include UV LED curing, conventional UV lamp curing, hot air drying, and infrared (IR) drying. The appropriate curing method is selected based on the ink type (UV-curable, water-based, or solvent-based) and substrate being used.

### **3.2.5 Die-Cutting Section**

The die-cutting section enables inline converting of the printed web into finished labels. It supports both full-rotary and semi-rotary die-cutting methods, depending on the model configuration. The die-cutting station features precision bearings and adjustable anvil pressure to ensure clean, accurate cuts across the full web width.

### **3.2.6 Rewind Section**

The rewind section collects the finished printed and die-cut material onto a core. It features automatic tension control to ensure consistent winding and a clean roll profile. A matrix stripping station located between the die-cutting section and the rewind removes waste matrix material and winds it onto a separate waste roll.

### **3.2.7 Registration System**

The Orient X-Press Flex is equipped with an advanced automatic registration system that provides both circumferential (print direction) and lateral (cross-direction) registration control. The system uses high-resolution cameras and sensors to detect registration marks on the printed web and makes real-time adjustments to maintain precise color-to-color registration throughout the print run, including during speed changes.

### **3.2.8 Control System and HMI**

The main Human-Machine Interface (HMI) is a large touchscreen panel located at the operator's primary station. It provides centralized control of all machine functions, including web speed, tension settings, registration parameters, curing system controls, and job storage. The HMI allows operators to save and recall job recipes, enabling rapid changeover between different print jobs.



Figure 3.4 — Close-Up View of Printing Station Control Panels

### 3.3 Working Principle

Flexographic printing is a rotary relief printing process that uses flexible photopolymer plates to transfer ink onto the substrate. The process begins at the unwind section, where the substrate material (paper, film, foil, or label stock) is fed into the machine under controlled tension.

At each printing station, the ink is pumped from the ink reservoir into the chambered doctor blade assembly, which fills the engraved cells of the anilox roller. The doctor blades wipe excess ink from the surface of the anilox roller, leaving ink only in the cells. As the anilox roller rotates, it transfers the metered ink to the raised image areas of the flexographic printing plate. The plate then contacts the substrate at the nip point between the plate cylinder and the impression roller, transferring the ink image onto the substrate.

After printing at each station, the wet ink is dried or cured using the appropriate drying/curing system before the web advances to the next printing station. This process is repeated at each station, with each station printing a different color or coating, to build up the complete multi-color image. After all printing and coating stations, the web passes through the die-cutting section for inline converting, followed by matrix stripping and rewinding of the finished product.

### 3.4 Applications

The Orient X-Press Flex is designed for a wide range of label and packaging printing applications, including: prime labels, pressure-sensitive labels, shrink sleeves, bottle wraps, flexible packaging, film labels, tags and tickets, in-mold labels, mono cartons, pouches, roll-fed labels and wraps, lidding, and extended content labels.

## 4. Technical Specifications

The Orient X-Press Flex series is available in three width configurations. The following tables provide the detailed technical specifications for each model range.

### 4.1 Narrow Web Series (330–650 mm Width) – Below are sample specs they may change depending on specific machine orders and specifications.

<b>Max Web Width</b>	450 mm (17.7") — also available in 330, 370, 550 mm
<b>Max Printing Width</b>	440 mm (17.3")
<b>Printing Repeat</b>	177.8–609.6 mm (7"–24")
<b>Die-Cutting Repeat</b>	304.8–609.6 mm (12"–24")
<b>Max Unwinding Diameter</b>	1050 mm (41")
<b>Max Rewinding Diameter</b>	1050 mm (41")
<b>Max Matrix Diameter</b>	600 mm (23.62")
<b>Driving Mode</b>	Full Servo (Single and Dual Servo each unit)
<b>Gear Pitch</b>	3.175 mm (1/8")
<b>Max Mechanical Speed</b>	180 m/min (594 ft/min)
<b>Ink Curing</b>	UV LED, Hot Air Drying, and IR Dryer
<b>Applicable Ink</b>	UV LED Cured / Eco-friendly Water-based / Solvent-based
<b>Substrate</b>	Paper / Film / Cardboard
<b>Substrate Thickness</b>	12 Micron to 400 Micron
<b>Cliché Thickness</b>	1.14 mm
<b>Sticky Back Thickness</b>	0.38 mm
<b>Drive and Motors</b>	Rexroth Bosch Servo Systems
<b>Attachments</b>	Delam Relam / Cold Foil / Peel and Seal / Turnbar
<b>Registration</b>	Auto (both circumferential and lateral)
<b>Pre-Registration</b>	Yes
<b>Second Pass Capability</b>	Yes

