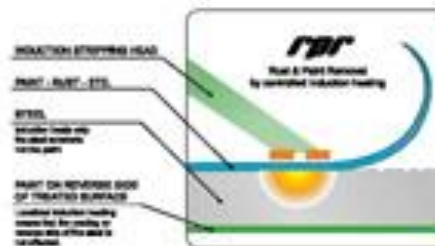


General Presentation

September 2018



**the world's fastest,
safest and cleanest
method for removing
paint from steel surfaces**



www.rprtech.com



Background for developing the concept

- Steel is dominant as construction material in large-scale constructions as marine, offshore and the shipping industry. **Corrosion represents a huge operational and cost problem** within the steel constructions area.
- R&D on **developing more resistant coatings** has not succeeded in improving the durability to a large degree the last decade.
- There are no results from ongoing research indicating that ferrous/steel substrates will be protected by other means than protective coatings in the future, and the need for refurbishment will increase as the number of new structures and ships increase more rapidly than the durability of coatings increases.
- Existing paint stripping methods represent **large environmental risk elements**, higher cost levels, **large risks for human hazards** and inefficiency with regards to use of time.
- **Innovation** within the paint stripping industry has not been profound. With regards to the risk factors traditional paint removal methods represent, it was quite obvious that a market for better solutions could exist.
- **Conclusion:** Traditional methods represent significant cost, health, environmental and energy challenges

RPR's main competitors



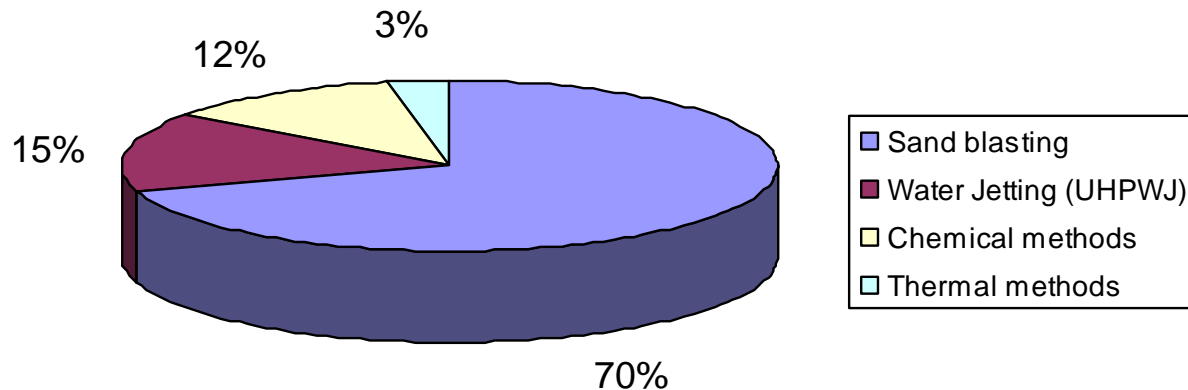
- Today's biggest competitor - when it comes to m² stripped paint area - is **sandblasting**. Although the method is under constant improvement, both with respect to speed and dust minimization, it is not envisaged that it can ever compete against the induction method. This is due to the very nature of the process in that it works its way from the top of the coating, through to the steel surface.
- The biggest competitor - when it comes to the overall market view - is **Ultra High Pressure Water Jetting (UHPWJ)**. UHPWJ can be dangerous in operation with pressures in excess of 3000 Bar, in addition the equipment requires a lot of maintenance, resulting in extended down-time. Again, the method works from the top of the coating, through to the steel. Operation speeds are typically only marginally faster than sandblasting, giving RPR a substantial competitive advantage.
- Certainly a future threat, at least for thin pain films might be **chemical stripping methods**. Fairly harmless chemical strippers exist, and there is continuous research being done in this field. The problems with this method as seen today is that it has problems with thicker paint films, and multiple layers of paint. Today, it is a “now it works, now it doesn't” product, probably more suitable for the domestic than industrial field.
- **Thermal methods** are on their way out, because of the hazards involved, and also because of the energy consumption, and pollution aspects. Thermal methods normally require a fairly thorough clean-up afterwards, before a new layer of paint can be applied.

There are no indications that anything revolutionary will be presented in the foreseeable future which will pose a threat to the induction method. Some experiments with ultra sound and laser have been executed, and also blast methods utilizing frozen carbon dioxide, but both these methods are expensive, and show little potential for the markets RPR is aiming at.

