

# MAN Diesel & Turbo

Presentation for Danish delegation March 2013



## Marine and Offshore market

MDT Organization

Own and Licensee production

Projects and Opportunities

Challenges

Localization

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MAN Diesel & Turbo Brasil



# Product Range

*by Strategic Business Unit*



## Engines & Marine Systems



## Turbomachinery



## Power Plants



## After Sales



# MAN Diesel & Turbo Brasil

Local Footprint: > 200 employees in Brazil



MAN | PrimeServ MAN | PowerManagement

MAN | PrimeServ

Diesel Workshop established in 2009

- Scope: After Sales Diesel
- Employees: 14 (being downsized to 7)



MANAUS



Regional Support Office implemented 2011  
PrimeServ Hub to be opened 2012

- Scope : Power Plants, After Sales
- Employees: 2 (+ 30 in 2012 if A-3 comes)

SALVADOR DA BAHIA

MAN | PrimeServ



Turbo Workshop established in 2007

- Scope: Handle THM O&M Contract
- Employees: 100 (+ 70 Turbomeca)

MACAÉ

MAN | PrimeServ



Diesel Workshop established in 2009

- Scope: All diesel activities (PrimeServ, Sales Marine Systems & Power Plants)
- Employees: ~80 (+10 in 2012)

RIO – SÃO CRISTÓVÃO

Repair shop acquired in 2011

- Scope: Repair of turbomachinery and diesel engines and part manufacturing
- Employees: ~ 50



Petrópolis

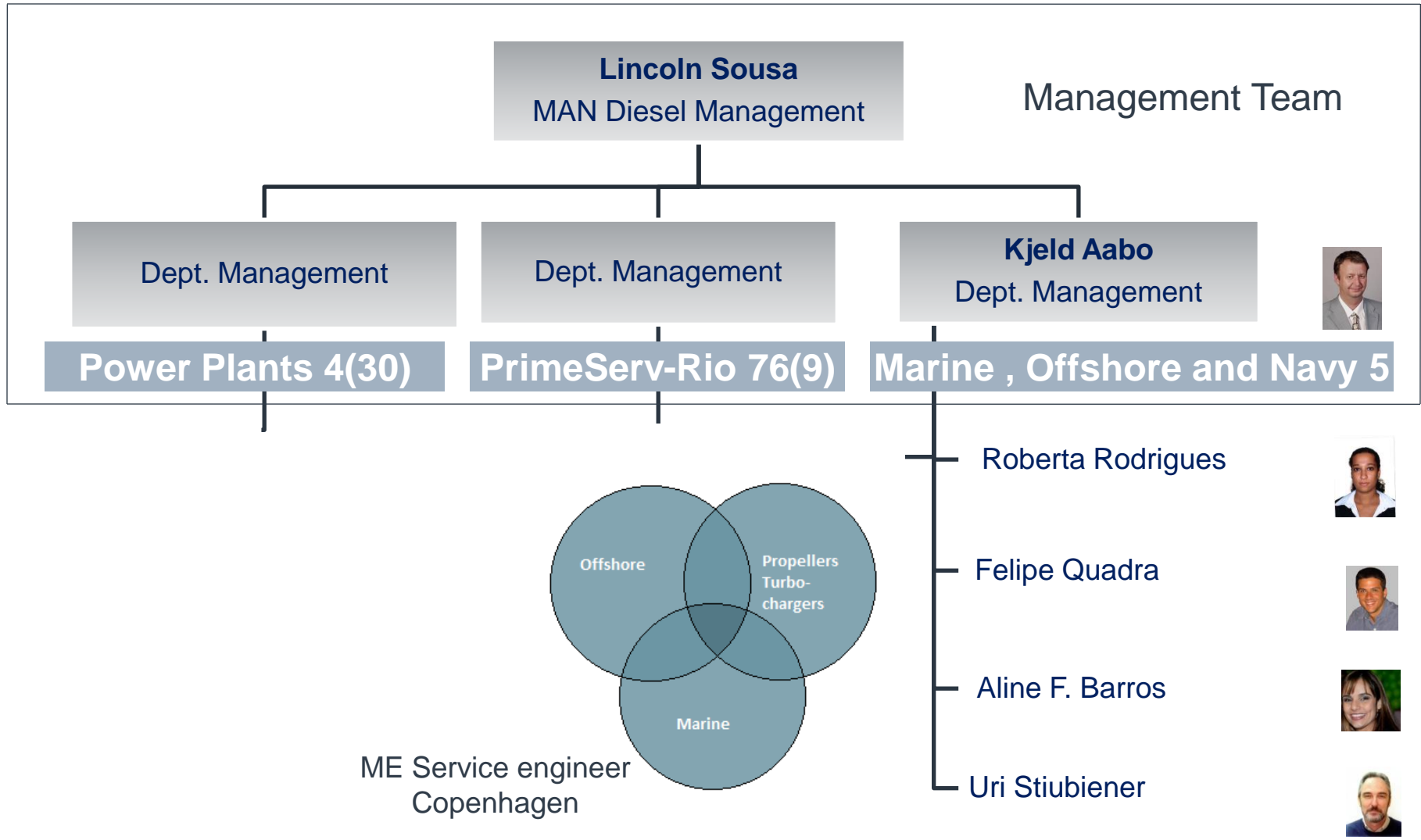


Central office created in 2004

- Scope: Sales Turbo (4), Controlling, Administration, Legal, Marketing
- Employees: 13 (35 after move to 9<sup>th</sup> floor)