### 4.2 Mid-Web Series (650–1000 mm Width)

<b>Max Web Width</b>	650 mm (25.6") — also available in wider sizes
<b>Max Printing Width</b>	640 mm (25.2")
<b>Printing Repeat</b>	177.8–609.6 mm (7"–24")
<b>Die-Cutting Repeat</b>	304.8–609.6 mm (12"–24")

<b>Max Unwinding Diameter</b>	1050 mm (41")
<b>Max Rewinding Diameter</b>	1050 mm (41")
<b>Max Matrix Diameter</b>	600 mm (23.62")
<b>Driving Mode</b>	Full Servo (Single Servo each unit)
<b>Gear Pitch</b>	3.175 mm (1/8")
<b>Max Mechanical Speed</b>	180 m/min (594 ft/min)
<b>Ink Curing</b>	UV LED, Hot Air Drying, and IR Dryer
<b>Applicable Ink</b>	UV LED Cured / Eco-friendly Water-based / Solvent-based
<b>Substrate</b>	Paper / Film / Cardboard
<b>Substrate Thickness</b>	12 Micron to 400 Micron
<b>Cliché Thickness</b>	1.14 mm
<b>Sticky Back Thickness</b>	0.38 mm
<b>Drive and Motors</b>	Rexroth Bosch Servo Systems
<b>Attachments</b>	Delam Relam (opt.) / Cold Foil (std.) / Peel & Seal (opt.) / Turnbar (opt.)
<b>Tension Range</b>	20–500 N
<b>Pneumatic Supply</b>	8 bar / 20 cfm non-lubricated, dehumidified, and filtered air
<b>Chill Water</b>	20–22°C
<b>Electrical Voltage</b>	415V ±10%
<b>Frequency</b>	50 Hz (Standard)
<b>Ambient Temperature</b>	20–40°C
<b>Registration</b>	Auto (both circumferential and lateral)
<b>Pre-Registration</b>	Yes
<b>Second Pass Capability</b>	Yes

### 4.3 Wide Web Series (1000–1500 mm Width)

<b>Max Web Width</b>	1100 mm (43.30") — also available in wider sizes
<b>Max Printing Width</b>	1000 mm (39.37")
<b>Printing Repeat</b>	350–850 mm (13.77"–33")
<b>Max Unwinding Diameter</b>	1200 mm (42")
<b>Max Rewinding Diameter</b>	1200 mm (42")
<b>Driving Mode</b>	Full Servo (Dual / Single Servo each unit)
<b>Max Mechanical Speed</b>	200 m/min
<b>Ink Curing</b>	IR Dryer / Hot Air Dryer / UV / LED (application-dependent)

<b>Applicable Ink</b>	UV LED Cured / Eco-friendly Water-based / Solvent-based
<b>Substrate</b>	Paper / Film / Cardboard
<b>Substrate Thickness</b>	12 Micron to 400 Micron
<b>Cliché Thickness</b>	1.70 mm
<b>Sticky Back Thickness</b>	0.38 mm
<b>Tension Range</b>	20–500 N
<b>Pneumatic Supply</b>	8 bar / 20 cfm non-lubricated, dehumidified, and filtered air
<b>Chill Water</b>	20–22°C
<b>Electrical Voltage</b>	415V ±10%
<b>Frequency</b>	50 Hz (Standard)
<b>Ambient Temperature</b>	20–40°C
<b>Registration</b>	Auto Registration

## 5. Installation Requirements

Proper site preparation and installation are essential for the reliable and safe operation of the Orient X-Press Flex. This chapter outlines the requirements that must be met prior to and during the installation of the machine.

