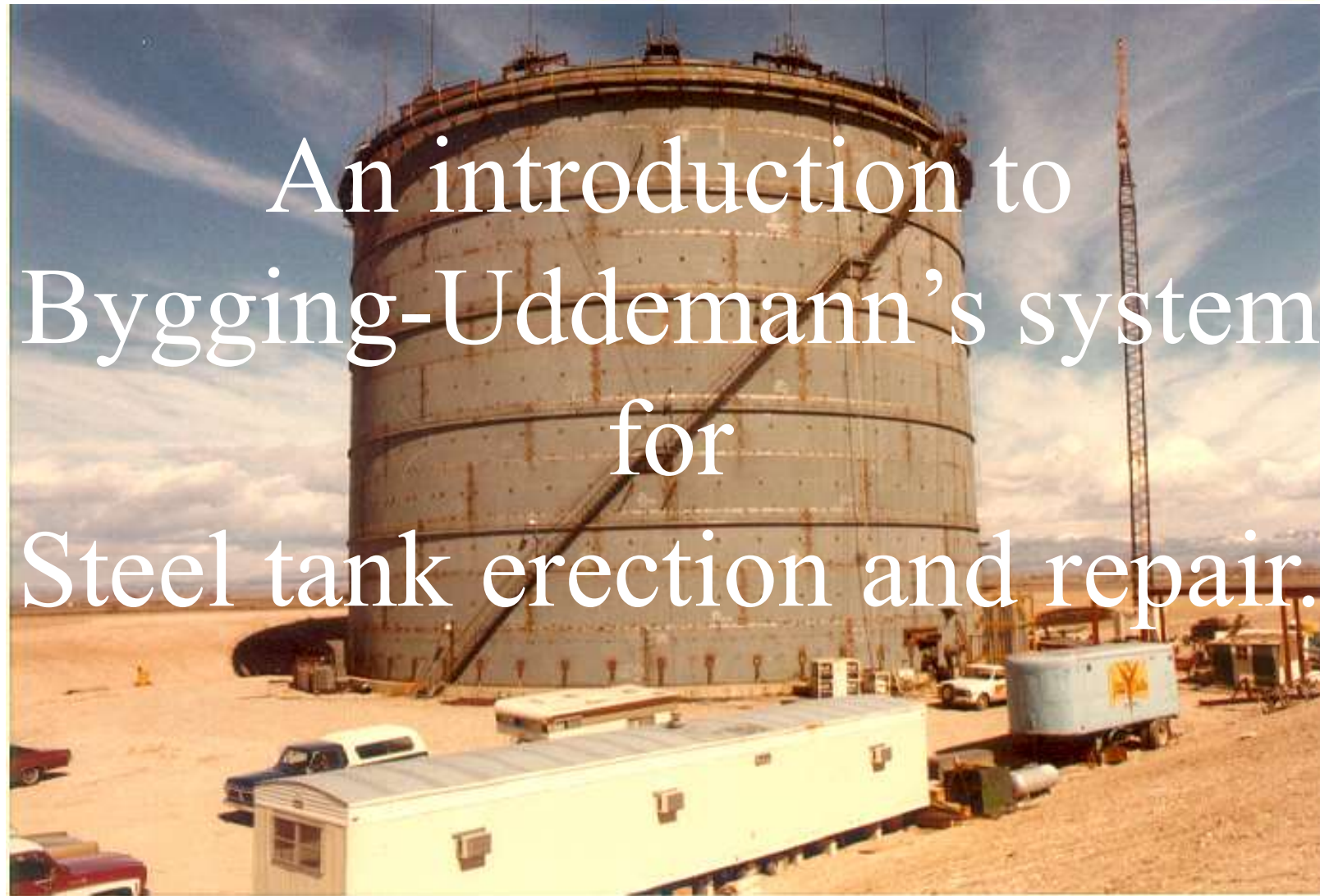


BYGGING-UddeMANN AB



An introduction to
Bygging-Uddemann's system
for
Steel tank erection and repair.

BYGGING-UDDEMANN AB



? Fixed roof

? Floating roof

? Conical roof

? Erection

- Jacking equipment for tank erection, type 2510 - 35
- Welding equipment
- Handling equipment for wall plates
- Erection procedure
- Time schedule
- Manpower requirement
- Cost comparison with conventional erection methods

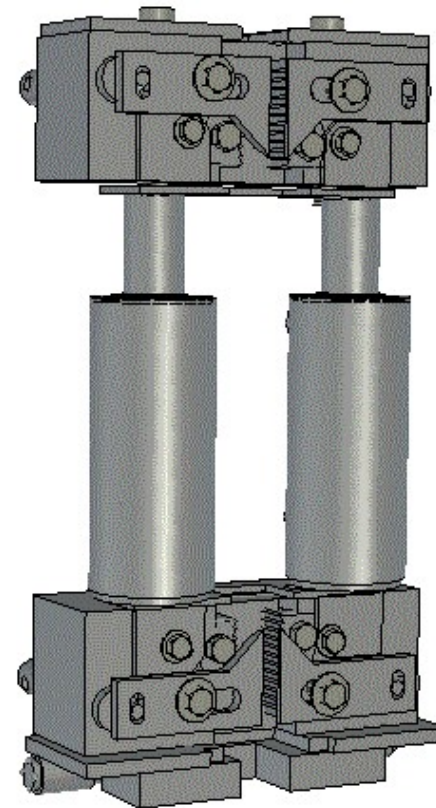
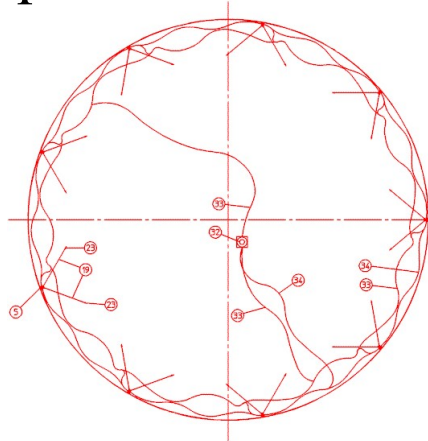
? Repair

