KOMAREK
EQUIPMENT AND MACHINES FOR BRIQUETTING AND COMPACTING

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January 16, 2008

Mr. Jeff Rockwood
Commercial Solutions
116-8818-111 Street
Fort Saskatchewan, AB
T8L 3T4
Canada

Quotation No. 2948

Dear Mr. Rockwood,

We are pleased to submit our quotation specifying the DH300-20.5 machine for briquetting nickel powder.

1.0 GENERAL

The DH300-20.5 two-roll briquet machine is a rugged machine that has been designed for reliability and ease of maintenance. The "H" frame construction allows removal of the rolls from the ends of the machine.

All components will be accurately aligned and mounted on a machined structural steel base. All rotating shafts will be suitably protected with guards.

Machine will be as shown on our drawing DH3412R2P4.

2.0 BRIQUET ROLLS & CAPACITY

The briquet rolls will be 20.5" in diameter x 4.75" wide with a 2" working face and will be made of 440C stainless steel, heat treated for maximum life.

The briquet rolls will be cut with a single row of pockets around the circumference. Pocket size is approximately 1-1/2" x 1.173" x 1/2" thick. There is one row of 48 pockets around the roll. Assuming a density of 8.9 g/cc per briquet, the machine will have an approximate nominal capacity of 2.2 TPH at 8.5 RPM.

2.1 OPTIONAL 150% CAPACITY

The briquet machine maximum roll speed is 12 RPM which would yield a calculated overcapacity of approximately 150%. The advantage of this design would be that the same machine can be used rather than changing to a larger briquet machine. If this option is taken, the roll drive motor would have to be increased to 60 HP (45 kW).

3.0 ROLL SHAFTS AND BEARINGS

Briquetting rolls will be mounted on shafts fabricated from AISI 4340 alloy steel forgings heat treated for maximum physical properties.

The roll shafts are supported by Timken double row tapered roller bearings with a L10 life in excess of 100,000 hours at full load of 75 tons.

Roll shafts will be designed so the tapered bearings can be removed hydraulically for ease of disassembly. Main roll shaft bearings will be greased lubricated. The shafts will be mounted in an H-frame assembly that will incorporate supernuts and a linear transducer to detect bearing block movement.

4.0 DRIVE TRAIN

The briquet rolls will be driven by a double output shaft speed reducer with 144:1 reduction ratio. The output shafts of the speed reducer will be directly coupled to the roll shafts by internal gear type couplings having hardened teeth.

In addition, one of these couplings will have a differential timing device to adjust the circumferential alignment of the rolls.

A 50 HP (37 kW) motor will be directly coupled to the input shaft of the speed reducer. The 50 HP (37 kW) inverter will be supplied by the customer.

5.0 HYDRAULIC SYSTEM

Two 6 inch diameter hydraulic cylinders will provide the DH300-20.5 machine with a maximum roll separating force of 75 tons at a hydraulic pressure of 3000 PSI. The hydraulic system will be infinitely adjustable to provide the roll separating force best suited for the product.

Two one quart nitrogen filled hydraulic accumulators will store the energy necessary to restore the rolls to their normal position after they have been displaced by momentary overloads.

Hydraulic system is designed for 3000 psi maximum continuous duty. A pressure relief valve will be provided to release the hydraulic pressure should it exceed safe levels.

A 1.75 HP (1.3kW) electrically driven hydraulic pump will be provided to charge the hydraulic system. This pump will be for intermittent "on demand" use only.

6.0 SCREW FEEDER & PUG MILL

The rolls will be fed by a feed screw driven by a 20 H.P. (15kW) shaft-mounted gearmotor. The 20 HP (15 kW) inverter will be supplied by the customer. This screw will precompress and meter material into the rolls. The feed screw, feeder base sleeve, and cheek plates will be identical to those supplied previously on the DH300-20.5 cobalt briquetter to facilitate interchangeability of parts.

A small 5 H.P. (3.7kW) gearmotor will mix the binder and nickel powder prior to its entry into the briquetter feed hopper. This mixer will be similar to the one shown on our drawing DH3416R1P2. It will feature a shortened shroud cover to allow for binder addition, and a flanged section to facilitate disassembly.

7.0 PRICING FOR DH300-20.5 MACHINE

One DH300-20.5 briquet machine as specified above.....US$297,621
(includes motors and pug mill) Total FOB Our Plant

All motors are 575VAC 3PH 60 HZ, TEFC. Other current characteristics can be quoted on request.

Export: There are no U.S. duties or taxes on this equipment. Import duties are the responsibility of the buyer.