### 5.1 Site Preparation

The installation area must provide a level, solid concrete floor capable of supporting the weight of the machine and associated materials. The floor should be free from excessive vibration and must have a minimum load-bearing capacity as specified in the machine's foundation drawings provided by Orient.

Adequate clearance must be provided around the machine for safe operation, maintenance access, and material handling. A minimum of 1.5 meters of clearance is recommended on the operator side and at both ends of the machine. The drive side requires a minimum of 1 meter of clearance for maintenance access.

### 5.2 Environmental Conditions

**Temperature:** The ambient temperature in the pressroom must be maintained between 20°C and 40°C for optimal machine performance and print quality.

**Humidity:** Relative humidity should be maintained between 40% and 65% to prevent static electricity buildup and substrate moisture-related issues.

**Ventilation:** Adequate ventilation and exhaust systems must be installed to remove solvent vapors, heat from dryers, and airborne contaminants from the pressroom.

**Lighting:** The work area should be well-lit with a minimum illumination level of 500 lux at the machine's operating height to allow operators to inspect print quality accurately.

### 5.3 Utility Requirements

#### 5.3.1 Electrical Supply

The machine requires a 3-phase electrical supply at 415V  $\pm$ 10%, 50 Hz (standard). The electrical supply must be dedicated to the machine and connected through an appropriately rated main disconnect switch. A qualified electrician must perform all electrical connections in accordance with local electrical codes and the machine's electrical schematic drawings.

#### 5.3.2 Compressed Air Supply

The machine requires a supply of clean, dry, non-lubricated compressed air at a minimum pressure of 8 bar and a flow rate of 20 cfm. The air must be filtered (5 micron minimum), dehumidified, and free from oil contamination. An air preparation unit (filter, regulator, lubricator) should be installed at the machine's air inlet.

#### 5.3.3 Chill Water Supply

For machines equipped with chill rollers, a closed-loop chilled water supply is required at a temperature of 20–22°C. The water should be treated to prevent corrosion and biological growth in the cooling system.

## 5.4 Installation Procedure

The Orient X-Press Flex machine is delivered in a partially assembled state, and final assembly and commissioning must be performed by Orient's trained installation engineers. The customer is responsible for preparing the installation site, providing all required utilities, and making the necessary rigging and unloading arrangements as specified in the pre-installation documentation provided by Orient.

**NOTE:** Orient's installation engineers will perform final assembly, alignment, calibration, and commissioning of the machine. Do not attempt to install or commission the machine without Orient's authorized personnel.

## 6. Operating Procedures

This chapter provides step-by-step instructions for operating the Orient X-Press Flex machine. All operators must complete Orient's operator training program before operating the machine independently.

### 6.1 Pre-Operation Checks

Before starting the machine at the beginning of each shift, operators must perform the following pre-operation checks to ensure the machine is in a safe and ready condition:

**Visual Inspection:** Walk around the machine and inspect for any visible damage, loose components, fluid leaks, or obstructions. Ensure all safety guards and covers are properly secured.

**Emergency Stops:** Test all emergency stop buttons to confirm they function correctly and bring the machine to an immediate stop.

**Air Supply:** Verify that the compressed air supply is connected and the pressure gauge reads at least 8 bar. Check the air filter/regulator for moisture and contaminants.

**Ink Systems:** Inspect ink supply lines for leaks. Verify that ink reservoirs are filled with the correct ink for the scheduled job.

**Web Path:** If a substrate web is threaded through the machine from a previous run, inspect the web path for any tears, wrinkles, or misalignment.

**Curing Systems:** Ensure UV lamps or LED modules are clean and functioning. Verify that cooling water or air systems for the curing units are operational.

### 6.2 Machine Startup Procedure

Step 1: Turn on the main power disconnect switch on the electrical cabinet. Wait for the HMI touchscreen to complete its boot-up sequence and display the main operating screen.

Step 2: Reset any emergency stops that may be engaged by twisting the mushroom-head buttons clockwise. Press the machine reset button on the main HMI panel.