Main methods for paint removal – relative market share



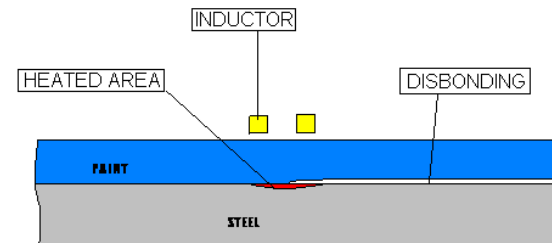
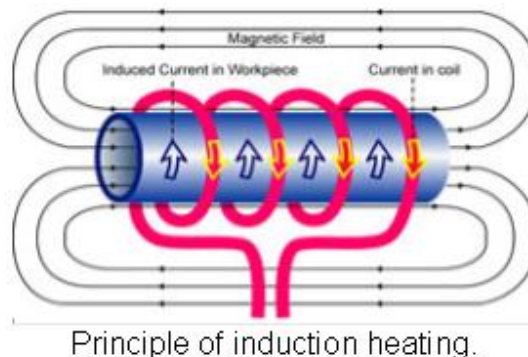
Relative share of total m² paint stripped



- Estimated 700 deaths annually in EU as result of sandblasting (silicosis of the lungs)
- Water Jetting (UHPWJ) is regarded as the best alternative to sandblasting equipment because it offers better *environmental* qualities, however, speed, safety and power usage are not any better than with sandblasting.
- Water Jetting represents only 15% of the total paint stripping market - also signaling the large potential for RPR.
- Use of chemical and thermal methods are declining

