OPERATION INSTRUCTIONS FOR CABR PARALLEL THREAD REBAR SPLICE WITH UPSET END

（USA EDITION）

（Scenarios for Video）

June 07 2010

1. Preparation before Production

1.1 Preparation of Super-high-pressure Electric Oil Pump

1.1.1 Filling the hydraulic oil

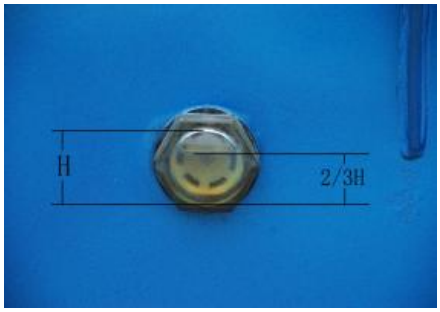
At first screw off the oil port cover, and then fill the hydraulic oil into the oil box (Pic.1.1.1-1), which should be up to the 2/3 height of the oil window (Pic.1.1.1-2). In this operation, filler should be used and there should be a little space between filler mouth and oil port, for being good to aeration and easy to fill. Avoid the sundries to be filled in.

At last screw on oil port cover when the oil is full. By the way, the hydraulic oil species is determined to the environmental temperature. Details listed in table1:

Table 1: The reference choice of hydraulic oil in different environmental temperature

Environmental Temperature	-10℃--0℃	0℃--25℃	10℃--35℃
Oil Species	10#aircraft fluid	32# hydraulic oil	46# hydraulic oil

Pic.1.1.1-1



Pic.1.1.1-2

1.1.2 Collect high pressure pipes: Remove the plastic cover upon the pipes before collecting (Pic.1.1.2-1). Then switch these two pipes in to the two oil ports of the reversal valve on oil box, and screw the round nut tightly (Pic.1.1.2-2).

Pic.1.1.2-1

Pic.1.1.2-2

Collect the other side of pipes with the oil ports on upsetting machine .Pay attention to following situation: Upper port of oil pump should be collected with Sequence valve(bigger one); lower port of oil pump collected with Return-stroke valve(smaller one). If following the above collecting method, the operation direction of reversal valve would be uniform with the extension direction of oil cylinder, which is good for easier operation of oil pump.

1.1.3 Checking and locking the highest oil pressure: This item is the most important in oil pump operation! Excessive oil pressure will damage oil pump or upsetting machine, while lower oil pressure can not drive the machine effectively. The checking and adjusting process are introduced as follow:

1.1.3.1 Set the reversal valve on the middle site (Pic.1.1.3-1);

1.1.3.2 Turn on the pump and make it work two minute without load (Pic.1.1.3-2).

Pic.1.1.3-1

Pic.1.1.3-2

1.1.3.3 Unfix the locked screw on adjusting valve of oil box (Pic.1.1.3-3).

Pic.1.1.3-3

1.1.3.4 Turn back the reversal bar (opposite direction from operator), make the big clip backward. And at the same time, check the pressure table (Pic.1.1.3-4), the highest position it touched should be the highest pressure that this pump can reached, which should be set to 40MPa since the pump come out from factory. If these were some differences, the reversal bar must be rotated (Pic.1.1.3-5) until the rated pressure is reached.

Pic.1.1.3-4

Pic.1.1.3-5

1.1.3.5 Set the reversal valve on the middle site. Tighten the locked screw on adjusting valve. In the whole production process, the rate pressure must not be changed at random. By now, all preparations of high pressure oil pump have been completed.

1.2 Preparation of Super-high-pressure Electric Oil Pump

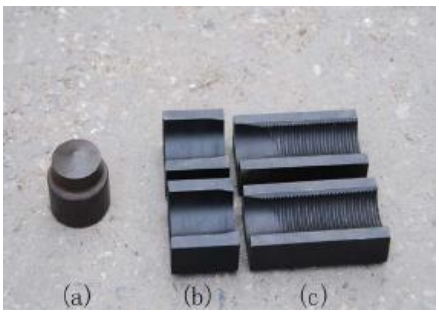
1.2.1 Equipment installation: Set the upsetting machine on the frame and pay attention to the right direction and position (Pic.1.2.1).

Pic.1.2.1

1.2.2 Exhaustion of oil cylinder: The main purpose is to exhaust gas from cylinder body, so as to make upsetting machine work stably. Turn on the pump, operating sequence valve to make the oil cylinder fore and after for many times. Unfit the junction of oil pipe slowly by hand (Pic.1.2.2), and there will be some gas come out during this movement. Dot set the reversal valve on the middle site until there is some oil comes out, and then lock the junction of oil pipe by hand tightly. Of course both of the two oil ports need exhaustion.