8.0 DELIVERY AND TERMS

Delivery: Five to seven months from receipt of order.
Delivery subject to revision based on backlog at time of order. If this does not meet your delivery requirements kindly allow us to review your exact needs.

Terms: 30% with Purchase Order.
20% by midway before shipment.
50% from date of shipment.

BRIQUETTING MACHINE

Project:	ME Phase 2 Expansion- Detailed Engineering	TAG NO.	2 - BM - 110
MR No	E3077-R-M108	PE No	13-2463
P&ID No.	616 - J - 304	Service	Nickel Briquetting Machine

DESIGN CRITERIA

SYSTEM DESCRIPTION

A mixture of nickel powder and acrycol binder is discharged from the Pug Mill into Briquetting Machine.

REMARKS: INFORMATION TO BE COMPLETED BY : ○ COLT ☐ VENDOR

		Normal	Maximum	Minimum	Rev
○ Contents/Material Properties					
Powder Feed					
Feed Rate	lb/h	4176	4705		
Green Density	lb/ft³	475			
Solid SG		8.9			
Temperature	°F	132	176		
Moisture Content	%w/w	0.00	0.10		
Chemical Analysis					
% Carbon		0.07	0.09	0.05	
% Sulphur		0.025	0.036	0.018	
% Binder (Polyacrylic Acid Solution)		0.05			
○ Solid Particle Size Distribution-cumulative					
< 28 mesh			100%w/w		
< 200 mesh			20 - 50%w/w		
< 32 mesh			25%w/w (max)		
☐ Briquette Product		Normal	Maximum	Minimum	
Briquette Weight	lb	0.159	0.165	0.154	
Briquette Length	in		1.5		
Briquette Width	in		1.125		
Briquette Height	in		0.5		
☐ Machine Geometry					
Machine Length	in		111		
Machine Width	in		77		
Machine Height	in		99 1/2		
☐ Machine weight					
Empty Weight	lb		22,000		
Operating Weight	lb		22,000		
Maximum Weight lifted for Maintenance	lb		2,050		
☐ Maintenance Requirements					
Shutdown Frequency and Duration					
Start-Up Requirements					
Shut Down Requirements					

☐ MECHANICAL DESIGN DATA

MODEL# DPBLD-LUS ROLL DIAMETER 20.5" ROLL WIDTH 434", 2" FACE

ROLL SEPARATING FORCE 75 TONS ROLL SPEED 12 RPM MAX

ROLL PRESSURE SYSTEM HYDRAULIC SPECIFICATION N/A

ROLL MATERIAL 440 SS MAXIMUM ROLL PRESSURE 3000 PSI

FRAME MATERIAL 1020 ROLL BEARING TYPE TAPER ROLLER LUBRICATION GREASE

MACHINE BASE MATERIAL A36 OTHER N/A

COUPLING: TYPE FLEXIBLE GEAR MATERIAL N/A

MOUNTING CLAMP OR BRACKET MATERIAL N/A HOUSING FRAME MATERIAL 1020

PACKING N/A MECH. SEAL N/A TYPE: N/A MATERIAL: N/A

Rev	Date	Description	Mech/Chk	Proc/Chk	Elect/Chk	Colt App	Corridor App
[illegible]	[illegible]	[illegible]	ED/AM	RTM			
B	[illegible]	Issued for Approval					
A	[illegible]	Issued for ICR	[illegible]	[illegible]			

COLT

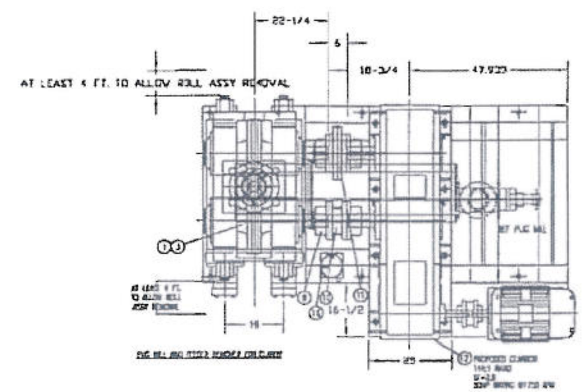
Briquetting Machine

Colt Job No	07E3477	Rev	01
Data Sht No	DS-2 - BM - 110	Sheet	1 of 2

[illegible]

