



# CLASS AND SHIPBUILDING IN FAR EAST

# *Hull Survey for New Construction*

- IACS UR-Z23 Last revision October 2007



# ***Importance of Kick-off Meeting***

- Appraise Yard and Class on Service Notations. Define requirements.
- Verify Class authorization from Flag for statutory surveys.
- List of drawings and documents to be submitted
- List of Materials and Equipment to be certified by Class.
- Yard to provide list of subcontractors (design, hull construction, NDT, machinery, electricity)
- Yard to provide point of contact for Class/Owner
- Define procedure for Class Intervention (form, time, verification)
- Patrol inspections
- Shipyard fabrication standards.
- Schedule quality tri-partite meetings.

**CHINA SHIPBUILDING  
QUALITY STANDARD  
CSQS**

IACS Recommendation 47,

***“Shipbuilding and Repair Quality Standard for New Construction”***

# *What is Patrol?*

- **Patrol**, the act of checking on an independent and unscheduled basis that the applicable processes, activities and documentation of the shipbuilding conform with class and statutory requirements.





# *List of Documents from Yard*

- Plans and supporting documents
- Examination and testing plans
- NDT plans
- Welding consumable details
- Welding procedure specifications
- Welding plan or details
- Welder's qualification records
- NDT operators qualification records
- ***Documents to be inserted into the ship construction file.***





# INSPECTION PLAN ACCORDING TO CLASS REQUIREMENTS

Bureau Veritas		INSPECTIONS AT WORKS						3
		HULL FITTINGS						B
N°	Item (0)	Design index (a)	Inspections and tests			Checking or tests (4)	Running test (5)	Remarks (6)
			Materials (1)	Inspections during fabrication (2)	Inspection after completion (3)			
B 1	<b>Steering gears</b> 1- pumps 2- cylindrical shell of hydraulic cylinders, rotor housing for rotary vane steering gear 3- rams, piston rods 4- tiller, rotor for rotary vane steering gear, quadrant, steering chains and rods 5- pipings	2			X r X	X h	X	(5) under load on board. (0) type test 100 hours following 15-62.61 of Rules (2) if welded element  (1) can be replaced by a works certificate  (2) if welded element. (4) proof loading of steering chains and rods (0) see G26
B 2	<b>Rudder</b> 1- rudder stock, rudder shaft, pintles, coupling bolts 2- rudder blade	2			X r X r	X h c		(2) if welded element. (4) for streamlined rudder blade of watertight construction
B 3	<b>Bower anchors</b>	1	X		X r	X s		(0) Homologation procedure applicable for: - ordinary anchor weight <100 Kg - high holding power anchor weight <75 Kg
B 4	<b>Chain cable (anchor)</b>	1	X		X r	X s		(a) special procedures for approval of the manufacturer
B 5	<b>Shackles, kenter shackles and swivels</b>	1	X		X r	X		

h : hydraulic test (or equivalent)      c : may be carried out at the yard or on board      r : checking of characteristics as per rules according to the reviewed drawings      s : non destructive tests as per rules

# *Steel Preparation and Fit-up*

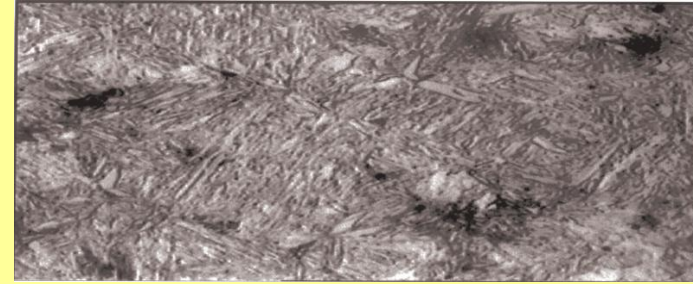
- Class to verify surface preparation, marking and cutting.
- Traceability and acceptability of material.
- Class to verify standard of shot-blasting and priming.
- Class to verify that steel grades can be identified.
- Acceptable tolerances for plates and stiffeners.

