

OUR REF: EC 26475/2
DATE: 14 NOVEMBER 1994

BCI Contract No. 72328/EC 26475/2

Covering:

**REGENERATIVE UNWIND, SPLICER
REBUILD, ROLL LOADING
EQUIPMENT & INSTALLATION &
COMMISSIONING SERVICES**

Submitted to:

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Black Clawson International Ltd.

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**ABSTRACT**

The following described Black Clawson equipment is shown on Black Clawson proposal drawing no. 451-B-2576.

GENERAL DESIGN SPECIFICATIONS

Web Width	: 3420 mm maximum 3350 mm minimum
Machine Roll Face	: 3600 mm minimum
Machine Line Speed	: 800 m/min maximum
Substrates - Unwind Paper/Board	: 38-127 g/m ²
Tension Ranges Unwind	: 0.15 to 0.50 kg/cm
Hand of Machine	: Standing in front of unwinder looking at oncoming web, drive is on the left hand side
Unwind Roll Diameter	: 1500 mm maximum 900 mm minimum
Roll Weight	: 5.0 tonnes maximum
Shaftless Steel Cores	: 3490 mm long x 269 mm o.d.
Expanding Shaft for Cardboard Cores*	: 3570 mm long x 301 mm o.d.

* Note : Cardboard core to be offset by 40 mm on expanding shaft to centralise paper reel with machine line centres.

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OPERATING SPECIFICATIONS

The foregoing General Design Specifications describe the mechanical design considerations of the equipment herein specified rather than the composite production capacity. An actual operating rate (speed) for production will be related to the material being processed, quality desired, operator skills and other such requirements for a given product run.

UTILITIES AND AUXILIARIES BY BUYER

The Buyer is to provide the following utilities and auxiliaries required for this specified process :-

Electrical Supply : 500 volts, 3 phase, 50 Hertz AC

Controls : 220 volts, single phase, 50 Hertz AC for PLC

Air Supply

Operating Power : 5 bar, clean and dry

Instrument Air : 5 bar, filtered, clean and dry minimum

Auxiliaries by Buyer

- a) AC motor control centre and local isolators
- b) AC drive motors and AC drive
- c) Foundation and civil work
- d) Interconnecting wiring and piping
- e) Any item or service not specifically included herein

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GENERAL ARRANGEMENT

The General Arrangement of the unwind and splicer equipment described in these specifications is shown on Black Clawson proposal drawing no. 451-B-2576.

Machines and machine components included in this proposal and which will be provided by the seller are :-

<u>Section no:</u>	<u>Description</u>
001	Track and Dolly Roll Loading Equipment
002	Model 50 Regenerative Turret Unwind (fixed arms)
003	Modification to existing Splicer
004	Mechanical Drive
005	Soleplates
006	Controls
007	Installation & Commissioning

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001 TRACK & DOLLY ROLL LOADING EQUIPMENT

The turret unwind will be provided with a transfer table, track and dolly system which will enable the reels to be manually loaded into the unwind without the use of lifting tackle. When loading reels of 1500 mm diameter, the unwind will be designed to pick-up the reels when the turret arms are in the splice position. For smaller reels down to 900 mm diameter, the turret arms will need to be indexed using the DC indexing motor, in order to pick up the smaller reels. A total length of ten metres of track will be provided.

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002 MODEL 50 REGENERATIVE TURRET UNWIND

This machine is designed to work in conjunction with the existing single direction splicer and unwind under conditions stated in the General Design Specifications.

- a. Pedestals - The front side pedestal supports the indexing reducer. The drive side pedestal is provided with steel rollers which support the turret wheel.
- b. Indexing Drive - A hollow shaft, double stage worm gear reducer is keyed to the mainshaft and is mounted to the pedestal. A DC motor, in a totally enclosed frame, provides approximately 1 RPM indexing of the turret. The DC motor and DC drive are supplied by Black Clawson. A pneumatically retracted, spring loaded brake is mounted to the motor. A pushbutton station is mounted to provide raise and lower indexing during roll handling.
- c. Mainshaft & Turret Arms - This assembly consists of a carbon steel mainshaft, a front side turret arm, housing the latch spindles and a turret wheel on the back side supporting the motor driven spindles.