RIO – CENTRO

# MAN Diesel & Turbo Brasil

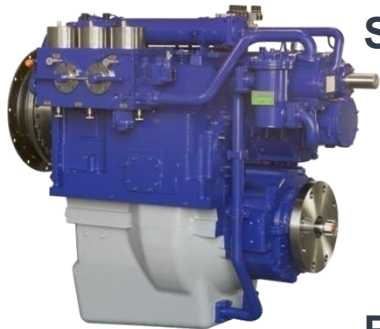
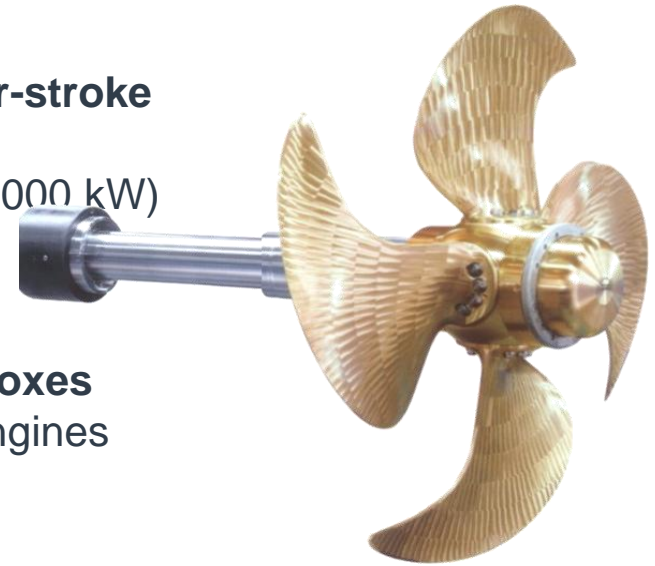


# Propulsion Products



## CP vs FP propellers for two and four-stroke engines

Propeller diameters up to 8 m (960-40.000 kW)



## Single in/single out reduction gearboxes

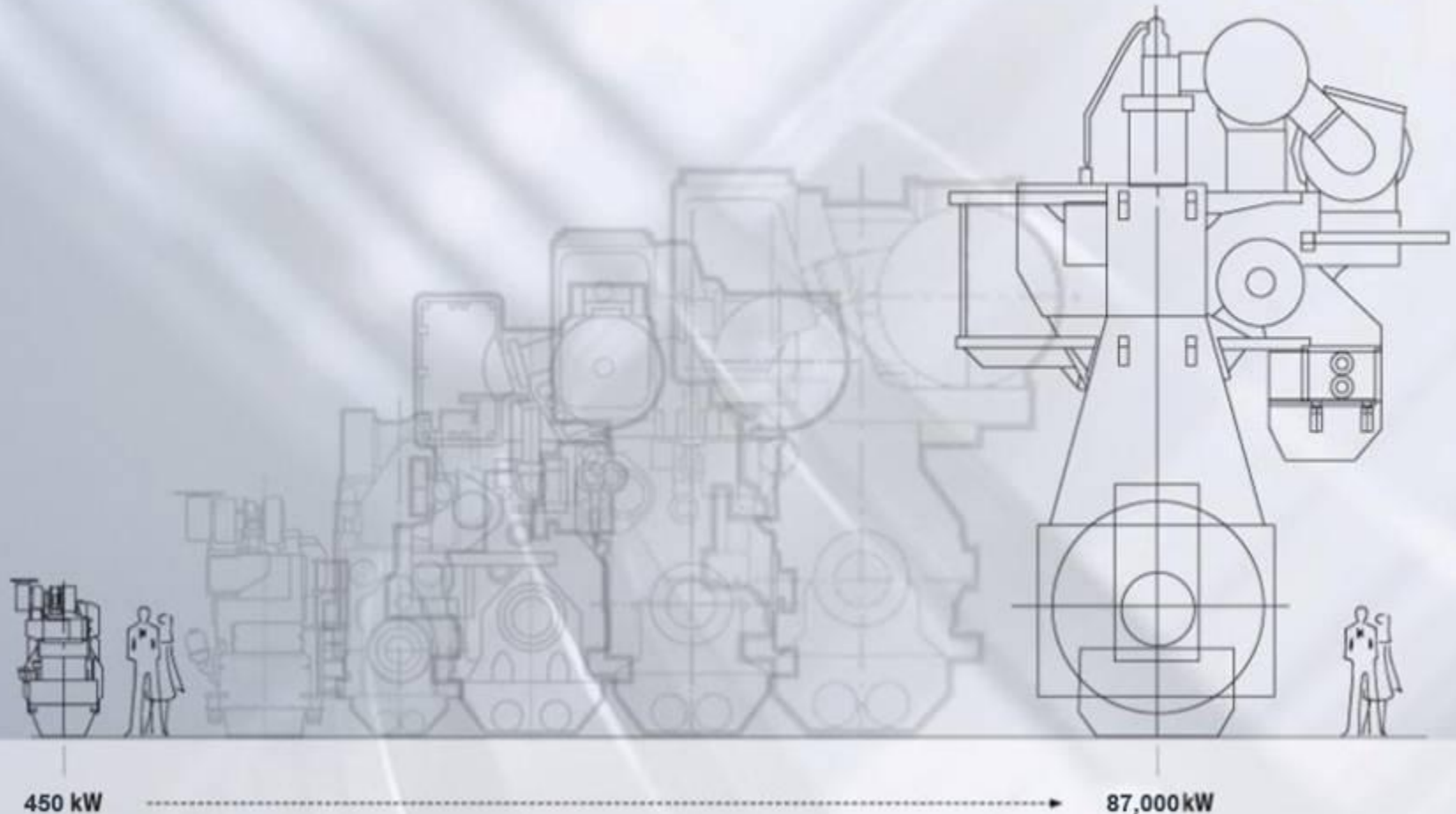
Four sizes covering 21/31 to 32/44 engines