- Different types of damage to the existing tank
- Jacking equipment for repair work, type 2510 – 35UDEQ
- Repair procedure

Jacking equipment

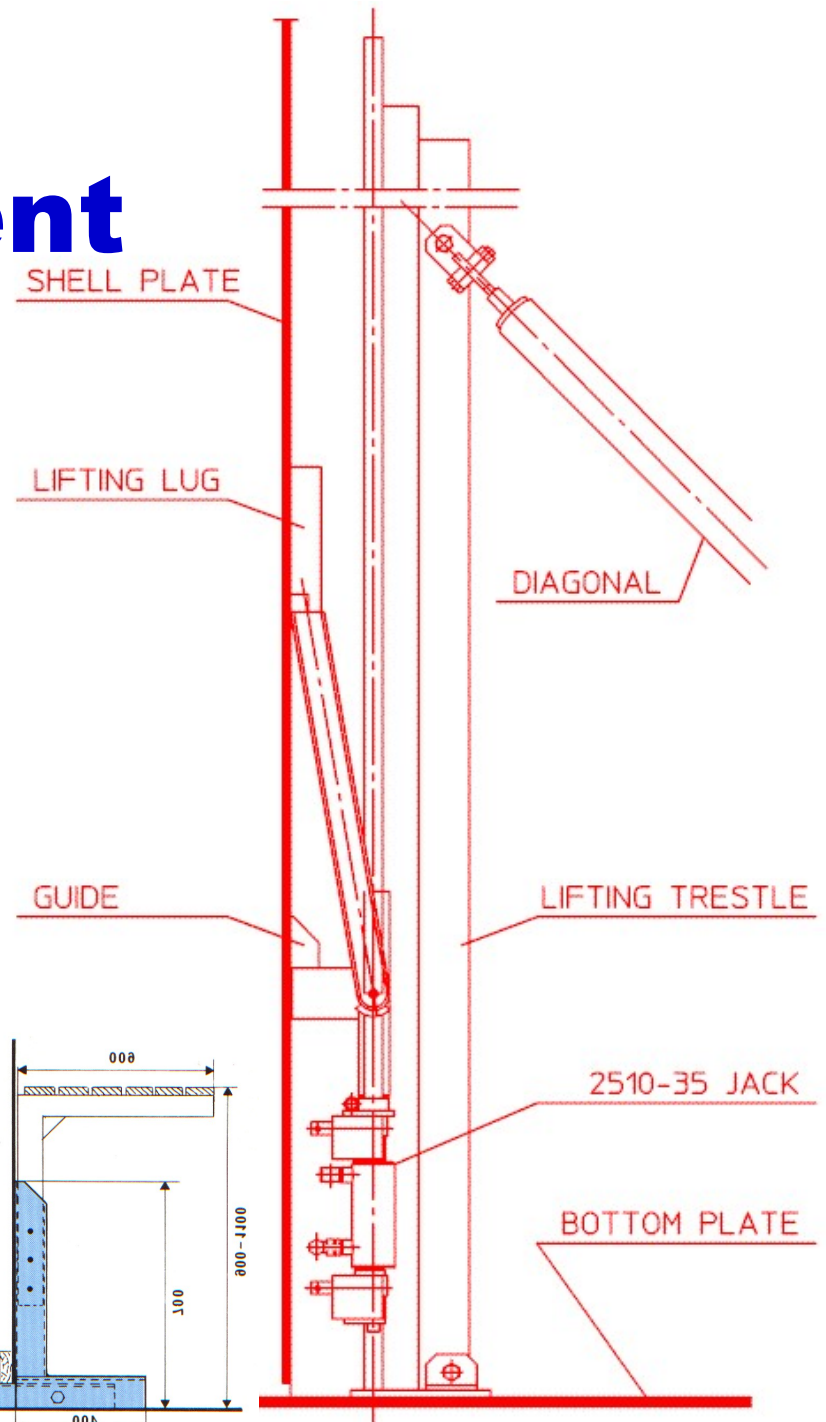
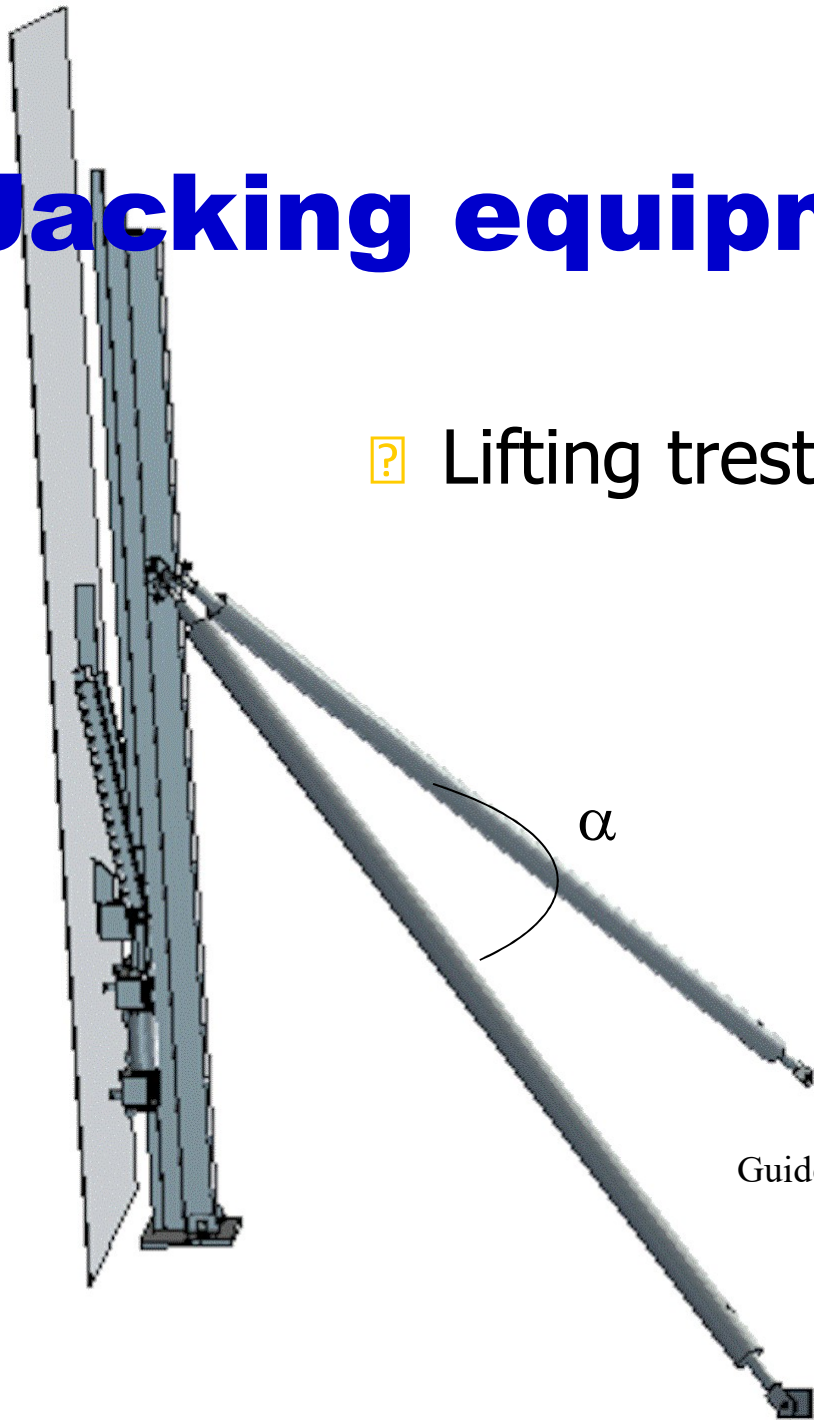
Jack	Heavy-Lifting	Slipforming	Steel tank		Capacity	Stroke
			Erection	Repair		
2510-35	X		X		12 ton	100 mm
2510-35UDEQ				X		