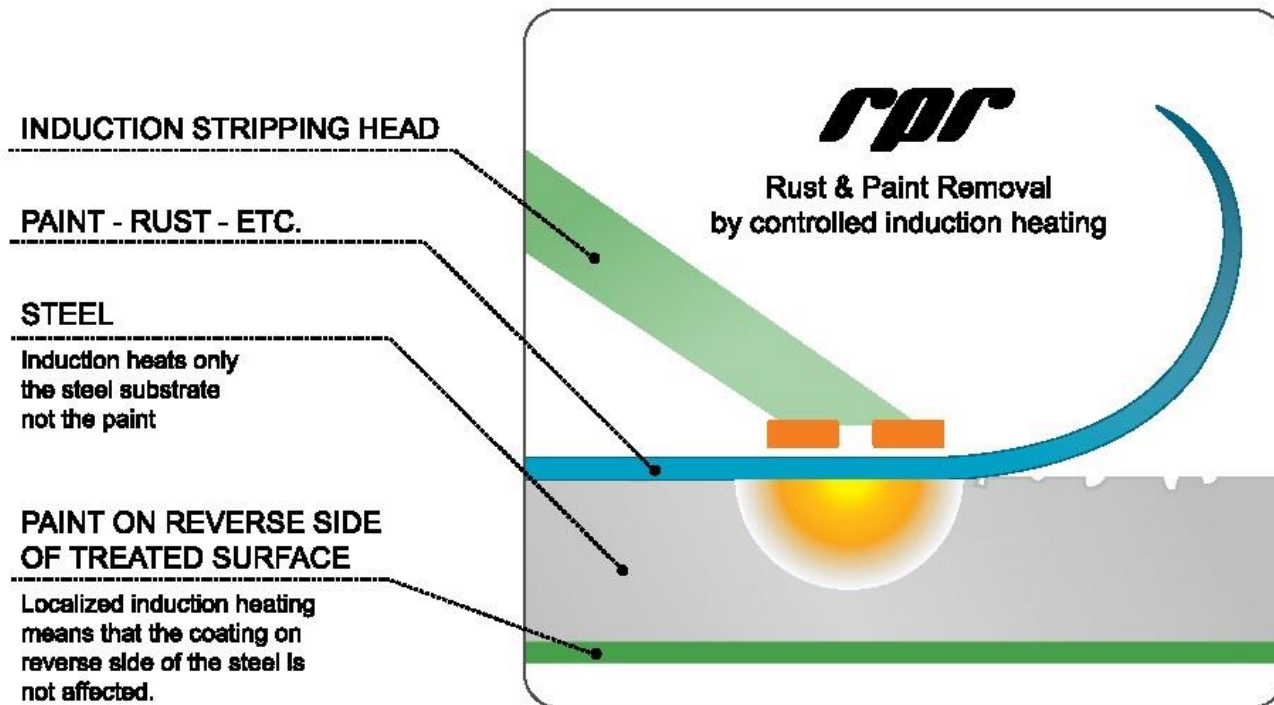
The RPR concept

- RPR uses **induction heating** of ferrous substrates to achieve removal of rust (also bacterial), mill scale and paints up to 30 mm thick, breaking the interfacial bonding between coating and substrate
- RPR uses minimal energy and leaves the substrates in original state of visual cleanliness and with a minimum outlet of harmful gases.
- By an innovative speed control (reflectometry sensor) where the disbonding temperature is kept constant, the method is made commercially beneficial for large scale paint removal in the marine, construction, oil/gas and offshore industry.
- RPR can document the removal of coatings and rust at a rate **10 times faster** than conventional methods
- RPR consumes **only 25% of the energy** needed by conventional methods.
- RPR represents **no noise, dust or harmful impact on the environment.**
- RPR reduces operator safety hazards dramatically

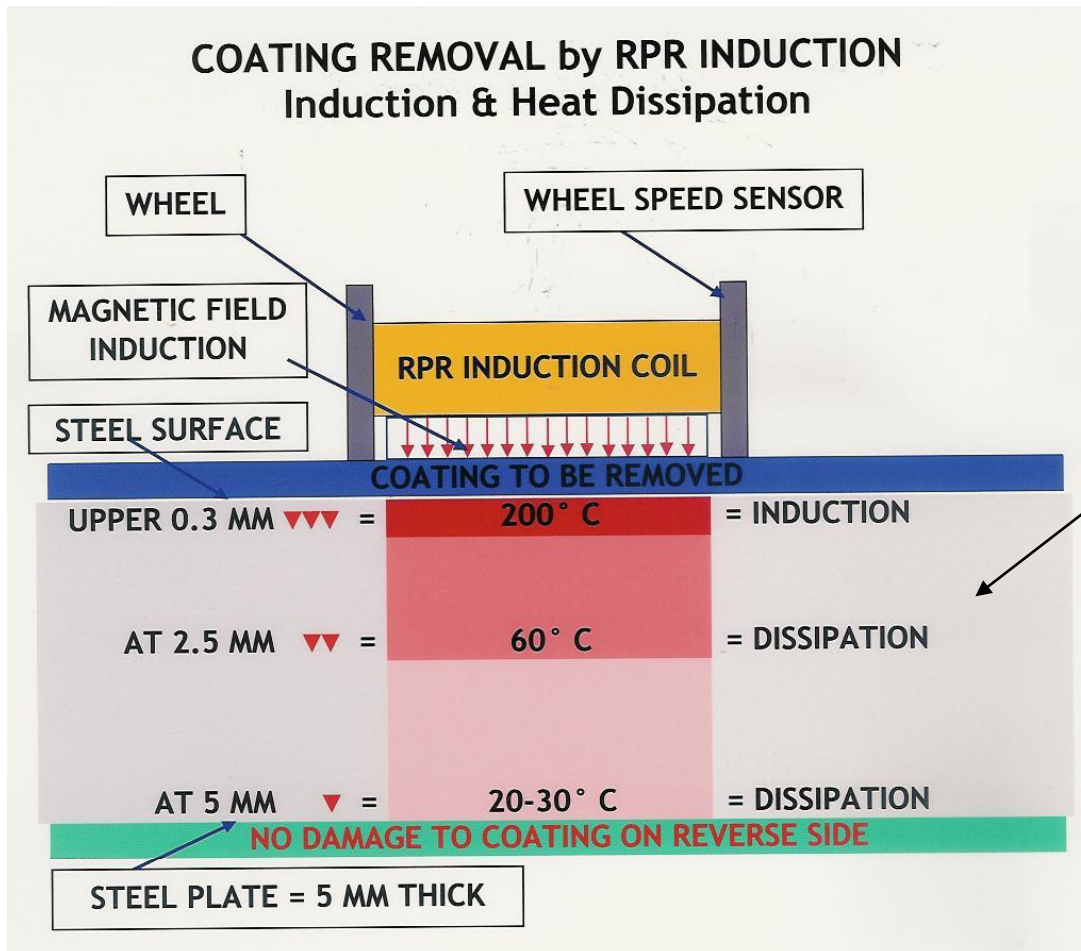


The heat is generated in the steel - under the paint coating, and results in immediate disbonding

The RPR Concept



Induction heat



Heat dissipation:
Only the upper 0.3mm of steel is heated to the temperatures necessary for disbonding. Heat dissipation ensures no damage to coatings on reverse side of steel.