## Remote control system AT2000

For all engine types

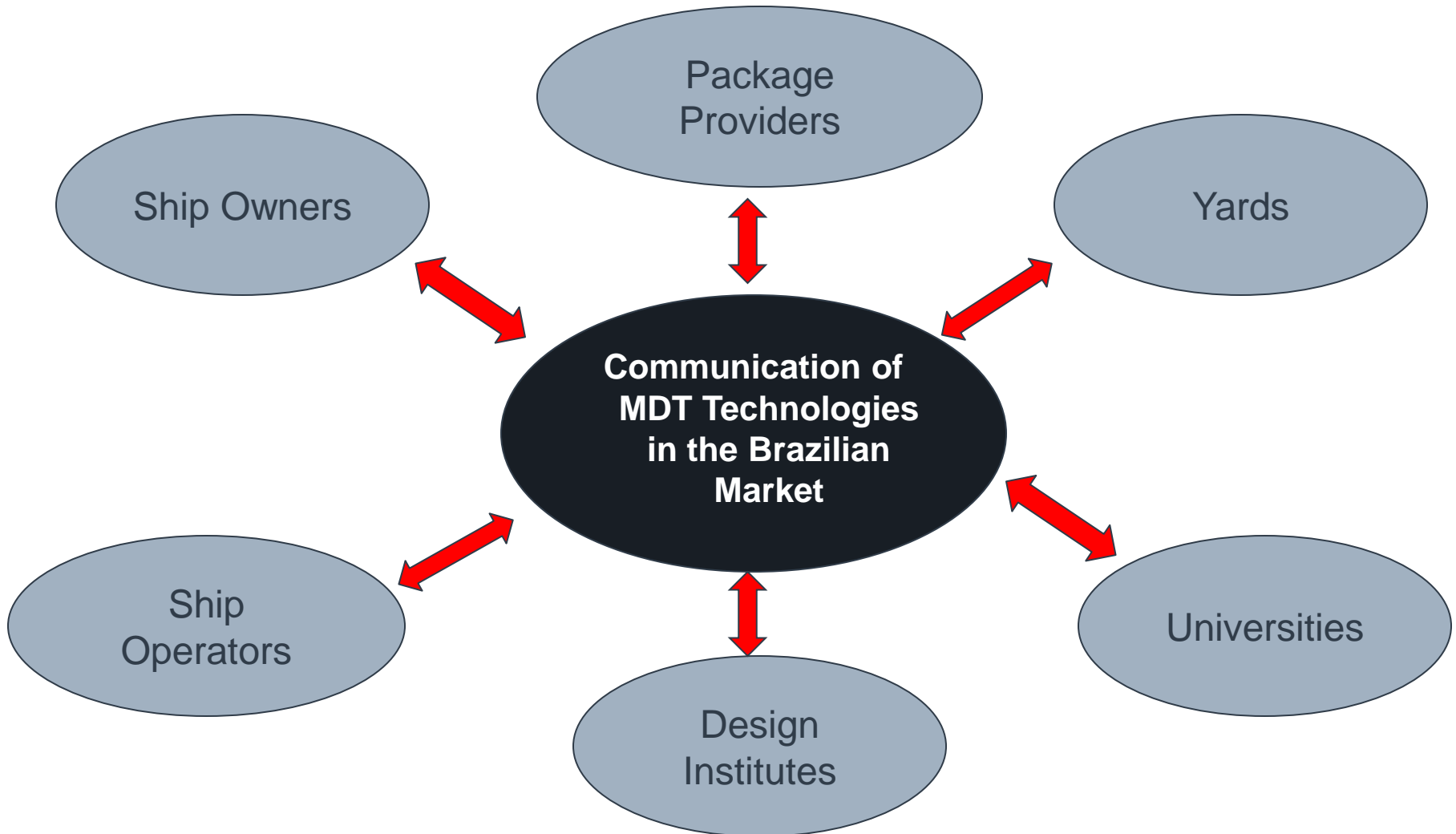


# Sole Provider of a Diesel Engine Programme from 450 kW to 87,000 kW



# Offshore E&P

## Market Contacts



# MDT Commissioning Support to Yard

Your team is trained by our team



## The MDT package includes:

- Comments on diagrams and drawings for auxiliary machinery
- Flushing of the engine
- Alignment of the scope of supply
- General installation of equipment onboard
- Erection and securing interfaces
- Quay and sea trial supervision







### 1. Delay:

- Yards are still virtual, and not even built today
- Yards do not have previous experience with drill ship projects in Brazil
- So far, all projects deliveries followed have been delayed

### 2. Support needed:

- Based on experience from Marine, yards need more support than scheduled for under normal contracts