- Hydraulic return stroke
- Patented switch mechanism
- Load equalization



Jacking equipment

? Lifting trestle

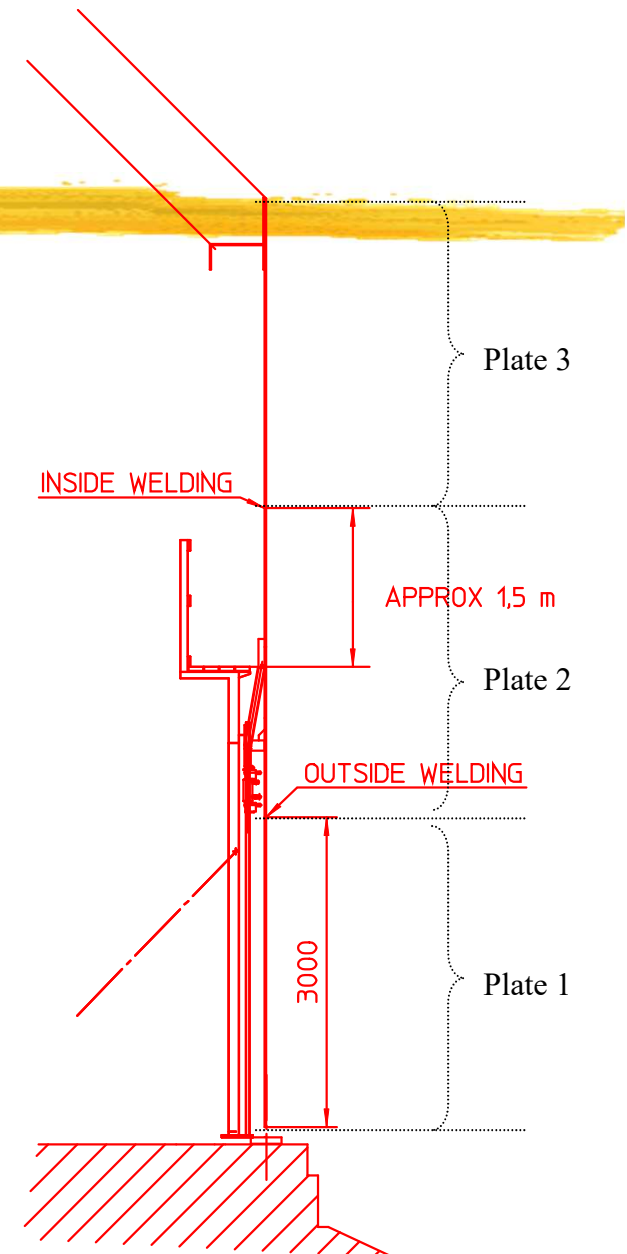


Welding equipment

? Manual welding

? Robotic welding

1. Outside joint between plates 1-2 at ground level
Inside joint between plates 2-3 from scaffold on top of lifting trestles
2. Complete joint between plates 2-3 is welded from the inside on platform above lifting trestles.
(Joints between plates 1-2 are only tack-welded at ground level before lifting).
All vertical joints are made at ground level prior to lifting.