The wheel and turret arm are secured to the mainshaft in a fixed position for single length steel core operation.

- d. Spindle Assemblies - The latch spindle assemblies installed in the tending side arm provide latching stroke plus overtravel. The latches are pneumatically operated and have a safety catch to prevent retraction until unlocked.

NB : Extra chucking is required to allow for different lengths of core.

- e. Spindle Noses - The spindles are equipped with noses to accept the ends of the steel cores.

The size of nose is dependent on the depth of bore in core.

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002 MODEL 50 REGENERATIVE TURRET UNWIND/Continued

- f. Mechanical Drive & Motor Mounting - Unwind sheet tension is controlled by the regenerative drive motors. A bracket is mounted to the turret wheel for mounting the drive motors and the belt drive connection to the spindles. The drive motors are supplied by drive supplier.

A collector ring assembly with the required rings for the motors, tachometers, etc., is provided. A wiring pull box is located on the inboard end of the collector ring for use in wiring the motors. Wiring between the collector ring and the motors is factory installed.

- g. Rotary Union - A rotary union is provided to supply air to the pneumatic latches.
- h. Auxiliary Rolls - Two (2) 250 mm diameter idler rolls of anodised aluminium construction are arm mounted to the mainshaft.
- i. Controls - Operator's devices for pneumatic latching and indexing are mounted on the machine. Tension control and line speed are located in the unwind and splicer floor mounted control desk.

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003 MODIFICATIONS TO EXISTING SPLICER

The regenerative turret unwind will be designed to operate with the existing splicer. The unwind brake generators will provide the speed-up of the new roll to match the surface speed of the expiring roll. The existing speed-up belts will not be required and will need to be removed.

The following alterations to the existing splicer will be required :-

Transducer Tension Control

The existing pneumatic load cells that control the pneumatic spindle brakes will be removed. These will be replaced by a pair of electric load cells that will control the unwind brake generators. The electric load cells will be provided by the AC drive supplier. Black Clawson will provide the necessary brackets to mount the electric load cells. The electric load cells will be adjustable to set the desired tension in the web. As the unwind roll decreases in size, the transducer measuring device senses an increase in tension and automatically corrects by regulating the unwind generator.

Speed Measuring Assembly

A speed measuring assembly is provided to measure the surface speed of the new roll in order that the roll diameter may be automatically calculated. This speed measuring assembly is operated by a pneumatic cylinder. The speed of the web actually being unwound will be measured by a tachogenerator connected by a belt to the splicer roll. The speed measuring assembly and necessary brackets will be supplied. The tachogenerator will be supplied by the AC drive supplier.

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003 MODIFICATIONS TO EXISTING SPLICER/Continued

Controls

Complete new controls will be provided for the unwind and splicer and will be mounted in a control desk. The controls will allow for the following splice sequences :-

UNWINDER ROLL CHANGE SEQUENCE

With a roll unwinding under normal tension control and a new core loaded into the empty spindle position, a roll change can be made in one of two modes, "auto" and "semi auto". The auto is a core detection system and is the primary control with the semi auto provided as an override control. Splicing detection is by means of photocells and a suitable located "black patch" on the control side end of the roll. The sequence in each case is the same.

NOTE: Before a roll change can take place the operator must make sure that the new cores are loaded onto the spindles and that the chucks are safely in place. He should then press the "roll ready" pushbutton to arm the sequence. If he should accidentally press the roll ready pushbutton, the sequence can be reset by pressing the cancel pushbutton.

AUTOMATIC ROLL CHANGE

In "auto", the automatic roll change sequence is initiated from a pre-selectable diameter setting. An audible and visual warning is given before auto roll change.