### 3. Strong unions:

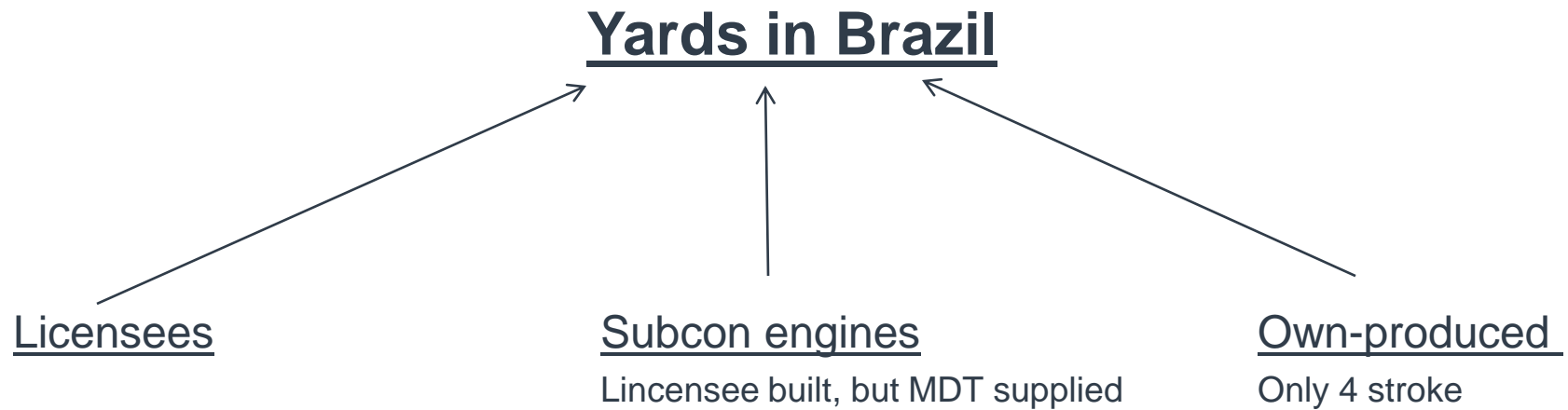
- Strikes are often seen

### 4. Cancelling or postponement for unknown time (regarding OSX's FPSO project, the engine is under construction)

### 5. Own production in Brazil will call for market experts, which will be hard to find

### 6. EAS as one yard receiving drill ships order is, so far, after 3 years in operation, but is not able to deliver tankers on time, and with the expected and needed quality

# Licensees vs. Own Production



# Low Speed Licensee Network



**Poland**  
Cegielski 1959



**Russia**  
Bryansk 1959



**Croatia**  
Uljanik 1954  
Split 1967



**China**

|        |      |
|--------|------|
| HHM    | 1980 |
| DMD    | 1980 |
| YMD    | 1989 |
| CMD    | 2007 |
| STX    | 2007 |
| JAD    | 2007 |
| ZJCME  | 2008 |
| ZHD    | 2008 |
| RPM    | 2008 |
| YungPu | 2008 |
| GMD    | 2011 |

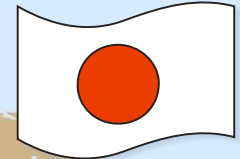


**Korea**

|         |      |
|---------|------|
| Hyundai | 1976 |
| Doosan  | 1983 |
| STX     | 1984 |