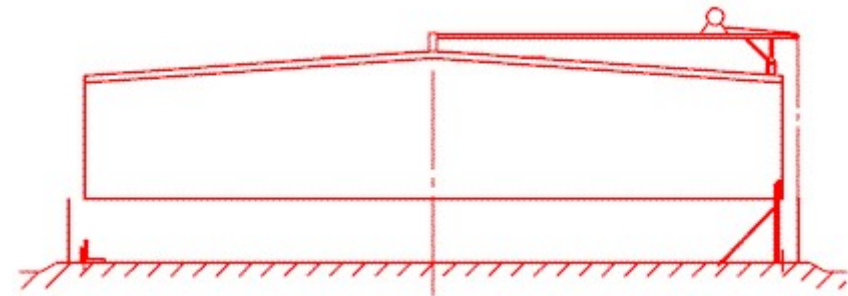


Handling of wall plates

? Winch

A winch of telfer type running on a beam attached to the top railing.

Suitable for smaller tanks with lighter plates.



? Forklift or front-loader

Equipped with two lifting claws on a common yoke beam, the forklift is a versatile and practical help for all plate handling on tanks of all sizes.

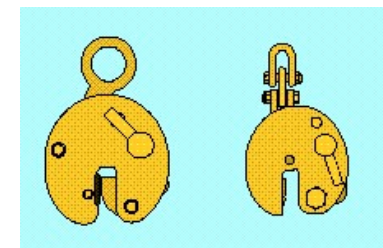
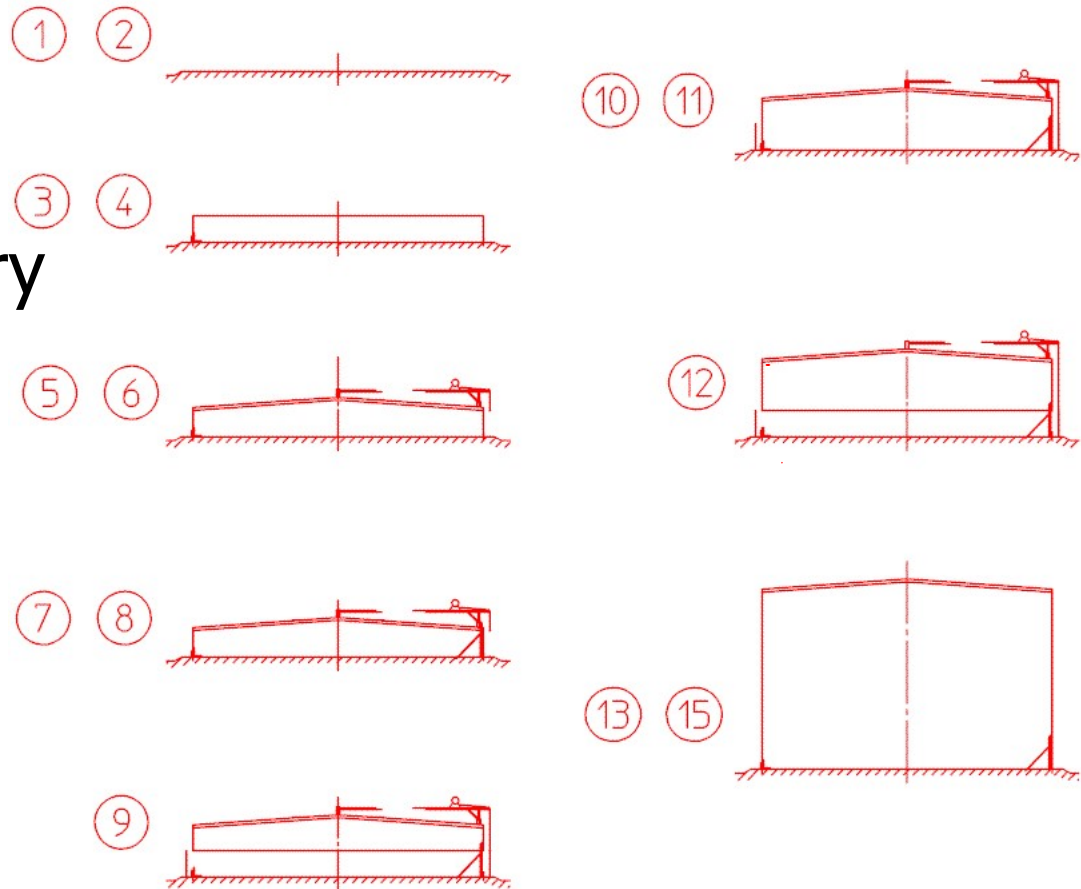