Step 3: Start the compressed air supply and verify the pressure is within the required range on the pressure gauge.

Step 4: If applicable, start the chilled water circulation system and verify the water temperature is within the 20–22°C range.

Step 5: Load the job recipe on the HMI. If this is a repeat job, recall the saved job parameters. If it is a new job, enter the required parameters including web width, repeat length, number of colors, and substrate type.

Step 6: Activate the curing/drying systems and allow them to reach operating temperature (for hot air and IR systems) or confirm readiness (for UV LED systems).

### 6.3 Substrate Loading

Step 1: Mount the substrate roll onto the unwind shaft using the appropriate adapters or chucks. Ensure the roll is centered and securely clamped.

Step 2: Thread the web through the machine following the web path diagram posted on the machine or displayed on the HMI. Use the machine's jog function at low speed to advance the web through each section.

Step 3: Set the unwind tension and rewind tension to the appropriate values for the substrate being used. Refer to the substrate manufacturer's recommendations for suggested tension values.

**CAUTION:** Incorrect web tension can result in poor registration, web breaks, or wrinkling. Start with conservative tension settings and adjust as needed during the initial make-ready process.

## 6.4 Print Setup and Make-Ready

Step 1: Mount the printing plates onto the plate cylinders at each station. Ensure the plates are correctly positioned using the registration marks and are securely adhered with double-sided tape (sticky back).

Step 2: Install the anilox rollers for each station. Select the anilox roller with the appropriate cell volume and line screen for the ink coverage and resolution required for each color.

Step 3: Install the chambered doctor blade assemblies and fill with the appropriate ink. Verify that the doctor blade angles and pressures are set correctly.

Step 4: Set the impression pressure at each station. Use the station-level touchscreen controls to adjust the impression between the plate cylinder and the impression roller. Start with light impression and increase gradually.

Step 5: Run the machine at low speed and verify print quality at each station. Check for correct ink transfer, uniform coverage, and proper registration.

Step 6: Activate the auto-registration system and allow it to lock onto the registration marks. Verify that registration is within acceptable tolerances.



Figure 6.1 — Printed Labels Exiting the Orient X-Press Flex

## 6.5 Production Run

Once the make-ready process is complete and print quality has been verified and approved, gradually increase the machine speed to the target production speed. Monitor the HMI display and printed output continuously during the production run. Periodically check print quality, registration accuracy, ink density, and die-cutting accuracy.

**NOTE:** The auto-registration system will maintain registration throughout the run, including during speed changes. However, operators should visually verify registration at regular intervals.

## 6.6 Shutdown Procedure

Step 1: Reduce the machine speed gradually and bring the machine to a controlled stop.

Step 2: Deactivate the UV/LED curing systems. Allow hot air and IR dryers to cool down before switching off.

Step 3: Remove the printed roll from the rewind section and label it with the job information.

Step 4: Clean the ink systems. Remove the chambered doctor blade assemblies and clean them thoroughly. Flush the ink lines with the appropriate cleaning solvent.

Step 5: Clean the anilox rollers using the recommended cleaning procedure (refer to Chapter 8).

Step 6: Wipe down the machine surfaces and remove any debris, ink splashes, or substrate waste.

Step 7: If the machine will not be used for an extended period, turn off the main power disconnect switch and the compressed air supply.

## 7. Ink and Substrate Management

### 7.1 Ink Systems

The Orient X-Press Flex is compatible with multiple ink systems, providing maximum flexibility for different printing applications:

**UV LED Curable Inks:** These inks are cured instantly by UV LED lamps, making them ideal for high-speed printing on heat-sensitive substrates. UV LED inks provide excellent adhesion, vibrant colors, and high gloss.

**Water-Based Inks:** Eco-friendly water-based inks are suitable for printing on paper and cardboard substrates. They require hot air drying and offer excellent results for food-grade packaging applications.

**Solvent-Based Inks:** Solvent-based inks offer excellent adhesion on a wide range of film substrates. They require hot air drying with solvent extraction and proper ventilation.