Pic.1.2.2

1.2.3 Preparation of dies: Set suitable dies (forming die, clamping die and upsetting bar) (Pic.1.2.3) for different size of rebar, there are relevant sign on the surface of die. The changing process is as followed:



Pic.1.2.3

1.2.3.1 Uninstall the covering steel board (Pic.1.2.3.1-1) and blocking board (Pic.1.2.3.1-2) above the big clip.

Pic.1.2.3.1-1

Pic.1.2.3.1-2

1.2.3.2 Operate the sequence valve to make the big clip move to the centre position of the window (Pic.1.2.3.2).

Pic.1.2.3.2

1.2.3.3 Use special tool to make the upsetting rod back until to stop position.

Pic.1.2.3.3

1.2.3.4 Use special tool to pull out the big clip one by one.

Pic.1.2.3.4

1.2.3.5 Install on the suitable clamping die and forming die, pay attention to the fixed direction (Pic.1.2.3.5): the big hatch of the forming die point to the outside of big clip, connecting bell-mouthed side of the clamping die with the forming die and the signal side of clamping die should point to the outside of big clip also. If the Installing Direction of clamping die is wrong, rebar would slip in clamping process and lead to no finally.

Pic.1.2.3.5

1.2.3.6 Setting on the suitable upsetting rod (Pic.1.2.3.6).

Pic.1.2.3.6

1.2.3.7 Set on the big clip with right dies one by one.

Pic.1.2.3.7

1.2.3.8 Set the covering steel board and blocking board back and pay attention to the installation direction of covering steel board.

Pic.1.2.3.8

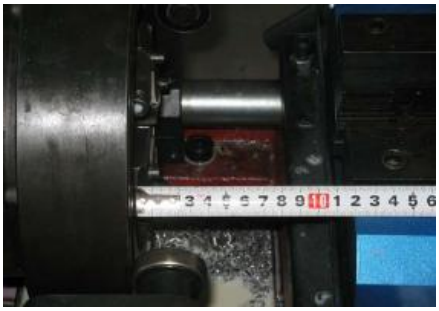
1.3 Preparation of threading machine。

1.3.1 Fill oil into the reduction box (Pic.1.3.1-1): the oil can keep working gears greasing, which should be 30# machine oil. Oil lever should be in the domain of two lines signal on the dipstick.

Pic.1.3.1-1

Pic.1.3.1-2

1.3.2 Checking the position of limit rods: the positions of two limited rods have been adjusted well since the threading machine comes out from the factory, but also you should check it before using. The distance between the face of front limited rod and clamp bench should be 120 mm (Pic.1.3.2-1)，the distance between these two limited rods should be 5 mm; The position of limited rod body and threading machine head should be moderate , not to be outside or inside (Pic.1.3.2-2), otherwise these will act bad to the threading machine head working and cause it wearing quickly; The position of these two limited rods should be keep justified ,which would make them touch the threading machine head at the same time when the threading machine head eject or furl the chasers, so that ejecting and furling would be smoothly and reduce the wearing of thread machine head.



Pic.1.3.2-1

Pic.1.3.2-2

1.3.3 Fixing the chasers (Pic.1.3.3):

1.3.3.1 Choose the right spec of chaser for the different rebar (Pic.1.3.3.1). The spec list is as follow.

Table 2

Rebar Spec.	Φ12～16mm	Φ18～22mm	Φ25～32mm	Φ36～40mm
Chaser Spec	P2.0	P2.5	P3.0	P3.5

Pic.1.3.3

Pic.1.3.3.1

1.3.3.2 Furl these four chaser frames and lock them (Pic.1.3.3.2).

Pic.1.3.3.2

1.3.3.3 Machine head move forward, do not move by excessive distance, ejecting the machine head by front limit rod.

Pic.1.3.3.3

1.3.3.4 Unscrew the Screw from Cover of Ring of Adjusting Cutters(Pic.1.3.3.4-1) and Get off Cover of Ring of Adjusting Cutters From the Thread Head(Pic.1.3.3.4-2).

