

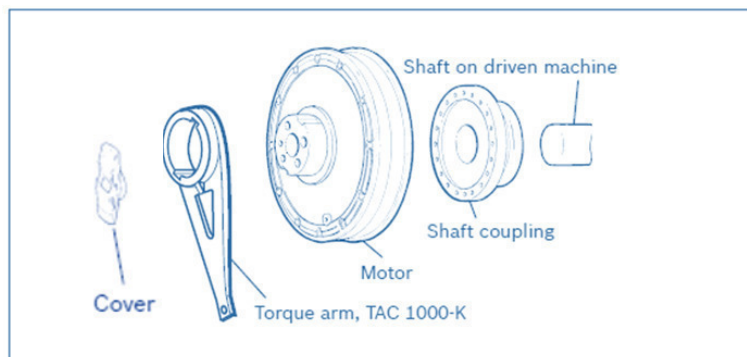
FIELD REPORT: Vessel S45, Contract Number R-1609

Work Order WE003, Item 8001



The following activities were carried out to attend the request to check and provide a diagnosis of why the hydraulic motor of the bow centerline mooring winch rotated but did not haul the drum shaft: http://www.olagorta.com/Radial_VI.pdf

1. Marking and decoupling of hydraulic lines
2. Removal of front cover
3. Removal of torque arm
4. Removal of crimp rings' coupling
5. Removal of hydraulic motor's rear cover
6. Withdrawal of hydraulic motor



After withdrawing the hydraulic motor, mooring winch drum shaft and hydraulic motor coupling housing are observed to be damaged; DRAGGING OF MATERIAL (contact surface extremely rough) from friction.



A misalignment between the crimp rings' coupling and mooring winch drum shaft was generated causing a transmissible axial force or torque variation therefore causing friction and damage to both components.

Reparation proposal:



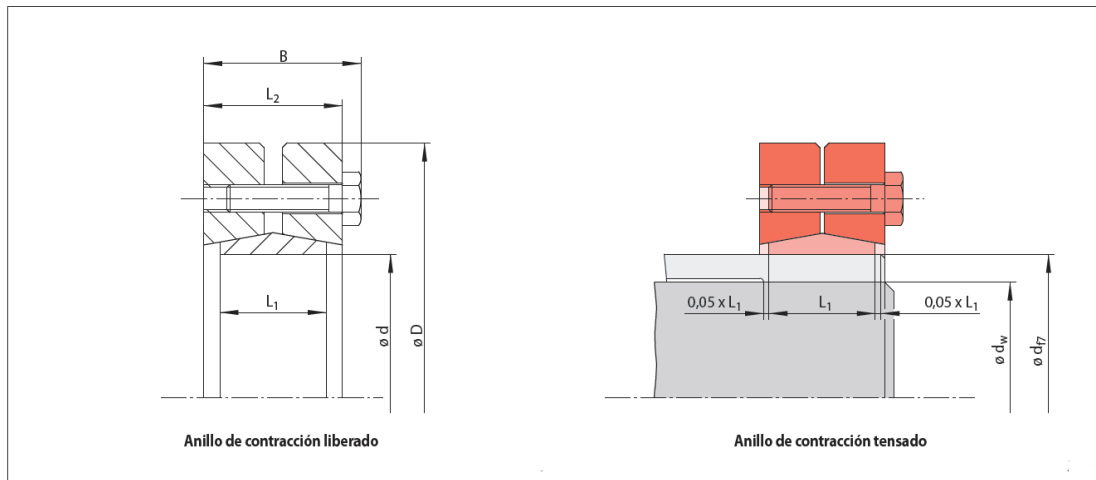
1. To dismount mooring winch shaft with all and drum. Crew will need to remove rope from drum.
2. Transport shaft and drum to ship repairs' mechanic shop
3. Withdraw mooring drum shaft and send to machining shop.
4. Machine the hydraulic motor's shaft and coupling housing; remove wear caused from dragging of material and then bush, weld and machine both components to dimensions.