# *Steel Forming Procedures*

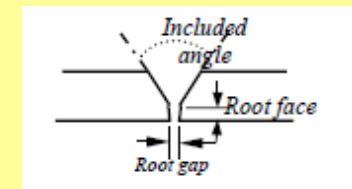
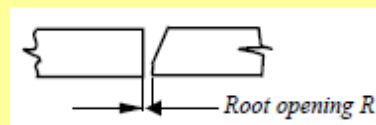
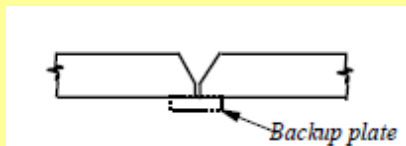
- *Straightening*-Procedure to be approved by Class for the grade and type of steel.
- *Forming*-Maintain material properties. Acceptability against deformations (hot forming). Verify temperature control.
- *Alignment-Fit-up* gap to be checked by Class. Verify potential remedial procedures to compensate for wide gaps/alignment deviations. Critical areas.



# Fit-up/Join/NDT

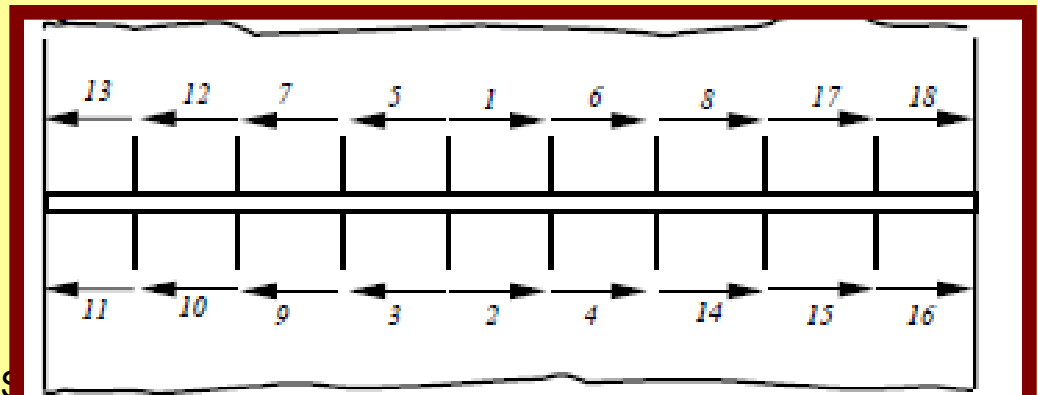


- Temporary cut-outs in highly stressed areas shall be avoided. Temporary cut outs shall have a corner radius not less than 100 mm.
- Members distorted by welding shall be straightened according to a detailed work instruction. The base material properties shall satisfy the specified requirements after straightening.
- Maximum temperature for straightening shall not exceed the temperature limit recommended by the steel manufacturer, but it shall in no case be higher than 600 °C.
- Final inspection and NDT of structural steel welds shall not be carried out before 48 hours after completion
- Welds containing cracks shall not be repaired, until the reason for the cracking has been determined.