### 7.2 Ink Viscosity Management

Maintaining correct ink viscosity is critical for consistent print quality. Viscosity affects ink transfer, dot gain, and color density. Operators should measure ink viscosity using an efflux cup (such as a Zahn cup) at regular intervals during the production run and adjust as necessary by adding the appropriate amount of solvent or water (depending on the ink type).

**NOTE:** Always follow the ink manufacturer's recommended viscosity range for the specific ink and anilox roller combination being used.

### 7.3 Anilox Roller Selection

The anilox roller is one of the most critical components in the flexographic printing process. It determines the amount of ink transferred to the plate and, consequently, the ink film thickness on the printed substrate. Selecting the correct anilox roller for each job is essential for achieving the desired print quality.

For process color printing (CMYK), high line screen anilox rollers (typically 700–1200 LPI) with low cell volumes (1.5–4.0 BCM) are recommended. For solid color and flood coating, lower line screen rollers (200–500 LPI) with higher cell volumes (4.0–12.0 BCM) provide better ink coverage.

### 7.4 Substrate Handling

The Orient X-Press Flex can print on a wide variety of substrates ranging from 12 micron thin films to 400 micron cardboard. Substrates must be stored in a controlled environment (temperature 20–25°C, humidity 40–60%) to prevent moisture absorption, curling, or dimensional instability. Allow substrate rolls to acclimatize to the pressroom temperature for at least 24 hours before use.

### 7.5 Curing and Drying Guidelines

Proper curing and drying are essential to ensure ink adhesion, scratch resistance, and durability of the printed product. For UV LED curing, ensure the LED modules are operating at the correct power level and the web speed does not exceed the curing capacity of the system. For hot air drying, ensure adequate airflow and temperature settings. Over-drying can cause substrate distortion, while under-drying will result in poor ink adhesion and blocking (sticking) on the rewind.

## 8. Maintenance Procedures

Regular and systematic maintenance is essential for maintaining the performance, reliability, and longevity of the Orient X-Press Flex machine. This chapter outlines the recommended maintenance schedules and procedures.

**⚠ WARNING:** Before performing any maintenance, ensure the machine is stopped and isolated from the power supply. Apply lockout/tagout (LOTO) procedures to prevent accidental startup.

### 8.1 Daily Maintenance

The following tasks should be performed at the end of each production shift:

**Clean Chambered Doctor Blades:** Remove the doctor blade assemblies from each station that was in use. Disassemble, clean all components thoroughly with the appropriate solvent, inspect the blades for wear or damage, and reassemble.

**Clean Anilox Rollers:** Clean all anilox rollers that were used during the shift. Use the recommended chemical cleaner and a soft brush or an automated anilox cleaning system. Never use abrasive tools on the anilox roller surface.

**Clean Plate Cylinders:** Wipe the plate cylinders clean. If the plates are to be removed, clean the cylinder surface and store the plates in a flat, cool, dark location.

**Wipe Down Machine Surfaces:** Remove all ink residue, dust, and substrate debris from the machine frame, rollers, and guides.

**Empty Waste Containers:** Empty ink waste containers and dispose of waste materials in accordance with local environmental regulations.

**Inspect Safety Guards:** Verify that all safety guards and covers are properly secured and that no safety interlocks have been bypassed.

### 8.2 Weekly Maintenance

**Lubrication:** Grease all lubrication points (bearings, slide mechanisms, gear interfaces) using the recommended lubricant type and quantity as specified in the lubrication chart. Over-greasing can be as harmful as under-greasing.

**Inspect Doctor Blades:** Check all doctor blades for wear, nicks, and bending. Replace any blades that show signs of wear beyond the acceptable limit.

**Check Web Guides and Rollers:** Inspect all web guide rollers, idler rollers, and nip rollers for smooth rotation, excessive play, and surface damage.

**Air System Maintenance:** Drain the moisture trap on the compressed air line. Inspect the air filter element and replace if dirty.

**Inspect UV/LED Modules:** Check UV LED modules or UV lamps for output consistency and cleanliness. Clean the optical surfaces with a lint-free cloth.

### 8.3 Monthly Maintenance

**Servo Motor and Drive Inspection:** Check all servo motors and drive belts for signs of wear, unusual noise, or vibration. Verify that all electrical connections are tight and secure.