Benefits of induction heating:
Fast, clean, localized, safe

RPR 1650



1. Induction Main Unit

1.

2. Cable Coil 20M

3. Cable coupling box

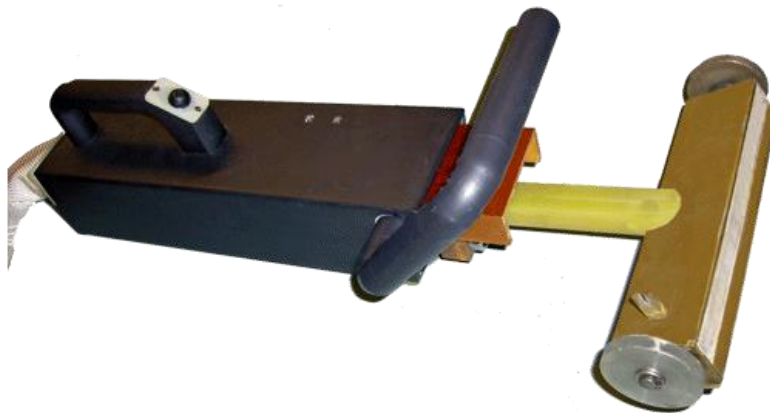
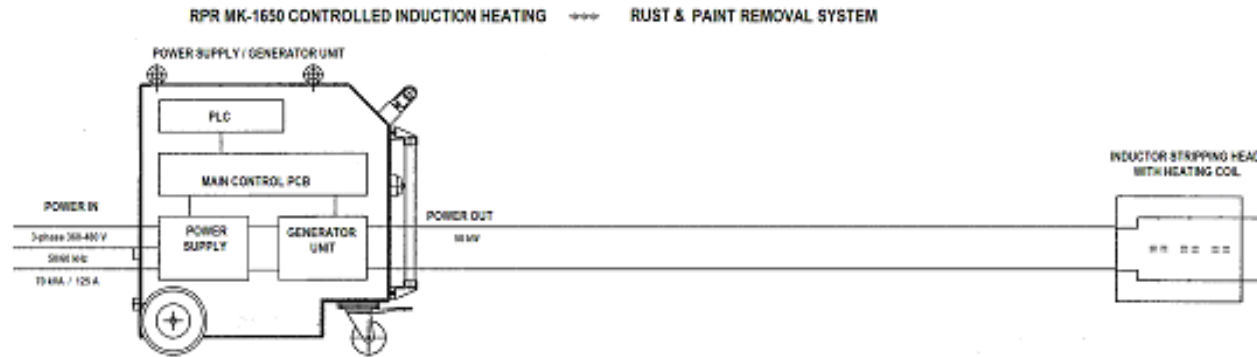
4. Handheld induction coil

2.

4.

3.

The concept



Hand-held induction coil unit



Many different shapes and sizes for induction coil heads



FOUR REASONS why you should use RPR instead of only sand or hydro blasting:

- **SPEED**
The RPR induction system removes coatings at rates from 5-20 times faster than other methods such as sandblast and water jets. Increased speed means less money in markets with expensive labour costs. Also, the RPR system uses only 25% of the electricity compared with blasting.
- **HEALTH & SAFETY**
The RPR system is quiet (no hearing protection necessary), does not use high pressure hoses and produces no airborne waste particles. Minimal safety equipment is necessary.
- **ENVIRONMENTALLY CLEAN**
The RPR system produces no airborne particle waste that is dangerous to the environment and operator. Produces no water waste or washoff that can contaminate rivers and sea.
- **REMOVES DIFFICULT COATINGS**
The RPR system easily removes thick and difficult coatings such as CharTek (fire retardant), vulcanized rubber and anti-skid. No other system does this so quickly, cleanly and effortlessly.