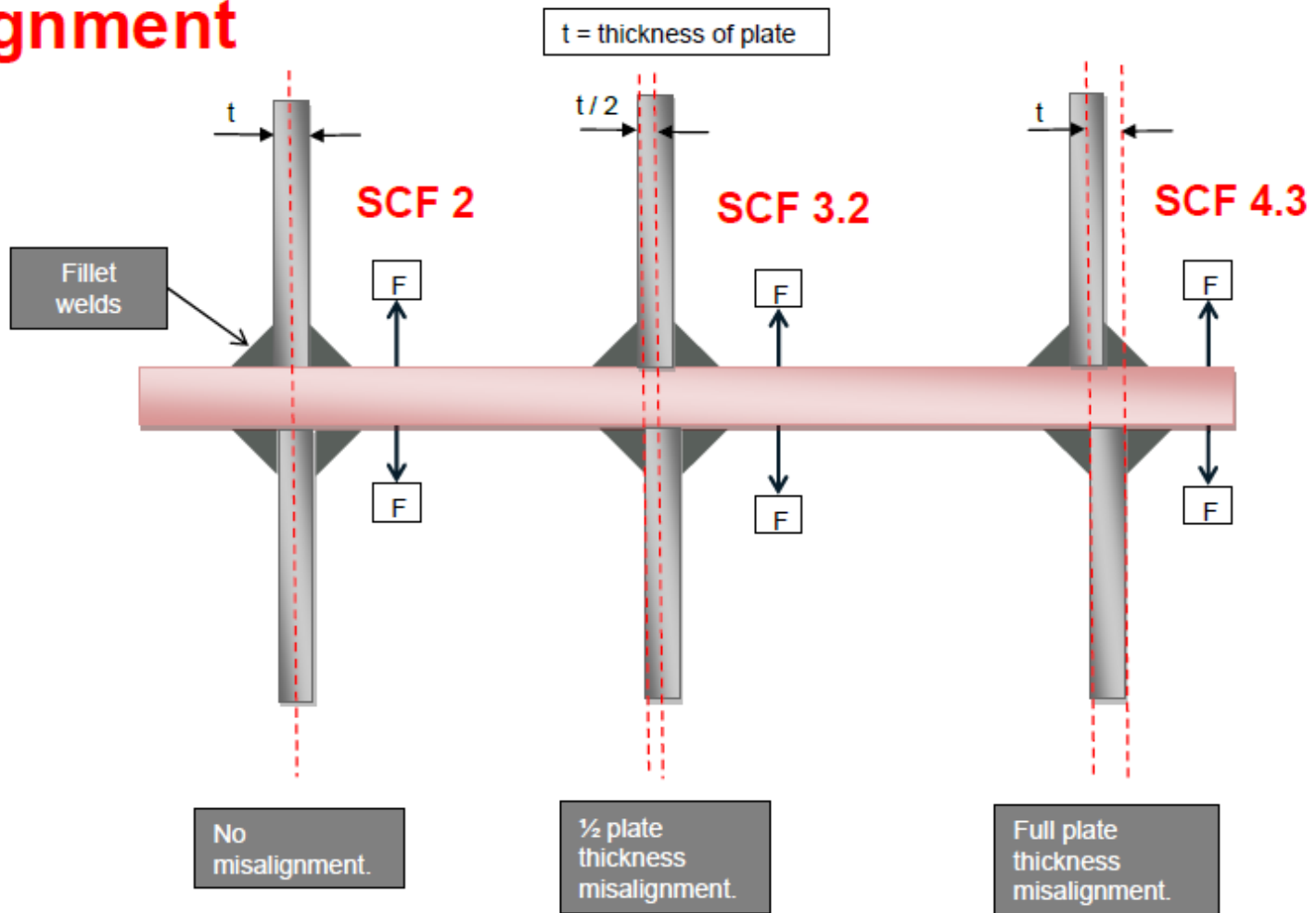


# Welding

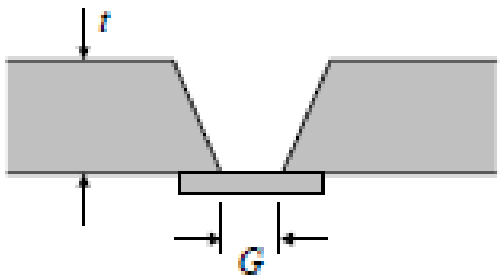
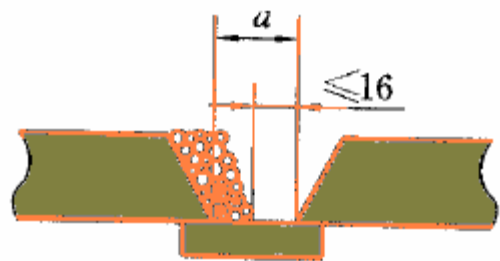
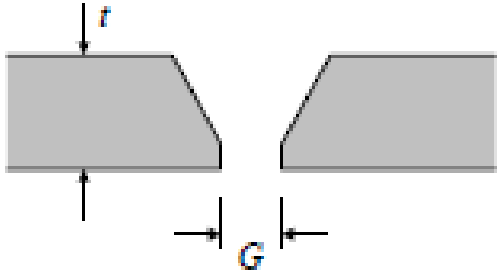
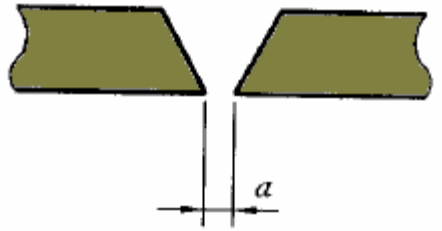
- Welding consumables (traceability-storage)
- Welder qualification (validity, weld position, class recognized qualification standard)
- Weld procedures approved by Class.
- Weld equipment correctly calibrated and maintained.
- Welding environment satisfactory.
- Welding NDT and visual examination according to approved plans where applicable.
- Class surveyor to review NDT records.
- Class to verify NDT operators are suitably qualified.
- Systematic review of radiographs to be carried by surveyor.
- Verify correct weld sizes