Plate-lifting claws of different sizes

Erection procedure

- 1. Foundation
- 2. Base plate
- 3. Cistern periphery
- 4. Guide trestles
- 5. Top shell plate
- 6. Roof trusses
- 7. Lifting trestles
Jacks
Hydraulics



Erection procedure

? 8. Lifting lugs

? 9. 1st lifting

? 10. Next shell plate

? 11. Lifting lugs

- Removed on first shell plate
- Installed on new shell plate
- Jacks are lowered

? 12. 2nd lifting

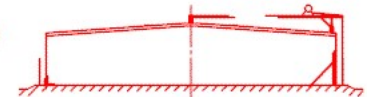
? 13-15. Last shell plate

- Guide trestles are dismantled
- Tank is lowered
- Jacking eq. dismantled
- Welding of last shell plate to base plate

① ②



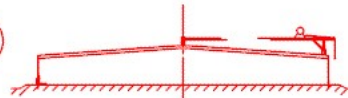
⑩ ⑪



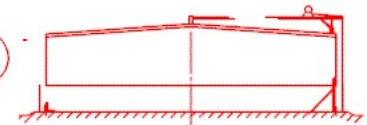
③ ④



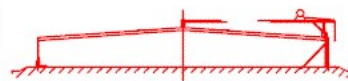
⑤ ⑥



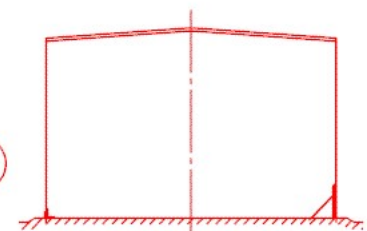
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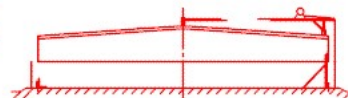
⑦ ⑧