**Vietnam**  
Vinashin 2004



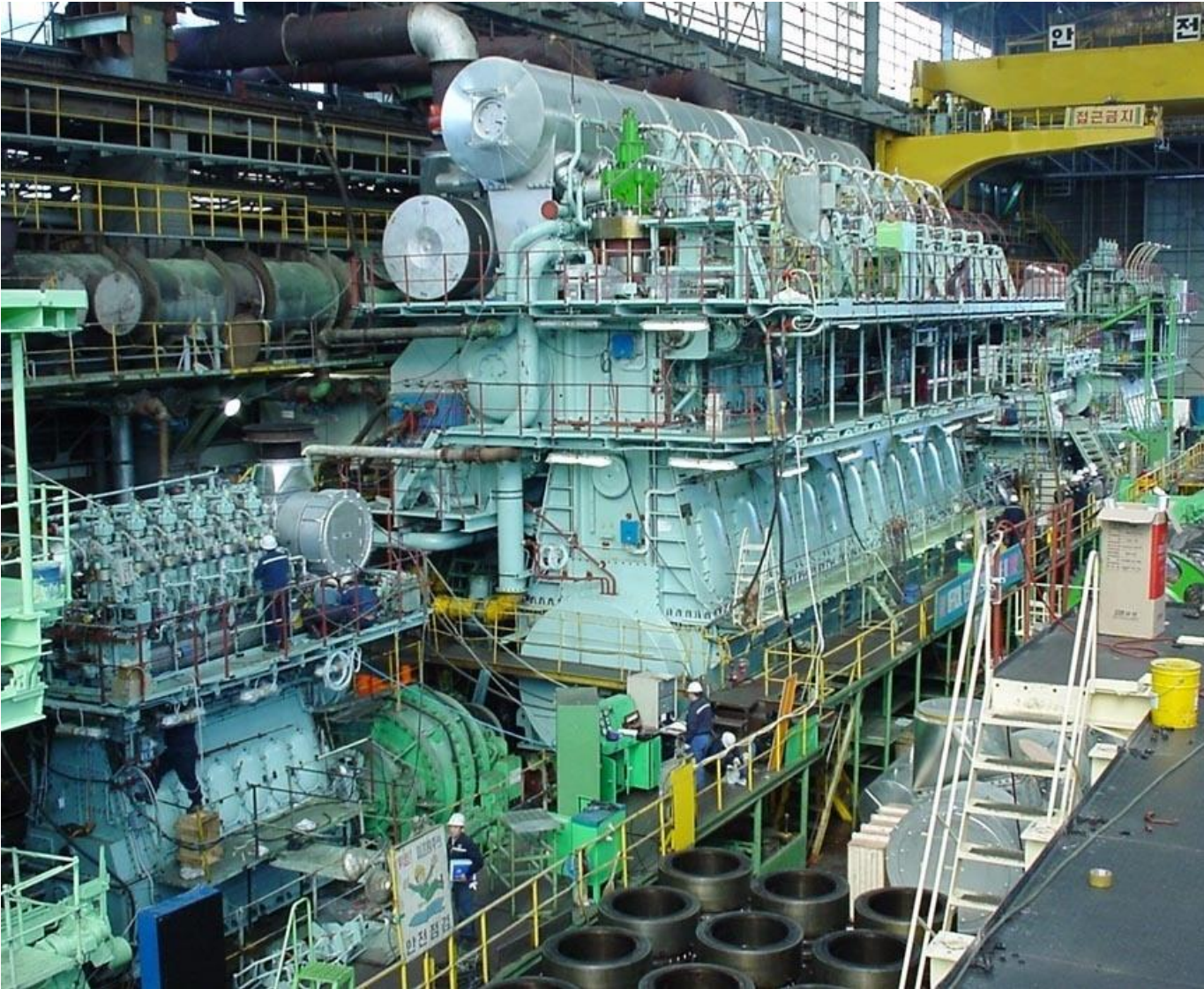
**Japan**

|                 |      |
|-----------------|------|
| Mitsui          | 1926 |
| ▪ Makita        | 1981 |
| ▪ Diesel United | 2008 |
| Hitachi incl.   |      |
| IMEX            | 1951 |
| Kawasaki incl.  |      |
| Hanshin         | 1911 |

# Marine



# MAN B&W 6S35MC and MAN B&W 10K98MC-C on Testbed



# SHIPYARDS MARINE



## SHIPYARDS MARINE



EAS: 22 Tankers (Transpetro)  
STX Promar: 8 LPG Carriers (EBN)

OSX: 11 Tankers (EBN-Kingfish)

EISA: 4 Tankers (Transpetro)  
Mauá: 20 Tankers (8-Transpetro + 12-EBN)  
RIONAVE: 10 Tankers (EBN, where 4-Pancoast and 6-Global)  
ENAVI-RENAVI: 2 Tankers + 3 Bunkers (EBN)  
SUPERPESA: 3 Bunkers (EBN)  
Bravante: 3 Bunkers (EBN-Pancoast)

CNI: 7 LPG Carriers (EBN)

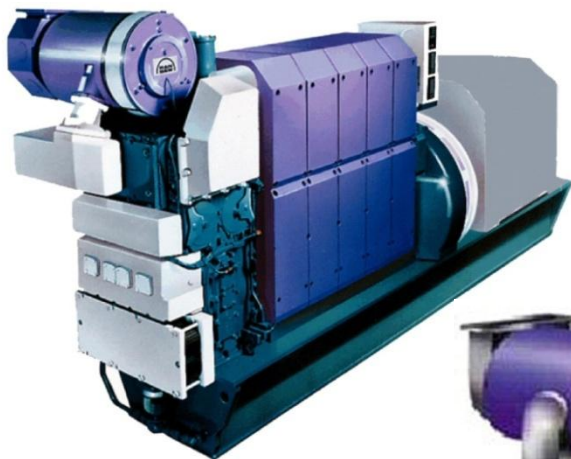
# Marine Market Brazilian Yards



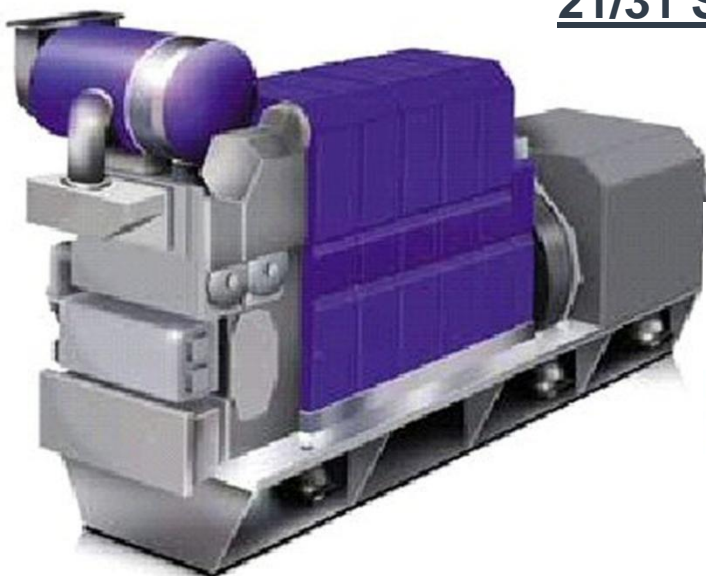
| Main Yards | Ordered                                 | Hot Projects   |
|------------|---|--|
| EAS        | 15 crude tankers                        | 5 x 32K product tankers  |
| MAUA       | 4 X 48.3 product carrier                | 11 x product carriers<br>8 x product tankers<br>3 x 45K                                      |
| EISA       | 4 x 72.9K tankers                       | 5 x 30K<br>2 x container vessels<br><b>4 x container vessels</b><br><b>4 x 72.9K tankers</b> |
| STX Promar | 2 x LPG 4K<br>4 x LPG 7K<br>2 x LPG 12K |  |
| ITAJAI     |   | 3 x 7500m <sup>3</sup> LPG   |
| RIO NAVE   |   | 2 x Kamsarmax bulk carriers  |