1. With a new roll loaded, and the roll ready signal given, a three diameter preset core detection system is started. The system continuously measures the diameter of the expiring roll and executes the splicing sequence.
2. At the first predetermined diameter, the new roll is indexed towards the splicer, slowing down at the first photoeye. The speed up tachometer automatically moves to the roll surface. The new roll is run at a set low speed and the diameter is automatically calculated.
3. At the second predetermined diameter, the new roll is speeded up to line-speed using the diameter calculated in 2 above.

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003 MODIFICATIONS TO EXISTING SPLICER/Continued

4. At the third predetermined diameter, which is adjustable for line-speed changes to control scrap left on the core, the splicing sequence is initiated provided the spindle is speed matched.
5. Splicing sequence is activated and a photoeye scans for a "black patch" on the new roll. In the first pass, the paster roll is fired into the new roll making the splice; and on the second pass the knife is fired.
6. The new roll changes from speed regulation mode to tension control mode and the expiring roll drive switches to current control.
7. The knife, paster roll and speed-up tacho retract to the stored position.
8. After the knife is fired the expired roll regens to stop and the splicer circuit is reset.

Note: If any time during an automatic roll change the operator notices a problem, the sequence can be aborted by pressing the reset pushbutton.

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003 MODIFICATIONS TO EXISTING SPLICER/Continued

SEMI AUTOMATIC ROLL CHANGE

In "semi auto" roll change sequence is initiated by the operator depressing the "roll change" pushbutton.

1. With a new roll loaded and the roll ready signal given, the operator presses the "roll change" pushbutton and starts the sequence.
2. The new roll is indexed to a preset distance from the paster roll and the speed up tachometer automatically moves to the roll surface. The new roll is run at a set low speed and the diameter is automatically calculated.
3. When the new roll reaches line-speed the "roll speed matched" using the diameter calculated in 2 above lamp glows and the roll is ready for splicing.
4. The operator observes the butt roll and when it has reduced sufficiently to make a splice, he presses the "splice" pushbutton and the splice sequence starts.
5. The splice sequence is identical to items 5 to 8 of the auto change.

Note : Any further work to be carried out on the existing splicer to bring it back to an "as new" condition can only be specified after an order has been received and a Black Clawson engineer has been to site to examine the unit. This work will be charged at extra cost to the contract.

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004 MECHANICAL DRIVE

Mechanical drives will be provided to connect AC motors to the section listed below. This will include all the gearboxes, belts, pulleys, belt take-up units, jack shafts, couplings, and AC motor support pedestals and support brackets.

- Unwind Spindle A
- Unwind Spindle B

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005 SOLEPLATES

Black Clawson will provide the required soleplates, complete with levelling screws and foundation bolts.

The main soleplates will be of cast iron. Other soleplates for smaller equipment, including drive motor and gearbox supports, will be of mild steel plates approximately 50 mm thick.

All soleplates will have machined tops. Soleplates for the equipment listed below will be provided :-

1. Unwind and Splicer.

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006 CONTROLS

- a. Piping of machine mounted pneumatic components to machine bulkheads.
- b. Wiring of machine mounted electrical components to machine mounted junction boxes.
- c. One (1) Control Station for Unwind and Splicer.
- d. All piping and wiring between machine mounted bulkheads and control stations and between junction boxes and control stations are by the Buyer.
- e. Splice and roll change control logic will be implemented in a Siemens 115U PLC.
- f. All interface to the drive is via volt free contacts signalling items such as :-

Calculate diameter of new roll.
Start speed up.
Paster roll fired.
Knife fired.

UNWIND - SPICER

ABSTRACT

The following described equipment is designed to unwind a paper web, making splices from roll to roll at machine line speed.