**Registration System Calibration:** Run the auto-registration system calibration routine from the HMI to ensure cameras and sensors are properly aligned and calibrated.

**Tension Control System Check:** Verify the accuracy of the web tension control system using a handheld tensiometer. Calibrate if readings deviate from the setpoint.

**Pneumatic System Inspection:** Inspect all pneumatic cylinders, valves, and tubing for leaks, wear, and proper operation. Replace any worn or damaged components.

**Electrical Cabinet Inspection:** Have a qualified electrician inspect the electrical cabinet for loose connections, overheating components, and dust accumulation. Clean the cabinet cooling fans and filters.

## 8.4 Semi-Annual Maintenance

**Gear Inspection:** Inspect all gears in the Orient X-Gear system for wear, backlash, and proper meshing. Replace worn gears as needed.

**Bearing Inspection:** Check all main bearings for noise, vibration, and temperature. Replace any bearings that show signs of excessive wear.

**Chill Water System:** Drain, flush, and refill the chill water system. Check for leaks and verify the proper operation of the chiller unit, pumps, and temperature controls.

**Complete Alignment Check:** Perform a comprehensive alignment check of all cylinders, rollers, and web guide components to ensure they are parallel and properly aligned.

## 8.5 Annual Maintenance

Orient recommends an annual comprehensive maintenance service performed by Orient's factory-trained service engineers. This service includes a thorough inspection of all mechanical, electrical, pneumatic, and electronic systems; replacement of worn components; calibration of all control systems; and a complete performance test.

## 8.6 Maintenance Log

Maintain a detailed maintenance log for the machine, recording all maintenance activities, dates, personnel involved, parts replaced, and observations. This log is invaluable for tracking the machine's condition, identifying recurring issues, and scheduling preventive maintenance.

## 9. Troubleshooting

This chapter provides guidance for diagnosing and resolving common issues that may arise during operation of the Orient X-Press Flex. If the issue cannot be resolved using the information provided here, contact Orient Technical Support for assistance.

### 9.1 Common Issues and Solutions

Symptom	Possible Cause	Recommended Action
<b>Poor print registration</b>	Registration cameras misaligned or dirty	Clean camera lenses; recalibrate registration system
	Web tension too low or fluctuating	Verify and adjust unwind/rewind tension settings
	Worn or damaged gears	Inspect X-Gear system; replace worn gears
<b>Uneven ink coverage</b>	Incorrect anilox roller for the application	Select anilox roller with appropriate volume and LPI
	Doctor blade worn, nicked, or incorrectly set	Replace doctor blades; verify angle and pressure
	Ink viscosity out of range	Measure and adjust viscosity per manufacturer's specs
<b>Ink not curing properly</b>	UV LED power insufficient	Verify LED module output; increase power if needed
	Web speed exceeds curing capacity	Reduce machine speed or add additional curing units
	Lamp/LED module dirty or degraded	Clean optical surfaces; replace end-of-life modules
<b>Web breaks</b>	Web tension set too high	Reduce tension; verify load cell calibration
	Damaged or wrinkled substrate	Inspect incoming material; reject defective rolls
	Nip point pressure too high	Reduce impression pressure at affected station
<b>Dot gain excessive</b>	Too much impression pressure	Reduce impression at affected printing station
	Plate swell from incompatible solvents	Verify ink/plate compatibility; replace plate if swollen
	Anilox cell volume too high	Switch to lower volume anilox roller
<b>Machine vibration</b>	Loose mounting bolts	Check and tighten all foundation bolts
	Unbalanced rollers or cylinders	Inspect and rebalance rollers; check bearings
	Worn bearings	Replace affected bearings
<b>Die-cutting issues</b>	Incorrect anvil pressure	Adjust anvil gap and pressure evenly across web width
	Dull or damaged die	Sharpen or replace the die

	Die not aligned with print	Re-register the die station to the printed image
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## 9.2 Error Codes

The HMI control system displays error codes and diagnostic messages when the machine detects an abnormal condition. Refer to the Error Code Reference Card supplied with the machine for a complete list of error codes and their meanings. If an error code is displayed that is not listed in the reference card, record the error code and contact Orient Technical Support.