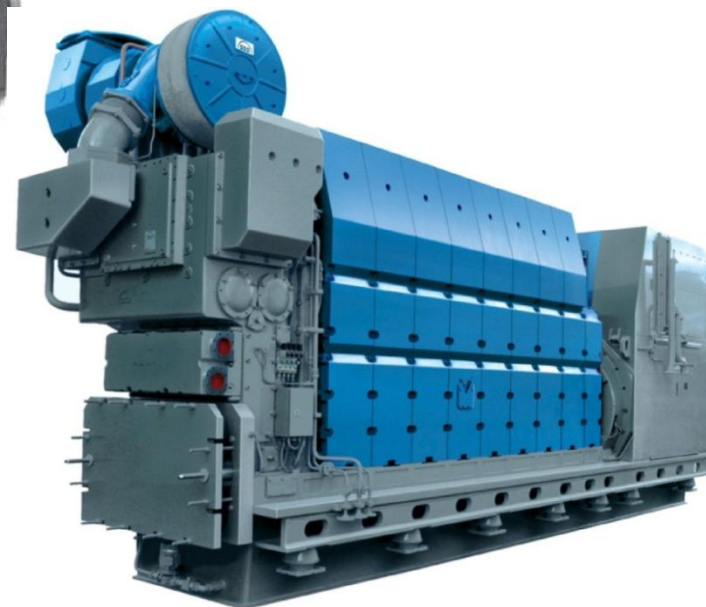
# MAN Diesel GenSets



16/24 Series 450 to 990 kW



21/31 Series 950 to 1,935 kW



27/38 Series 1,500 to 2,970 kW



# Offshore

FPSO and drillships



## Drillships

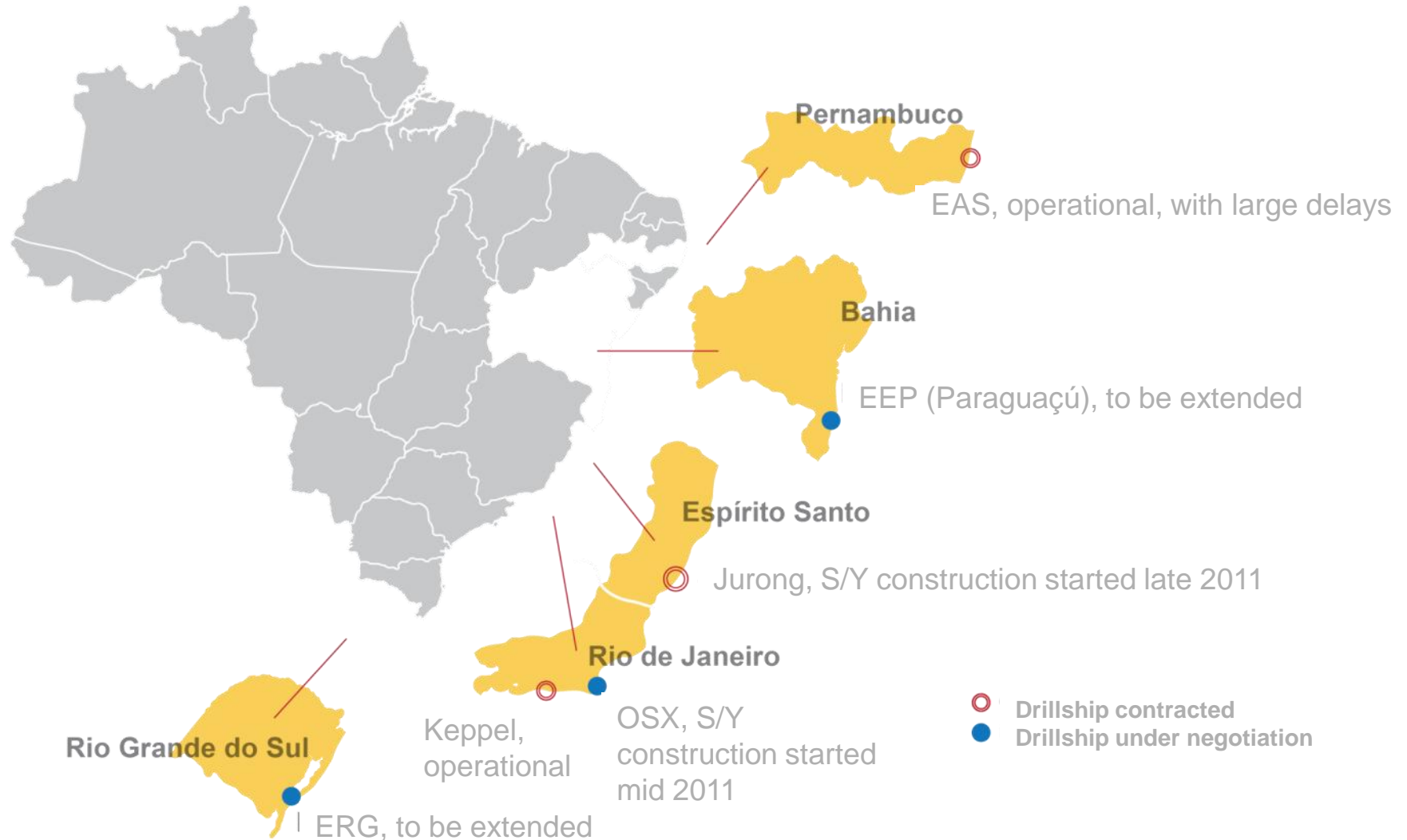


## FPSO



# The Brazilian Drillship Programme

Planned shipyard localizations



# SHIPYARDS OFFSHORE E&P



## SHIPYARDS OFFSHORE E&P



EAS: 7 Drillships (Sete Brasil)  
STX Promar: Virtual yard for Tankers and FPSO

EEP: 6 Drillships (Sete Brasil)