Pic.1.3.3.4-1

Pic.1.3.3.4-2

Clockwise rotation Ring of Adjusting Cutters Like (Pic.1.3.3.4-3) and get it off (Pic.1.3.3.4-4).(**Each size for one ring of adjusting cutters**)

Pic.1.3.3.4-3

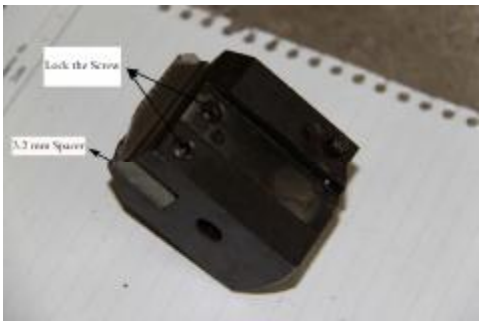
Pic.1.3.3.4-4

1.3.3.5 Unfix the chaser frames one by one (Pic.1.3.3.5-1), then install chasers into them (Pic.1.3.3.5-2). Set on 3.2mm spacer for chaser behind the chaser before installation of

chaser, the installation of chasers order is A-B-C-D one by one and follows the counter clockwise toward the threading machine head (Attention: the wrong installation order would lead to no thread of rebar end) (Pic.1.3.3.5-3).The back plate of chaser must touch the cutting frame tightly and then use lock screw to compress the chaser. The compressing force should be moderate (Pic.1.3.3.5-4), otherwise too light force would lead sliding, but too heavy would make cutting frame distorted and act badly to the ejecting and furling of threading machine head.

Pic.1.3.3.5-1

Pic.1.3.3.5-2



Pic.1.3.3.5-3

Pic.1.3.3.5-4

1.3.3.6 Put on the Ring of Adjusting Cutters(Pic.1.3.3.6-1) and contrarotate the the Ring of Adjusting Cutters like (Pic.1.3.3.6-2).

Pic.1.3.3.6-1

Pic.1.3.3.6-2

Than put Cover of Ring of Adjusting Cutters on thread head and lock the screw(Pic.1.3.3.6-3). Unloose these four chaser frames and unlock them.

Pic.1.3.3.6-3

2. Cutting of rebar

2.1 Using grinding wheel machine to cut rebar.

2.1.1 The end of rebar that is bent needs to be made straight or cut.

2.1.2 The cutting surface shall be vertical to the rebar axis, the preparing surface of rebar end must not skew over 4°after cutting, and the cut rebar end should not be inside water after cutting.

2.1.3 The rust, sand, greasy dirt and other things on the surface of the rebar end shall be cleaned away to prevent these things from entering the upset machine to affect its service life.

2.1.4 Attention to safety: the rotating direction of grinding should be away from operator, there should be safe cover around grinding to prevent spunk wound person or damage other things.

2.1.5 The rebar cutting length should refer the Shorten rebar length by upsetting, which is just as the following table3.

2.2 using special cutting machine to cut rebar.

3 Upsetting of rebar end

3.1 At first to ensure that oil cylinder of upsetting machine has been back to the back stop port, and the dies in machine is matched with the rebar that will be produced otherwise the dies need to be changed (referring 1.2.3)

3.2 Put the prepared rebar into the die cavity levelly, and keep vertical rib of rebar and horizontal direction being 45°. Catch rebar tightly until it is caught by clamping die. Being careful, the rebar end should not be skew, otherwise the rebar end would be upset bent and off-grade.

3.3 Make reversal valve rod go forward (Pic.3.3) and the oil cylinder extend forward, Not put the reversal valve rod backward until the oil pump reach the required pressure. Then the oil cylinder will go back, when it reach the stop port, pressure become rising, set reversal valve rod at middle position at once. A process of rebar upsetting has been finished.

Pic.3.3

3.4 Pull rebar out from dies with hand, Measure the Basic dia. of upset end to check whether it meets the standard as table 3, it also need check whether the upset end straight or not (the skew upset end would affect to the thread quality), if it meet the standard, continue to the next process, otherwise the upset end must be cut off and upset again, it is prohibit to upset two times at one position of rebar. If rebar is caught by the dies,

swinging it around and it will come out easily.

Table 3

	LD1200 Upsetting System						
Rebar size	Φ13	Φ16	Φ19	Φ22	Φ25	Φ29	Φ32
Reference upsetoil pressure(Mpa)	9~11	16~18	18~20	23~25	26~28	31~33	36~38
Basic dia. of upset end (mm)	14.2~14.8	17.7~18.3	21.2~21.8	24.2~24.8	28.2~28.8	31.2~31.8	34.2~34.8
Shorten rebar length by upsetting (mm)	12±3	12±3	12±3	15±3	15±3	15±3	15±3
Upset end length (mm)	13-15	16-18	19-21	22-25	25-28	29-32	32-35
Rail block thickness (mm)	46	44	40	38	35	32	28

Remarks:

① The parameter of upset pressure is just to be referent, and the basic dia. of upset end is the core parameter.