PARTS LIST

NO.	DESCRIPTION	QTY	PART NO.	DWG. NO.
1	BRIQUET ROLL, 440C STEEL	2	-	-
2	FRAME ASSEMBLY	1	-	-
3	ROLL, SHAFT & BEARING BLOCK ASSEMBLY	1	-	DH3414
4	FEED SCREW ASSEMBLY	1	-	DH3415
5	PUG MILL ASSEMBLY	1	-	-
6	HYDRAULIC ASSEMBLY	1	-	DH3390
7	MACHINE BASE	1	-	DH3413
8	ROLL DRIVE COUPLING 1070T10	1	-	-
9	DH00 COUPLINGS	2	-	-
10	COUPLING SPACER	1	DH378-3	DH378
11	COUPLING TIMING SPACER	1	DH378-1/-2	DH378
12	REDUCER, 144:1 RATIO	1	-	-
13	ROLL DRIVE MOTOR, TEFC, 50 HP, 575V/3PH/60Hz 1750 RPM	1	-	-
14	FEEDER DRIVE FLANGE MOUNT GEARMOTOR, TEFC, 10 HP, 575V/3PH/60Hz [illegible]	1	-	-
15	PUG MILL GEARMOTOR, 5HP 575V/3PH/60Hz 60RPM OUT	1	-	-
16	HYDRAULIC POWER PACK, 575V 1.75 HP, 3PH/60Hz, 1.87 GAL RESERVOIR	1	-	-



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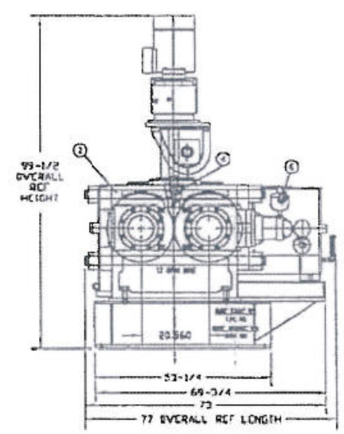

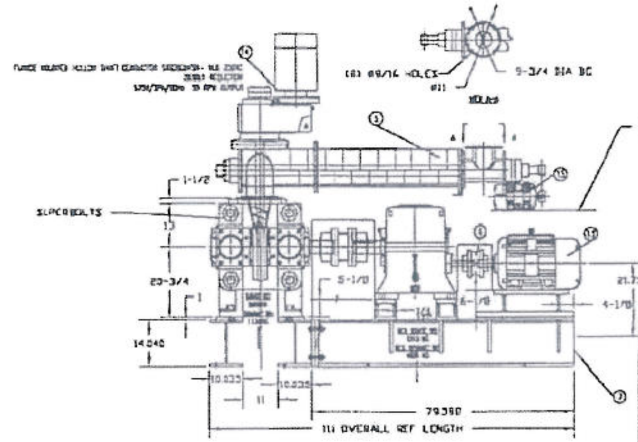

DESIGN SPECIFICATIONS

REQUIRED ROLL SPEED: 8.5 RPM, 12 RPM MAX
MAXIMUM FEEDER SCREW SPEED: 36 RPM
MINIMUM FEEDER SCREW SPEED: 15 RPM
MATERIAL DIAMETER: [illegible]
MATERIAL SPECIFIC GRAVITY: 0.80
CAPACITY: 4780 LBS (2.4 TONS)/HR DESIGN, 4170 LBS (2.1 TONS)/HR NOMINAL

MAXIMUM ROLL SEPARATING FORCE: 75 TONS

REV.	DESCRIPTION	DRAWN	APPROVED	DATE

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DESIGNED BY	FND	[illegible]
DRAWN BY	FND	[illegible]
APPROVED BY	FND	[illegible]
SCALE	1/16	
NO REQ'D		
MATERIAL		
WEIGHT		

TITLE: GENERAL ARRANGEMENT OF [illegible] FOR WORLEY PARSONS [illegible] (PROPOSAL)