5. Original: $\varnothing$ 165 mm, looking for the adjustments indicated for hollow shafts and solid shafts.

Tolerancias

d_w > mm	d_w ≤ mm	Diámetro del eje hueco ISO	Diá. del eje macizo ISO	Holgura	
				mín. mm	máx. mm
6	10	H6	j6	-0,007	0,011
10	18			-0,008	0,014
18	30			-0,009	0,017
30	50	H6	h6	0	0,032
50	80	H6	g6	0,029	0,048
80	120	H7	g6	0,012	0,069
120	180			0,014	0,079
180	250			0,015	0,090
250	315			0,017	0,101
315	360			0,018	0,111

6. Acquire and change crimp rings' coupling. See information included:
<https://www.ringspann.es/es/productos/uniones-conicas/anillos-de-contraccion/disenio-en-tres-partes/anillos-de-contraccion-rlk-603-s>



Dimensiones						Datos técnicos							Número de artículo
Tamaño d mm	D mm	B mm	L ₁ mm	L ₂ mm	d _w * mm	Par o fuerza axial transmisible		Tornillos de fijación				Peso kg	
						M Nm	F kN	Par de apriete M ₅ Nm	Número	Tamaño	Longitud mm		
220	370	114	88	104	160 165 170	90 700 98 600 106 000	1 130 1 190 1 240	250	15	M 16	80	50,0	4200-220301-000000


Carlos Santibañez Reyna
 Superintendente Mecánico
 (Mechanics Superintendent)

FIELD REPORT: Vessel S45, Contract R-1609

Component damage repairs



Mooring winch drum was dismantled and transported to workshop. It was then dismantled at the workshop removing coupling-clutch and solid shaft. One of the two bronze bushings of the drum was found to be stuck against the shaft, rotating along with the shaft inside the drum housing. This was shown to the Shipowner for him to make a decision.



Solid shaft was sized and turned while removing adhered and loosened off material as a result of dragging (Report to be delivered by Machining Supervisor)



Hollow shaft was sized and turned (housing of the winch's solid shaft), to remove adhered and loosened material as a result of dragging material (Report to be delivered by Machining Supervisor), leaving ready for repairing and installing a duly welded and later machined bushing.



Conditions of crimp rings' coupling was shown to Shipowner who was informed that to reuse it and for the sleeve to be able to fit with a greater transmissible axial force or torque to the solid shaft, a 1 mm cut would be made at its joint (parallel to this, a request to quote new coupling was made). Lacking a new coupling, proposal was accepted.



Completed machining of both (solid and hollow) shafts, crimp rings' coupling installed on hollow shaft was tested. The 16mm screws/bolts were torqued at 250 lb/ft shrinking the housing of hollow shaft by .004". Adjustment was agreed with client to be satisfactory.



As for adjustment between the hollow shaft and solid shaft, both shaft measurements were checked, remaining with a slightly forced adjustment (the minimum diameter admitted was greater than the maximum diameter admitted for the hole), so slight heat had to be applied to the rear cover of the hydraulic motor to insert it into the winch's shaft.

A winch *load*-bushing had to be machined with client-supplied material. TNG personnel carried out machining, adjustment and installation work.

Winch was mounted and during the first tests performed with a load of less than 4 tons, the hydraulic motor moved the winch's shaft without any trouble; then, with a load of more than 4 tons, the hydraulic motor rotates and the winch's shaft-drum fails to move. Components were checked finding loose screws/bolts even though such had been torqued. A decision was made to change the fifteen 16 X 100 mm screws/bolts of the crimp rings' coupling along with the respective spring washers.

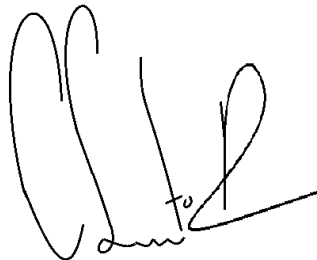


Having changed the 15 screws/bolts, these were torqued to 250 lb/ft and tests were performed once again with the same effect: with a load of less than 4 tons, the hydraulic motor moved the winch's shaft without any trouble; with a load of more than 4 tons, the hydraulic motor rotates and the winch's shaft-drum fails to move

Conclusion:

Being there was no information from the client on the original adjustments there should be between the rear cover of the motor and winch shaft, it was estimated and agreed, by common consent client-supplier, that by machining the solid shaft, bushing the hollow shaft and adjusting and shrink-fitting hollow shaft to up to .004", the winch could end-up working satisfactorily. Unfortunately, the objective was not achieved.

A more forced adjustment would have to be obtained between both coupling parts to again test and check behaviour (trial and error) until the exact adherence is achieved, reason for which it is essential to count on the original settings from the client to avoid reworks.

A handwritten signature in black ink, consisting of stylized, overlapping loops and a long horizontal stroke extending to the right.

Ing. Carlos Santibañez Reyna
Mechanical Superintendent