② The rebar need to do test of upsetting for each spec, when it become to be use in the project., Adjusting the oil pressure, until the rebar end reach the right basic dia. of upset end，the oil pressure that shown on the manometer at that time would be the practical pressure which should be standard parameter performed in the production of rebar.

3.5 In normal production, if dies are damaged and they affect the normal procession, they should be changed at once.

3.6 The quality inspection of rebar upset end: measure the basic dia of upset end to affirm whether it meets the parameters shown in table 3 (Pic.3.6). 10% of upset end should be checked in large production. If the size does not meet requirement, adjust it at once.

Pic.3.6

3.7 The cracks problem of upset end

3.7.1 Vertical cracks: It is occasional for separate rebar to appear vertical cracks on upset end in upsetting procession (Pic.3.7.1). It is permitted that width is not over 1-2 mm, these vertical cracks would not affect the strength of splice. But if the width is over 2mm, the tensile strength test needs to do. If the result is OK, this rebar is permitted to use. Otherwise, do adjustment of upsetting parameter until passing the strength test; if not, it is prohibited to use this kind of rebar.

Pic.3.7.1

3.7.2 The method to reduce the vertical cracks

①Under the premise of meeting the standard of Basic dia. of upset end, Try to reduce the upsetting pressure.

②The corner angel of upsetting rod should be grinded by grinding wheel (Pic.3.7.2).

Pic.3.7.2

3.7.3 The transverse cracks: All the transverse cracks that caused by upsetting is prohibited to use. It could affect the strength of splice. In this situation it need to do more sample and then to judge whether it is caused by the rebar itself.

4. Thread machining of rebar

4.1 At first return the machine head back to the backward limit rod (Pic.4.1).

Pic.4.1

4.2 Put the upset rebar in the rebar gripper. Place the suitable steel block which is the same size to the rebar on the front surface of the machine head. Make the rebar touch the steel block (Pic.4.2) and fasten the rebar, then pull out the steel block.

Pic.4.2

4.3 When rotating the feeding handle forward to make thread (Pic.4.3). Attention: please keep slow speed when chasers are just touching the rebar end. Please don't use big power until all 4 chasers have touch the rebar end, then at the same time, change to the regular forward speed. When threading machine starts to make thread, keep the feeding speed the same as the threading speed. The feeding power should not be too strong or weak, or it will effect the quality of thread tooth; keeping big power to make forward in the ejecting process of machine head, until the machine head eject completely and could not go forward.

Pic.4.3

4.4 Rotate the feeding handle to make machine head backward quickly by hand, when it comes back to the starting position port (Pic.4.4). The back surface of machine head would touch the furling axis, and the whole furling process has been finished. At the same time, the position switch touch the position dog and the power of redactor and cooling pump will be turned off, the machine head will stop rotating, and also the cooling liquid would stop running.

Pic.4.4

4.5 Unfix the rebar gripper and take out the rebar (Pic.4.5).

Pic.4.5

4.6 Checking the quality of thread end: At first use the go gauge to check the thread length (Pic.4.6-1), then using the no go gauge to check the thread diameter. No-go gauge must not go in more than 3 pitches (Pic.4.6-2). 10% of upset end should be check quality in large production. If the size is not meet requirement, to do adjusting at once, until it meets the requirement.

Pic.4.6-1

Pic.4.6-2

4.7 Covering the qualified thread end with plastic cover or suitable couple, tightening it by hand to prevent the thread from being damaged. Locate the rebar with thread to the laying place. Until now, the whole threading process has been completed.

5 The splice of rebar end

5.1 First take off the plastic cover on the rebar thread end, checking the thread whether is damaged or not. If there is some damage, it should be manually repaired.

5.2 Screw the right couple into the thread end of rebar that is ready for splicing, and then rotate the rebar tightly by hand.

Pic.5.2

5.3 Take off the plastic cover on the coupler and the other rebar thread end. Screw the rebar thread end into another end of couple by hand (Pic.5.3-1), and then rotate the rebar tightly by wrench (Pic5.3-2). Right now, one splicing process has been finished.

Pic.5.3-1

Pic.5.3-2

5.4 Check the splice quality: The thread length that outside the coupler should be basically the same. The permission of difference is not over one pitch. If the splice can not meet the above requirement, uninstall the coupler and do adjustment until it is qualified.