# Alignment



# Typical Butt Plate Edge Preparation (Manual Welding)

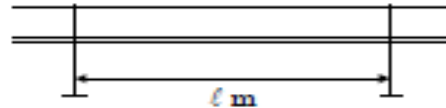
Detail	Standard	Limit	Remarks
<p>Single vee butt, one side welding with backing strip (temporary or permanent)</p> 	$G = 3 - 9 \text{ mm}$	$G = 16 \text{ mm}$	<p>see Note 1</p> 
<p>Single vee butt</p> 	$G \leq 3 \text{ mm}$	$G = 5 \text{ mm}$	<p>see Note 1</p> 





## Fairness of Plating with Frames

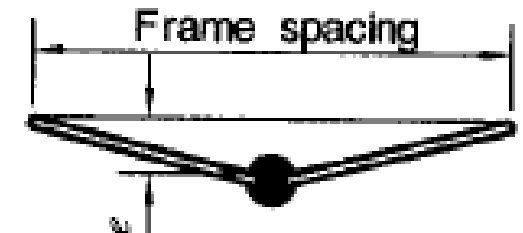
Item		Standard	Limit	Remarks
Shell Plate	Parallel part	$\pm 2\ell/1000$ mm	$\pm 3\ell/1000$ mm	$\ell$ = span of frame To be measured between one trans. space (min. $\ell$ = 3 m)
	Fore and aft part	$\pm 3\ell/1000$ mm	$\pm 4\ell/1000$ mm	
Strength deck (excluding cross deck) and top plate of double bottom		$\pm \ell/1000$ mm	$\pm 4\ell/1000$ mm	
Bulkhead		$\pm 4\ell/1000$ mm	$\pm 5\ell/1000$ mm	
Others		$\pm 5\ell/1000$ mm	$\pm 6\ell/1000$ mm	

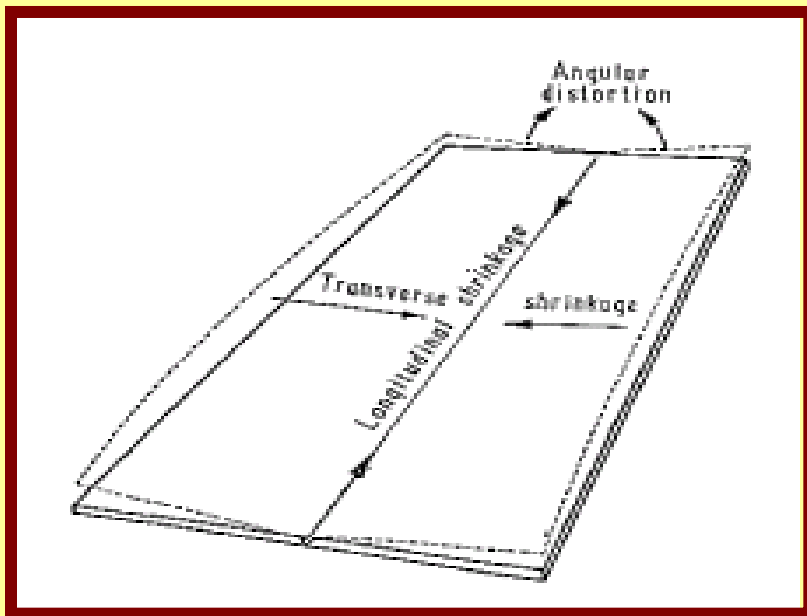


$\ell$  = span of frame  
(minimum  $\ell$  = 3 m)



To be measured between one transverse space





# Distortion and Economic Value



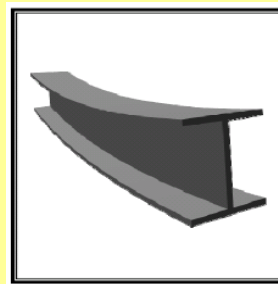
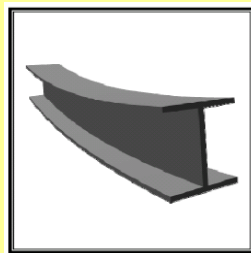
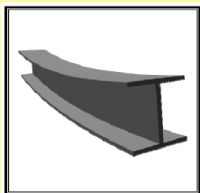
(a) LONGITUDINAL DISTORTION OF A BUILT-UP BEAM