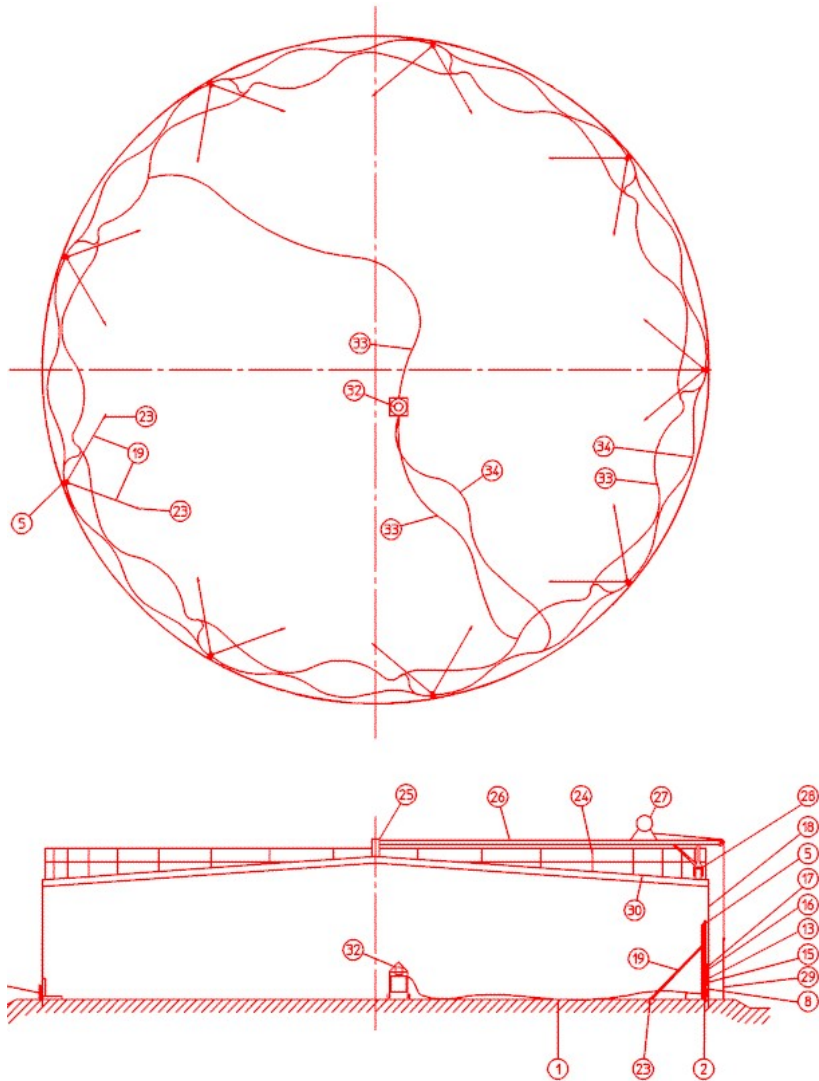
⑬ ⑮



⑨



Erection procedure, 1-8



Erection procedure, 9-11



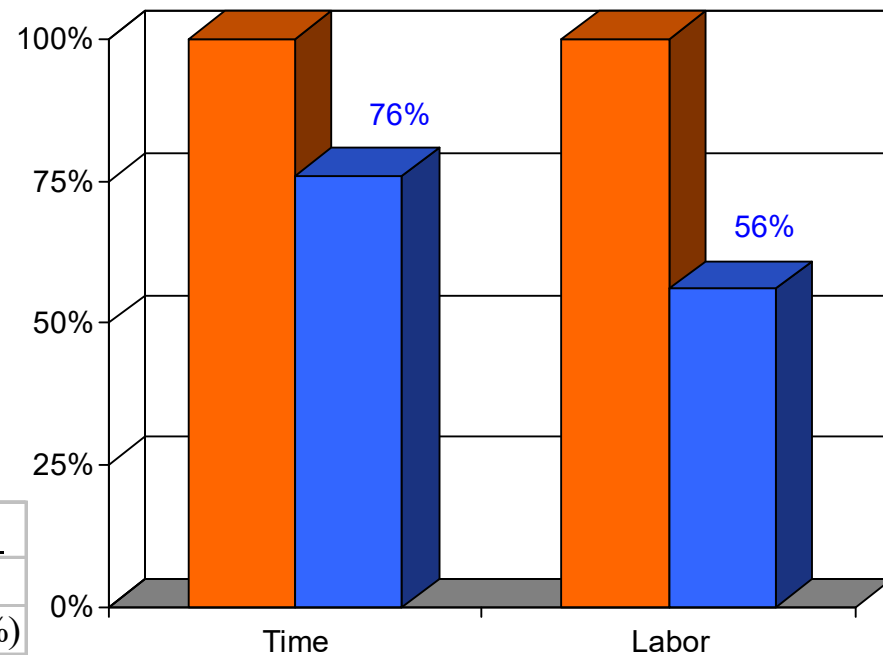
Guide trestle
(small version)

Comparison, time and labour

? 1 Nos typical tank

- Volume 35.000m³
- Dia 48 m
- Height 20 m
- Weight 600 ton
(lifted weight 500 ton)
- 42 Nos tank jacking units

	<u>BYUM method</u>	<u>Conv. method</u>
Construction time	14 weeks (76%)	17 weeks (100%)
Manpower	7300 hours (56%)	12.900 hours (100%)



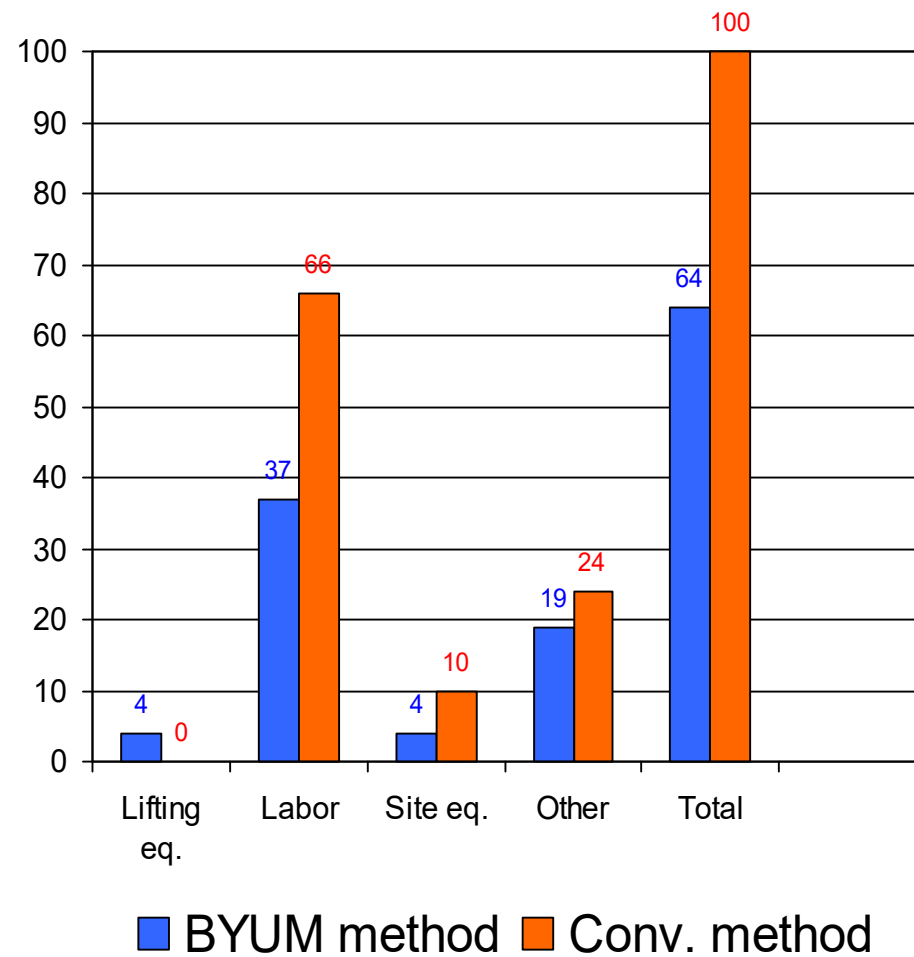
■ Conv. method ■ BYUM method

Construction time and manpower based on European standard 40 hours/week

Cost comparison

	Construction method		Remarks
	BYUM	Conventional	
Lifting equipment		-	Based on depreciation after 6 tanks with a 40% residual value
---freight	3	-	
---supervision	1	-	
	4	0	
Labor cost	37	66	
Equipment cost			
---scaffolding	-	1	
---welding	3	3	
---plate handling	1	6	
	4	10	
Other costs			
Jig and tool	3	5	
Machining	3	3	
Non destructive test	2	2	
Consumable materials	3	5	
Field expenses	4	4	
Overhead charge	4	5	
	19	24	
Total per tank	64	100	