## 9.3 When to Contact Orient Support

Contact Orient Technical Support if any of the following conditions occur: the issue cannot be resolved using the troubleshooting guidance in this chapter; the machine displays an unfamiliar error code; any unusual noise, vibration, or smell is detected that cannot be traced to a routine cause; or any safety system (interlock, emergency stop, guard sensor) is not functioning correctly.

## 10. Spare Parts and Consumables

To minimize machine downtime and ensure consistent performance, Orient recommends maintaining an inventory of critical spare parts and consumable items. The following is a list of commonly required parts and consumables.

### 10.1 Recommended Spare Parts

**Doctor Blades:** Maintain a stock of replacement doctor blades in the standard and any special sizes used on the machine. Doctor blades are high-wear items and should be replaced regularly.

**Bearings:** Keep a set of replacement bearings for the main impression rollers, plate cylinders, and anilox rollers.

**Pneumatic Seals and Cylinders:** Stock replacement seals and O-rings for pneumatic cylinders used in the impression, doctor blade, and die-cutting systems.

**Servo Drive Belts:** Maintain spare drive belts for the servo motor assemblies.

**UV LED Modules:** Keep spare UV LED modules available for replacement in the event of a module failure.

**Sensors and Encoders:** Stock replacement registration cameras, web break sensors, and rotary encoders.

**Electrical Components:** Maintain spare fuses, contactors, relays, and power supply units as recommended in the machine's electrical parts list.

### 10.2 Consumable Items

**Sticky Back Tape:** Double-sided adhesive tape (0.38 mm thickness) used for mounting flexographic plates onto the plate cylinders.

**Cleaning Solvents:** Appropriate cleaning solvents for the ink type in use (UV cleaners, water-based cleaners, or solvent-based cleaners).

**Anilox Cleaning Solution:** Dedicated anilox roller cleaning solution for removing dried ink from the cells.

**Lubricating Grease and Oil:** Use only the lubricant types and grades specified in the machine's lubrication chart.

**Air Filter Elements:** Replacement elements for the compressed air filtration unit.

**Wiper Cloths:** Lint-free wiper cloths for cleaning rollers, UV modules, and machine surfaces.

### 10.3 Ordering Parts

To order spare parts or consumables, contact Orient's Parts Department with the machine serial number, the part description, and the Orient part number (if known). Orient maintains a comprehensive parts inventory and can arrange expedited shipping for critical items.

## 11. Contact and Support Information



T H E P R I N T E R S H O U S E

### 11.1 Orient Head Office

**Company:** The Printers House (P) Ltd.

**Address:** 10, Scindia House, Connaught Place, New Delhi, India

**Telephone:** +91-11-2331 3071-73

**Fax:** +91-11-2331 0490

**Email:** tphho@tphorient.com

**Website:** www.tphorient.com | www.orientnexgen.com

### 11.2 Technical Support

Orient's Technical Support team is available to assist with machine operation, troubleshooting, maintenance questions, and parts inquiries. When contacting Technical Support, please have the following information ready: the machine model and serial number (found on the machine nameplate), a description of the issue or question, any error codes displayed on the HMI, and the steps already taken to resolve the issue.

### 11.3 Warranty Information

The Orient X-Press Flex is covered by Orient's standard equipment warranty in our general terms and conditions. General Terms and conditions are applicable as published on [www.tphorient.com](http://www.tphorient.com) website on the following link <https://tphorient.com/assets/pdf/domestic.pdf> for any orders in India and on the following link <https://tphorient.com/assets/pdf/International.pdf> for any orders outside of India.

### 11.4 Training Programs

Orient offers comprehensive training programs for operators and maintenance personnel. Training can be conducted at Orient's factory, at the customer's site, or remotely via video conferencing. Training programs cover machine operation, make-ready procedures, print quality optimization, routine maintenance, and basic troubleshooting. Contact Orient to schedule a training session for your team.

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Orient X-Press Flex Series — Operation & Maintenance Manual

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