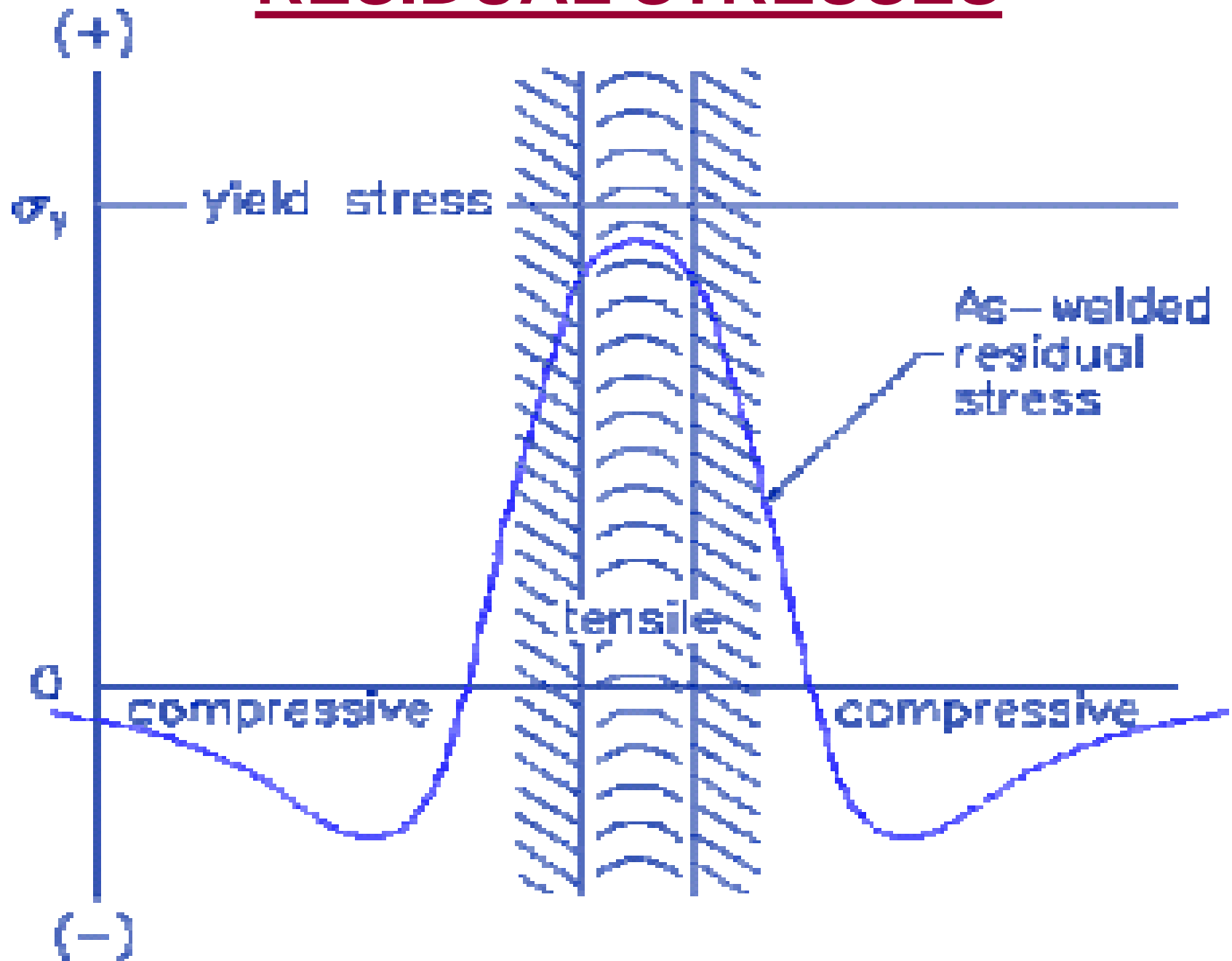
(b) LONGITUDINAL BENDING DISTORTION OF A SINGLE-VEE BUTT WELD