Jurong: 6 Drillships (Sete Brasil) + 2 FPSO (Petrobras)

OSX: 5 Drillships (Sete Brasil) + 3 FPSO (OGX)

Inhauma: 4 VLCC Conversions to FPSO  
Mauá: 1 FPSO Modules

Brasfels: 6 SEMIS (Sete Brasil) + 4 FPSO Modules (Petrobras)

Engevix: 3 Drillships (Sete Brasil) + 8 FPSO Hull constructions (Petrobras)

# Drillship Projects

## Petrobras Commitment



Petrobras has announced their intention to have 50 drillships in operation by 2020, in order to achieve their plan to increase the oil production from 2 million barrels/day to 4.2 million barrels/day. **About 25 new drillships remain to be ordered.**

Petrobrás is very concerned about equipment delays that can affect their performance to achieve their new target for 2020 (4.2 million barrels/day).

Each drillship takes about 48 months to build. The first vessel must be delivered in June 2015 (29 months from now) and the last one in 2020.



# Drillship Projects

## Package leaders



| Name          | Project Lead Location  | Relation to MDT  |
|---------------|--|--|
| ABB           | Norway   | No agreement / commitment. Is not easy to cooperate.                         |
| Siemens       | Norway   | No agreement / commitment. We still try through world organizational Norway. |
| Wärtsilä      | Singapore (Local Office)<br>Finland (Head Office)<br>Brazil (Local Office) | None   |
| GE/Converteam | UK   | Close relationship   |
| WEG           | Brazil   | Close relationship   |
| RongAn / STX  | China / Brazil   | No EA  |

# Petrobras Drill Ship Project

## Highlights



- Operator/owner cannot be influenced on engine choice;
- Yards have two drivers for selection: Price / Local Content; Technical aspects are left to the yards.
- Yards are virtual or newly built and not finished. Very little competence and lack of experience;
- Yards are forced by Petrobras to work with experienced yards and design institutes outside Brazil;
- Due to the lack of experience, complete package supply is expected by shipyard and suggested by Petrobras at bid specification.

# Marine & Offshore

## Supply & support tugs



Harbor tugs

Pusher tugs

Offshore support vessels:

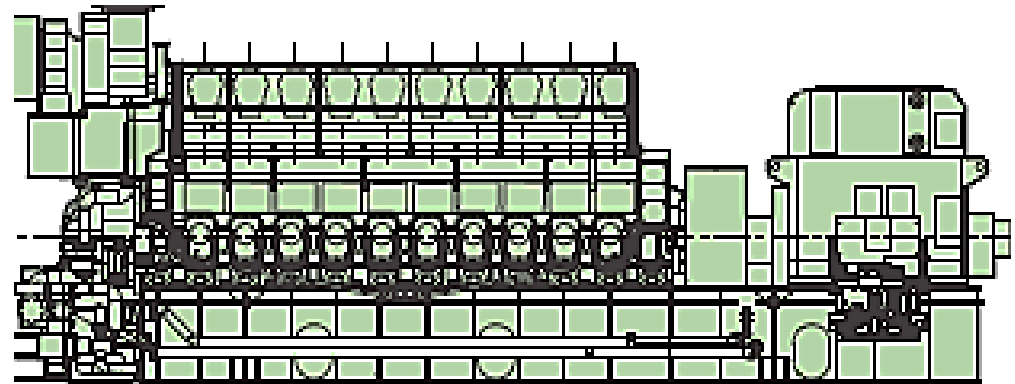
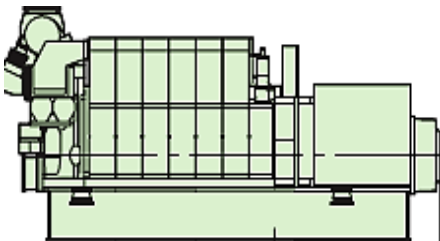
- Platform supply vessel
- Ancor handling tug supply
- Pipelaying ship
- Oil rig vessel



# Assembly and Testing of Gensets for Marine, Navy and Offshore



Marine power generating sets (“GenSets”)



|                       |                |
|-----------------------|----------------|
| <b>Smaller GenSet</b> | <b>5L21/31</b> |
|                       | 950 kW         |
| <b>Dimensions</b>     |                |
| Length                | 5.83m          |
| Width                 | 1.60m          |
| Height                | 3.19m          |
| Weight                | 21.5Ton        |



|                      |                    |
|----------------------|--------------------|
| <b>Bigger GenSet</b> | <b>20V32/44 CR</b> |
|                      | 10,850 kW          |
| <b>Dimensions</b>    |                    |
| Length               | 13.86 m            |
| Width                | 4.26 m             |
| Height               | 5.02 m             |
| Weight               | 172 tons           |



# SHIPYARDS OFFSHORE S&S



## SHIPYARDS TUGS



# SHIPYARDS TUGS



## SHIPYARDS OFFSHORE S&S



# Offshore S&S

## Potential



| Supply and Special Vessel | Current Situation<br>(Sept/2012) |                | By 2020 |
|---------------------------|----------------------------------|----------------|---------|
| Foreign vessels           | 235                              | 2012-2020      | 386     |
| Built in Brazil           | 188                              | $\Delta = 112$ | 300     |
| Total                     | 423                              |                | 686     |

- The initial estimation did not take the pre-salt area into account. Therefore, the market estimates an additional potential of 158 vessels, some to be built even before 2020.