Excluded: material, welding, paint



Repair

? Repair works

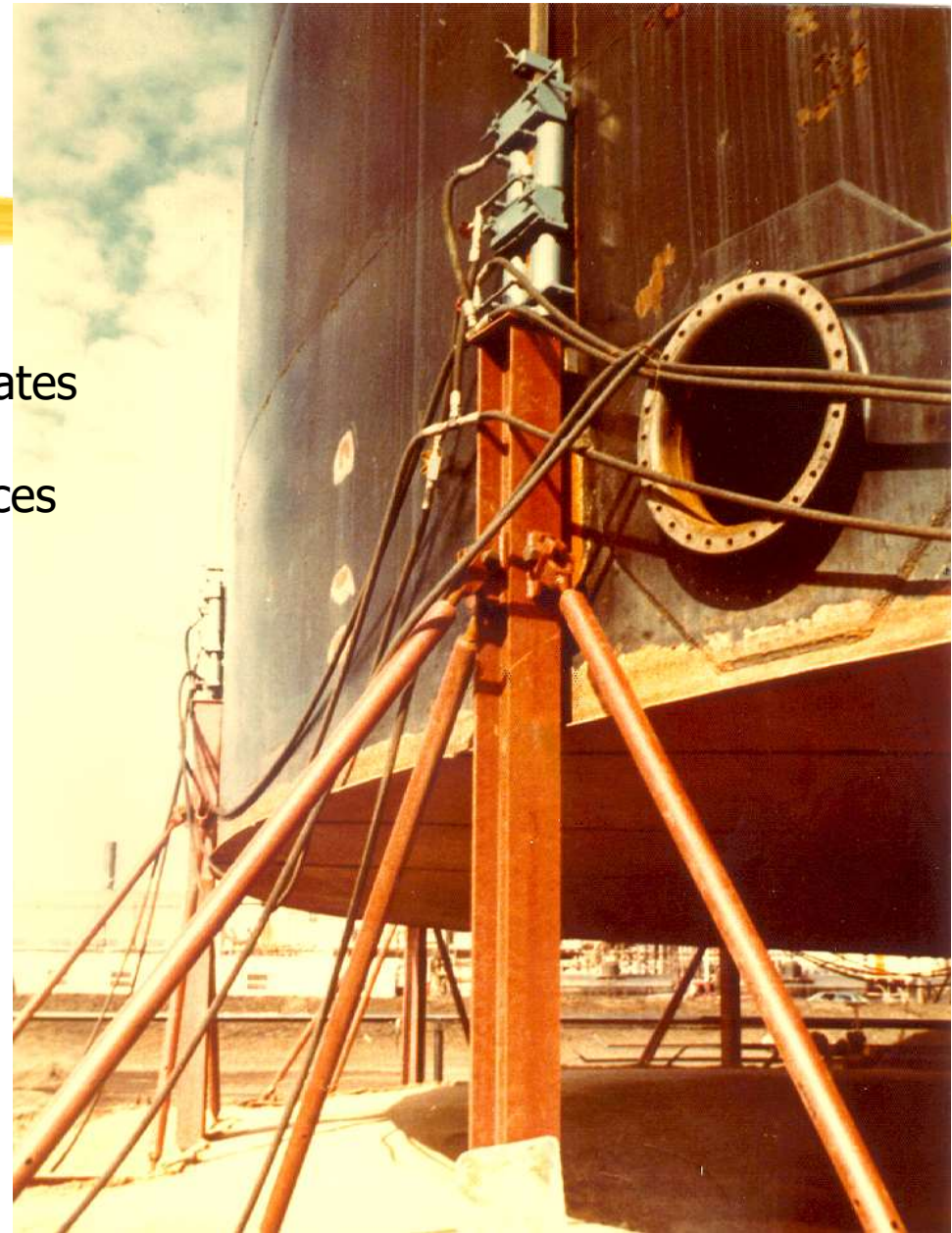
- Replacement of corroded bottom plates
- Repair of foundation
- Controlled demolition in limited spaces

? Equipment

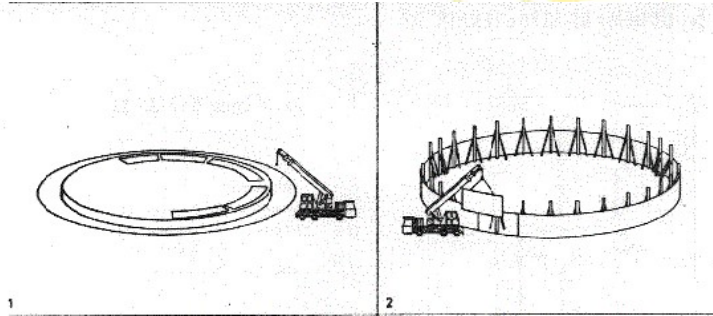
- 2510-35UDEQ with load equalizers interconnected in 3 circuits forming a 3 point support.

? Procedure

- Assemble the lifting equipment and apply a force to the jacks equal to the weight of the tank.
- Cut the wall plates free from the bottom plate.
- Perform desired repair.