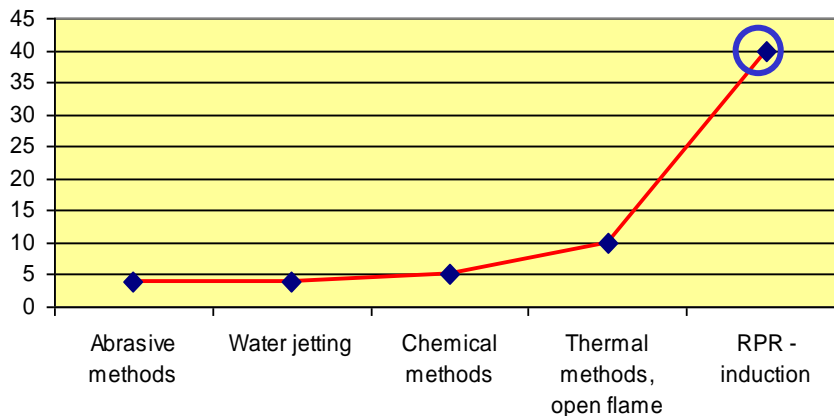


FOUR REASONS why you should use RPR instead of only sand or hydro blasting:

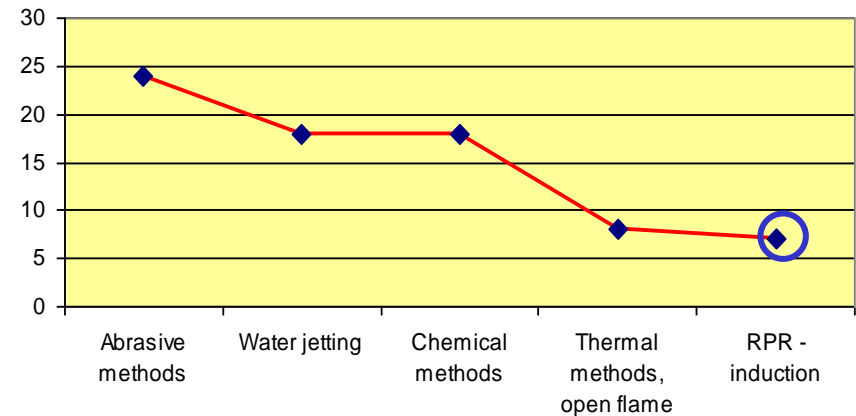
- SPEED OF COATINGS REMOVAL**

The RPR induction system removes coatings at rates from 5-15 times faster than other methods such as sandblast and water jets. Increased speed means less money in markets with expensive labour costs. Also, the RPR system uses only 25% of the electricity compared with blasting.

Max. rate of stripping (m²/hour)



Cost of stripping (€ pr. m²)





FOUR REASONS why you should use RPR instead of only sand or hydro blasting:

- **OPERATOR HEALTH & SAFETY**

The RPR system is quiet (no hearing protection necessary), does not use dangerous high pressure hoses and produces no airborne waste particles. Minimal operator safety equipment is necessary.

Typical recommended operator safety equipment:

Sandblasting



Hydroblasting





FOUR REASONS why you should use RPR instead of only sand or hydro blasting:

- **IMPACT ON THE ENVIRONMENT**

The RPR system produces no airborne particle waste that is dangerous to the environment and operator. RPR produces no water waste or washoff that can contaminate rivers and sea. This results in lower costs and better cooperation with local health authorities.

Results of Abrasive Blast Cleaning Ship's Underwater Hull



Conservatively the U.S. Navy performs corrosion control on more the 1,500,000 ft² of steel for its ships tanks and voids, generating more than 18 million pounds of mixed abrasive and paint waste. This waste must be disposed at a cost of nearly \$5.4 million annually. *



FOUR REASONS why you should use RPR instead of only sand or hydro blasting:

- **REMOVES DIFFICULT COATINGS**

The RPR system easily removes thick and difficult coatings such as CharTek (fire retardant), vulcanized rubber and deck anti-skid. No other system does this so quickly, cleanly and effortlessly.



CHARTEK®
FIREPROOFING

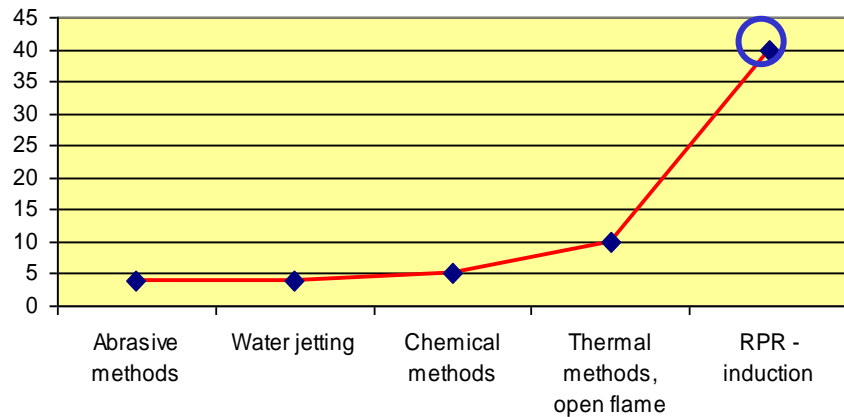
Comparison between relevant parameters for different paint stripping methods