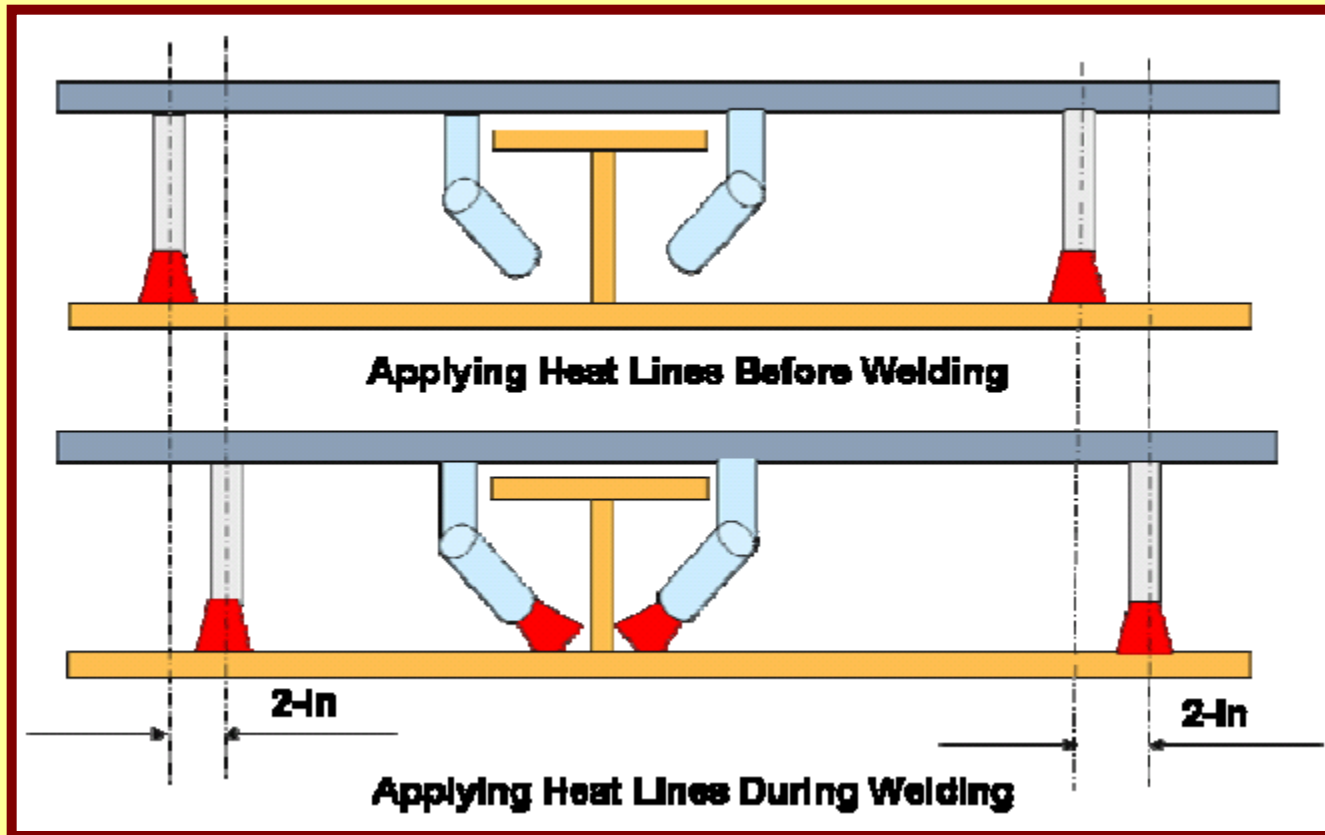


(c) BUCKLING DISTORTION



# RESIDUAL STRESSES







- The presence of a substantial on-site team is likely to
- increase the risk of friction with the shipbuilder's representatives.



# ***Corrosion Protection/Coatings***

- Verify that applied coatings are approved.
- Class to review records of application.
- Verify adequate records are maintained and placed in CTF.
- Class to monitor implementation of coating inspection requirements.

# *More Class Checks*

- Ammunition for Class: Granting of Safety Construction Certificate.
- Verify that Flag requirements have been incorporated.
- Verify position of draft marks.
- Verify air pipes, vents, closing devices are of approved type.

# **BE ALERT TO AVOID SURPRISES**

- Marine Components



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# COOPERATION & SYNERGY