GENERAL DESIGN SPECIFICATIONS

Web Width

- 3480 mm (137 inches) maximum
- 2200 mm (87 inches) minimum

Machine Roll Face

- 3556 mm (140 inches) minimum

Roll Diameter Unwind

- 1500 mm (60 inches) maximum
- ~~30 inches~~ (35" *240618*) minimum for splicing

Roll Weight Unwind

- 5 M.T. (12000 pounds) maximum

Core Size - Shaftless Unwind - Metal Cores

- 254 mm (10 inches) inside diameter
- 267 mm (10½ inches) outside diameter
- 150 mm (6 inches) I.D.
- 165 mm (6½ inches) O.D.

- Core Lengths

- 87 inches to 140 inches

Machine Line Speed (Based on roll balance and connected horsepower)

Paper Grades

- 800 MPM (2600 Feet per minute) maximum
- 100 MPM (400 Feet per minute) minimum

Thread Speed

- 15 MPM (50 feet per minute)

Acceleration/Deceleration Time

- 60 seconds required to accelerate machine line from zero to maximum line speed or to decelerate from maximum line speed to zero.

Tension Range (At machine speeds)

Paper Grades

- .178 to .535 KG per Cm (1 to 3 pli)
- 800 MPM (2600 FPM)
- 186 Kg. (410 total pounds)

Base Stock

Paper Grades

- 90-160 points caliper (.12-.14 & .24-.26 mm)
- 37 to 125 pounds per 3000 sq. ft.
- 60 to 200 GPSM

Hand of Machine

- Standing in front of unwinder looking at oncoming web, drive is on the right hand side.

The Selling Conditions attached are an integral part of these specifications.

OPERATING SPECIFICATIONS

The above General Design Specifications describe the mechanical design considerations of the equipment herein specified rather than the composite production capacity. An actual operating rate (speed) for production will be related to the material being processed, quality desired, operator skills, and other such requisites required for a given product run.

UTILITIES AND AUXILIARIES BY BUYER

Unless specifically included in the following machine specifications, the Buyer is to provide the following utilities and auxiliaries required for the specified process:

Electrical Power

Machines

- 500 Volts, 3 phase, 50 Hertz for AC Motors
- 380 volts, 3 phase, 50 Hertz for DC drive
- 230 volts, 1 phase, 50 Hertz

Controls

Air Supply

Operating Power

- 80 pounds per sq. in., clean and dry

Instrument Air

- 80 pounds per sq. in., filtered, clean and dry

Auxiliaries

- Motor Starters and Disconnects
- Interconnecting wiring and piping
- Erection of machine
- Foundations and sole plates
- Spares

GENERAL ARRANGEMENT

The general arrangement of the equipment described in these specifications is shown on proposal drawing D-45283.

Machines and Machine Components included in this proposal and which will be provided by the Seller are:

1. Model 623 Unwind - Shaftless Operation
 - a. Cast iron pedestals and turret arms
 - b. Dual Rotation gear cases with brakes
 - c. Individually adjustable arms - air motor operated
 - d. 11" Dia. Mainshaft
 - e. 5" Electric Sidelay
 - f. Dual water cooled air actuated brakes - ATD-211
 - g. 2 Bracket mounted 8" dia. idler rolls
 - h. 2 Adjustably mounted 8" dia. idler rolls
 - i. Chucks for 10" I.D. metal cores (Alternately 6" I.D. metalcores)
 - j. Controls

The Selling Conditions attached are an integral part of these specifications.

2. Model 325 Full Speed Automatic Splicer
- a. Fabricated side frames
 - b. 13½" dia. Rubber covered pressure roll
 - c. 2-Speed up belt assemblies
 - d. 12" Dia. spring roll
 - e. 12" Dia. Tension roll with Pneumatic Application control
 - f. 12" Dia. Squaring roll
 - g. Splice-O-Matic 3000 controls
 - h. Mechanical drive connections and gear box for speeder belts
HP for machine line sectional drive motor 30 HP at 1750 RPM

The Selling Conditions attached are an integral part of these specifications.