	Sand Blasting	Water jetting	Chemical methods	Thermal methods, open flame	Induction heating <i>With RPR</i>
Max. rate of stripping (m ² /hour)	4 m ² /hour	4 m ² /hour	5 m ² /hour	10 m ² /hour	20- 40 m ² /hour
Cost of stripping (€ pr. m ²)	€24	€18	€12-24 (dep. On chemicals)	€4-12 (depending on material to remove)	€7
Average energy consumption, kWh/m ²	3,0	3,0	Dependant on washing method	Dependant on washing method	0,8
Cleanliness of surface	Good	Good	Good	Medium/low	Good
Efficiency on irregular surfaces, welds etc.	Good	Good	Good	Good	Good
Reliability	Medium	Low	High	High	High
Work environment Dust and gas emission Noise exposure <i>Ergonomic conditions</i> <i>Human injuries,</i> <i>Protective equipment</i>	Very high	Low	Low to high	High	Low
	Very high	High	None	High	Low
	Very high risk of strain injuries	Very high risk of strain injuries	Low risk of strain injuries	Low risk of strain injuries	No risk of strain injuries
	High risk	Very high risk	High risk	-	Low risk
	Hearing, respiratory and eye protection.	Hearing, respiratory and eye protection.	Respiratory and eye protection	Hearing, respiratory and eye protection.	None
External environment Local community	High noise emission Contamination of area close to work sites - toxic metals from abrasive or removed paint	High noise emission. Contamination of area close to work sites. Toxic metals from abrasive/ removed paint	Contamination of work site area. Chemicals from paints stripper. Toxic metals from removed paint	Emission of toxic gases and fumes. Contamination of work site area. Toxic metals from abrasive/ removed paint	None
External waste products	Contaminated abrasive media - 40 kg/m ² (dust - difficult to collect) Contamination of water and soil from old deposits.	Removed paint - (various) kg/m ² (dust - difficult to collect) Contamination of water and soil from old deposits	Chemical residue and removed paint. Contamination of water and soil from old deposits	Residue of paint difficult to collect.	Removed paint (disbonded paint film - easy to collect)

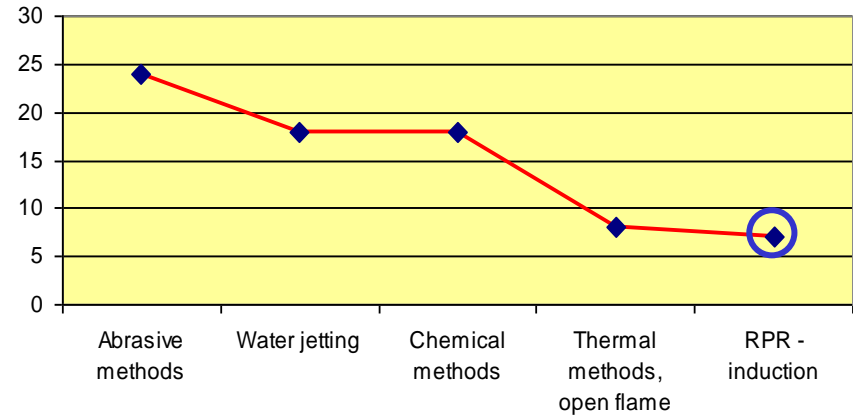


Graphical comparison between relevant quantitative parameters for different paint stripping methods