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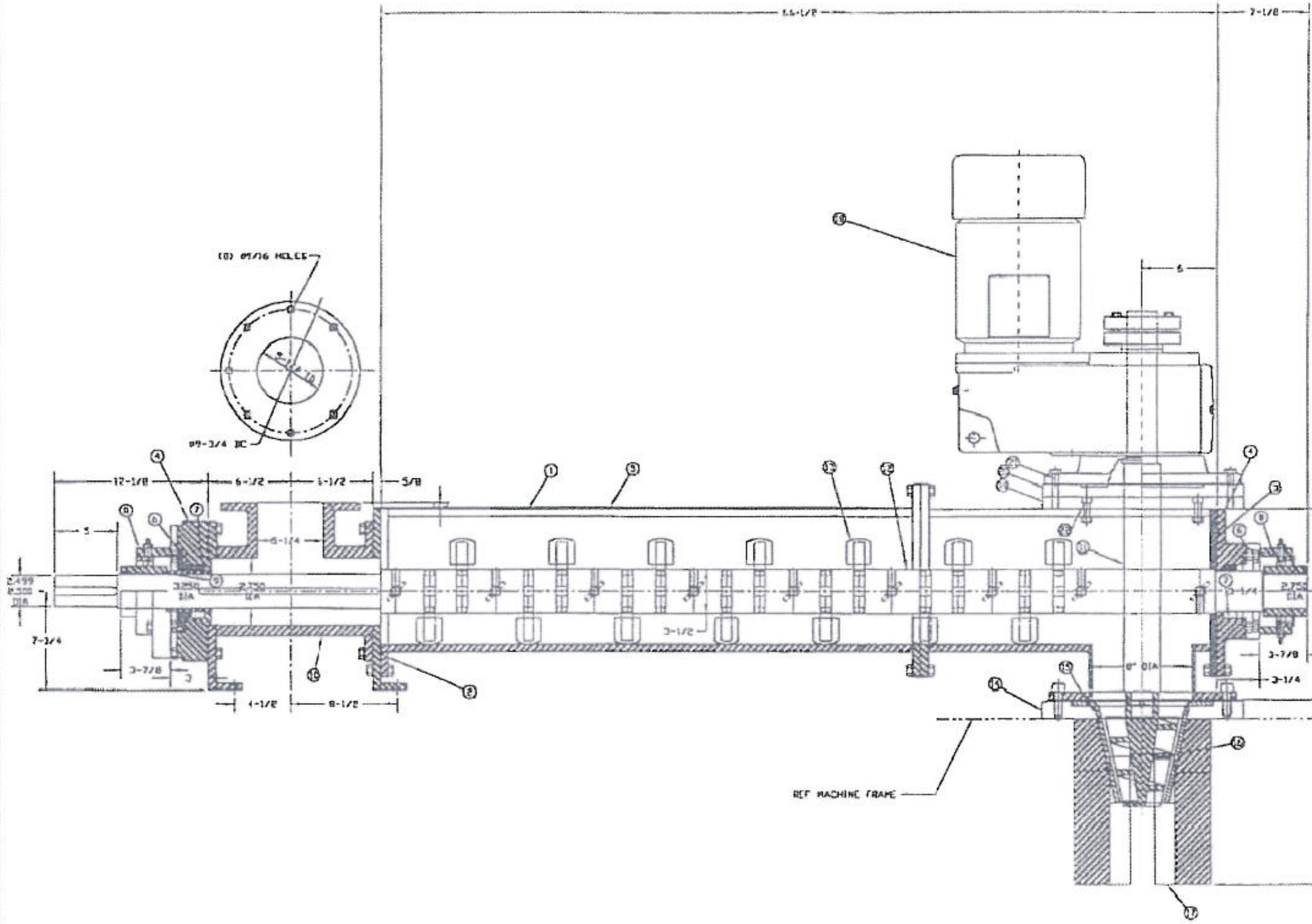
METHOD A

OLD DWG NO:
DRAWING NO: DH3412R2P4



PARTS LIST

NO.	DESCRIPTION	QTY	PART NO.
1	MIXER TROUGH	1	-
2	MIXER END (DRIVE SIDE)	1	DH3430-2
3	MIXER END (OFF DRIVE SIDE)	1	DH3430-3
4	DRIVE END BEARING MOUNT	1	DH3430-4
5	PARTIAL SHROUD COVER	1	-
6	PACKING GLAND	2	DH3435-6
7	1/2" SQUARE GRAPHITE & ASP PACK	-	-
8	[illegible] FLANGE BRG	2	-
9	SPACER SLEEVE	1	R625-1
10	INLET HOUSING	-	-
11	FEED SCREW SHAFT	1	DH3471-1
12	MIXER SHAFT	1	-
13	MIXER PADDLES	23	R625-4
14	FEEDER BASE	1	DH3373-1
15	FEEDER BASE INSERT SLEEVE	1	R373-4
16	FEED SCREW	1	DH3377-2
17	CHEEK PLATES (BRIQUET ROLLS)	2	R485-1
18	[illegible]	1	-
19	MOUNTING PLATE	1	-
20	MOTOR MOUNTING PLATE	1	-
21	1/2 NC-13 X 2" LG HHCS	4	-
22	1/2 SHCS X 2" LG	4	-

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REV.	DESCRIPTION	DRAWN	CHK.	ENGR.	DATE

TITLE: PUG MILL ASSEMBLY
FOR COLT ENGR/WORLEY PARSONS/COMMERCIAL SOLUTIONS

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DRAWN	FNC	CHECKED	FND	ENGR	FND
SCALE	1/4	DATE	18 JAN 08	REV.	0
JOB NO.	-	FILE NO.	DH300-20.5	DWG NO.	DH3416R1P2