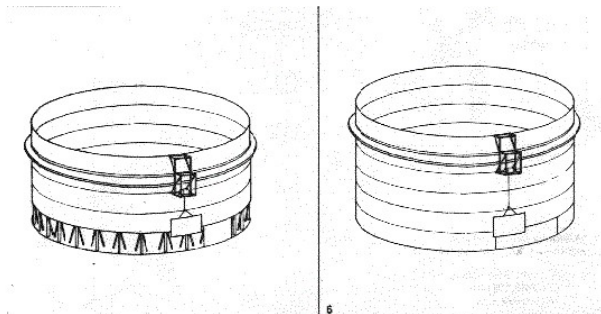
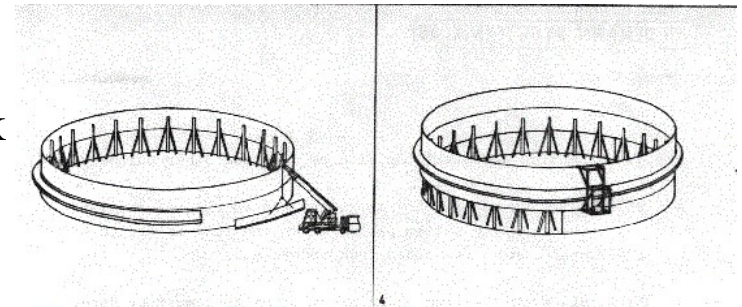


Tanks with floating roofs



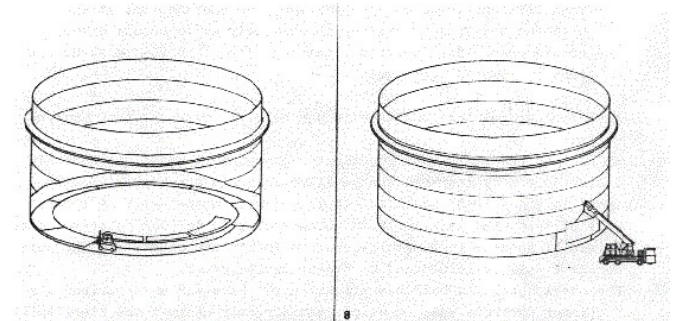
1-2: The floating roof is to the greatest extent finished before tank wall construction begins.

3-4: Stabilizing flanges prevent buckling of the tank walls during erection.



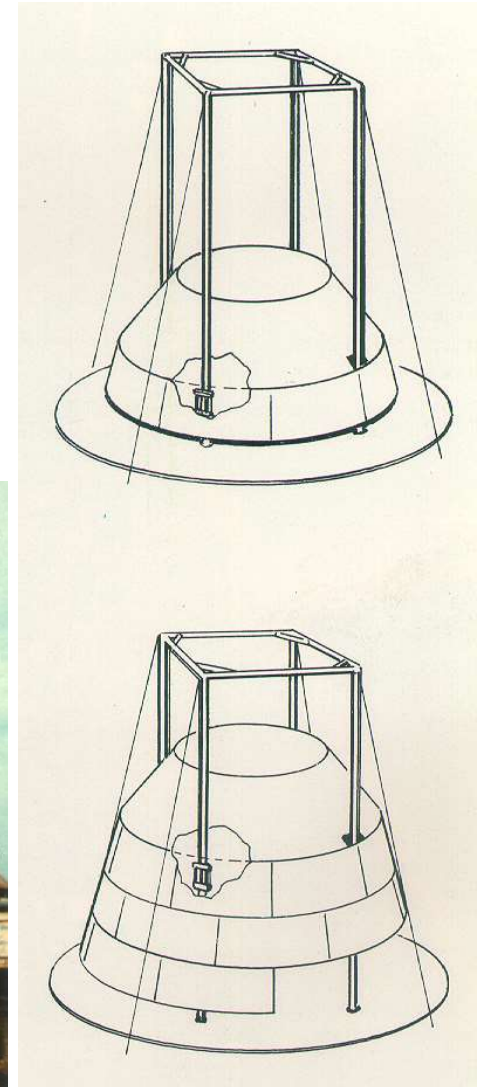
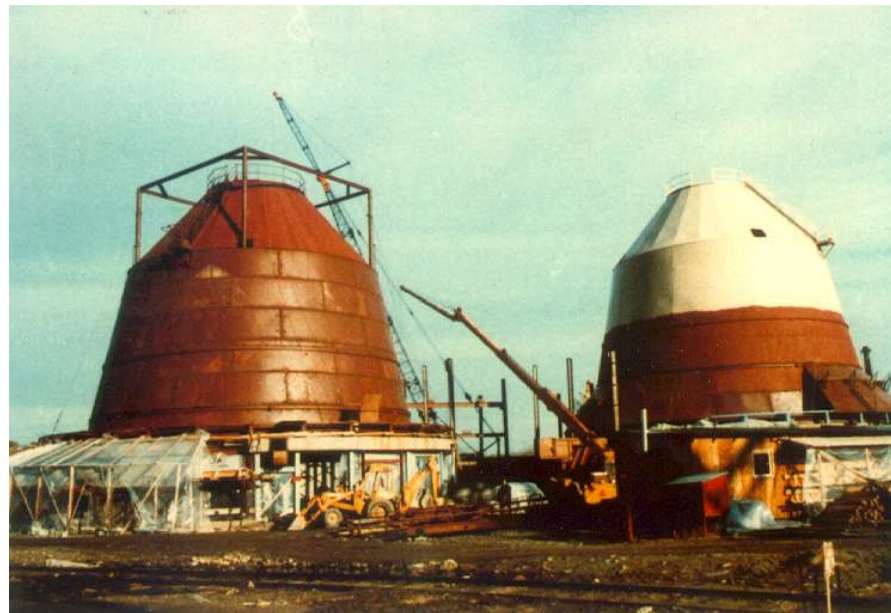
5-6: The tank is then erected similar to fixed roof tanks using the BYUM method.

7-8: The floating roof is finished and all lifting trestles are removed before final assembly of last wall plate.



Conical tanks

- ❓ Jack rods are welded to temporary scaffolding
- ❓ Loads are transferred from wall plates via ball-bearings to the jacks





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