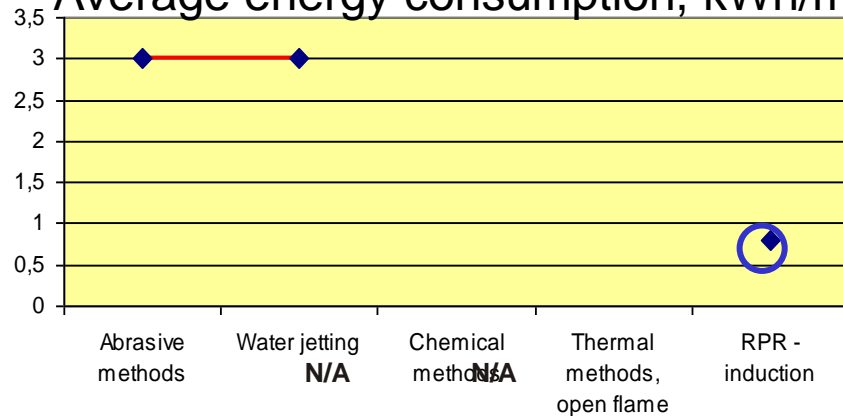
Max. rate of stripping (m²/hour)



Cost of stripping (€ pr. m²)



Average energy consumption, kWh/m²

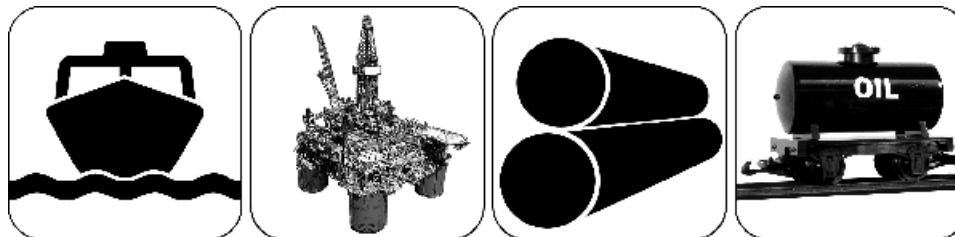
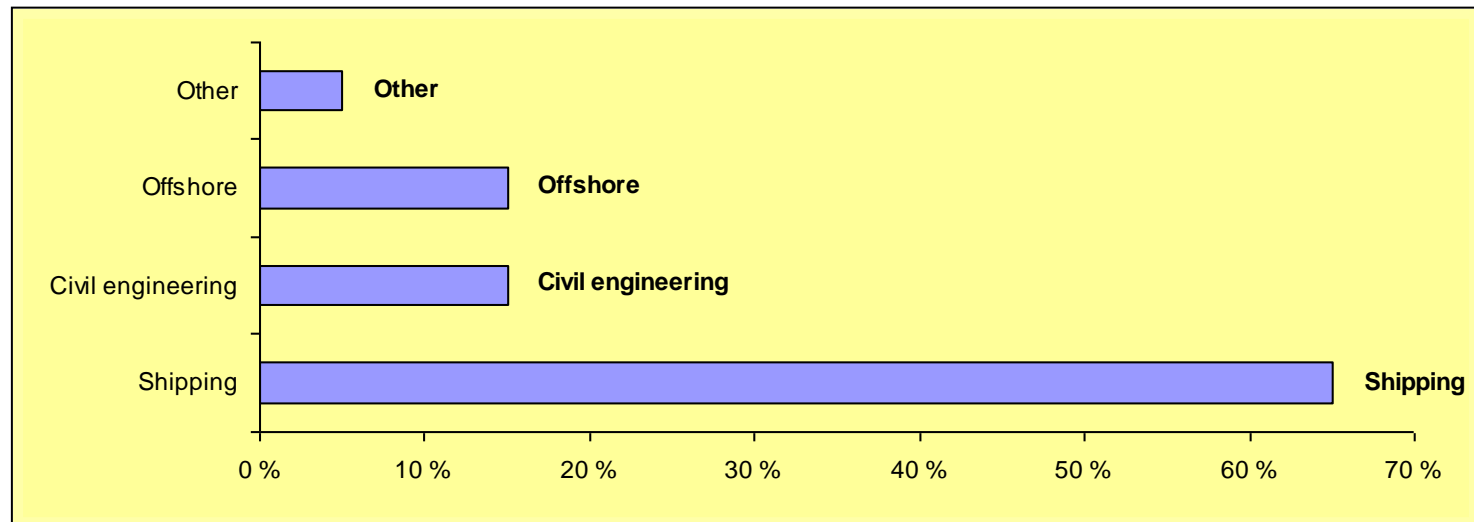


CONCLUSION:

- RPR outperforms the competing methods, both when it comes to operational parameters and efficiency/cost of docking for ship owners

Market for corrosion protection including paint removal – relative share between main segments

The market for corrosion protection - main segments



Ideal for: shipping, tanks, oil platforms, gas pipes

A revolution in paint and rust removal...



Thank You