**TOTAL POTENTIAL = 270**

(PSV and AHTS to be built at Brazilian yards over the next years).

- This includes only PSV and AHTS, there is further potential for PLSV and Construction Vessels, but for these, there is no concrete estimation, and we do not know if they are going to be built in Brazil.

- Contract signed with EISA shipyard for 4 PSVs to be built for Swire Pacific Offshore Operations (Pte) Limited:
  - PSV 5000, powered by 4 MDT gensets 6L27/38 (1980 kW @ 720rpm) each, 16 engines in total
- Contract effectiveness for 2 pusher tugs (1 x 8L21/31 each) for JF Oliveira (Manaus)
- Offshore S&S market share research in Brazil: 6% MDT, 13% Wartsila, 21% RR, 40% Caterpillar
- More presence (articles) at publications focused on shipbuilding and offshore industries





- 3 Offshore Patrol Vessels recently acquired by BR Navy. All of them with our 2x16V28/33D engines.

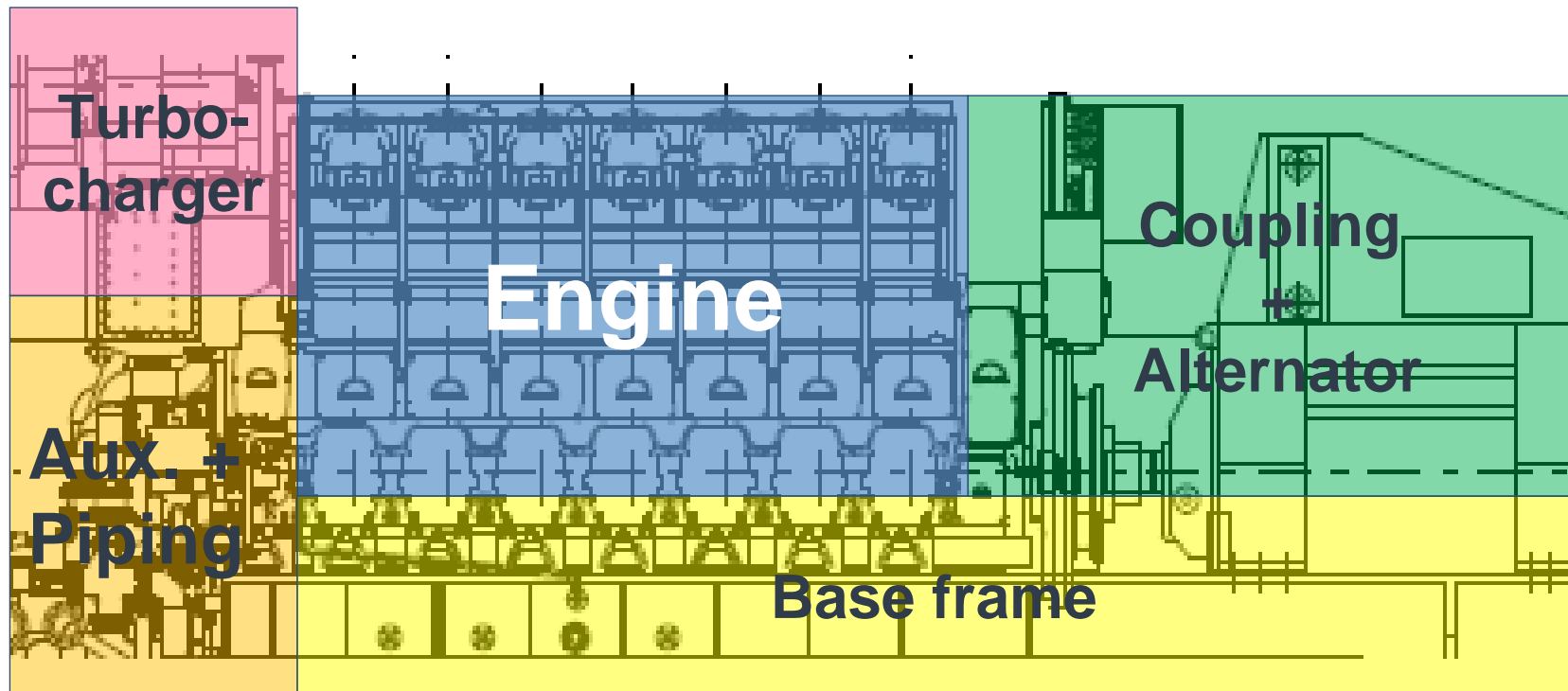
First vessel, *Amazonas*, has already been delivered and is operating in Brazil.

### PROSUPER (5 frigates, 5 OPV and 1 LPV) status:

- Navy has received proposals from 7 different countries, and this has been presented to the government.
- The navy budget will have to be increased 14 times in order to be able to carry on PROSUPER
- World economic situation is not favorable and the navy is considering alternatives. If PROSUPER will ever materialize, it will not be in 2013.



## Mechanical assembly



**Integration of 6 main mechanical components**

Our equipment, mainly the bigger gensets, require adequate logistics infrastructure because of their size, which is very close to road limits

- Distance
- Roads
- Bridges
- Tunnels
- Cables



This is an picture of a big engine transport to the assembling workshop. Out from the workshop, the genset dimensions are considerably bigger!



## Partner localization:

By the sea, near a port → Lower logistics cost!

Close to sea shore → Low logistics costs

Inland, far from the sea → **High logistic costs!**

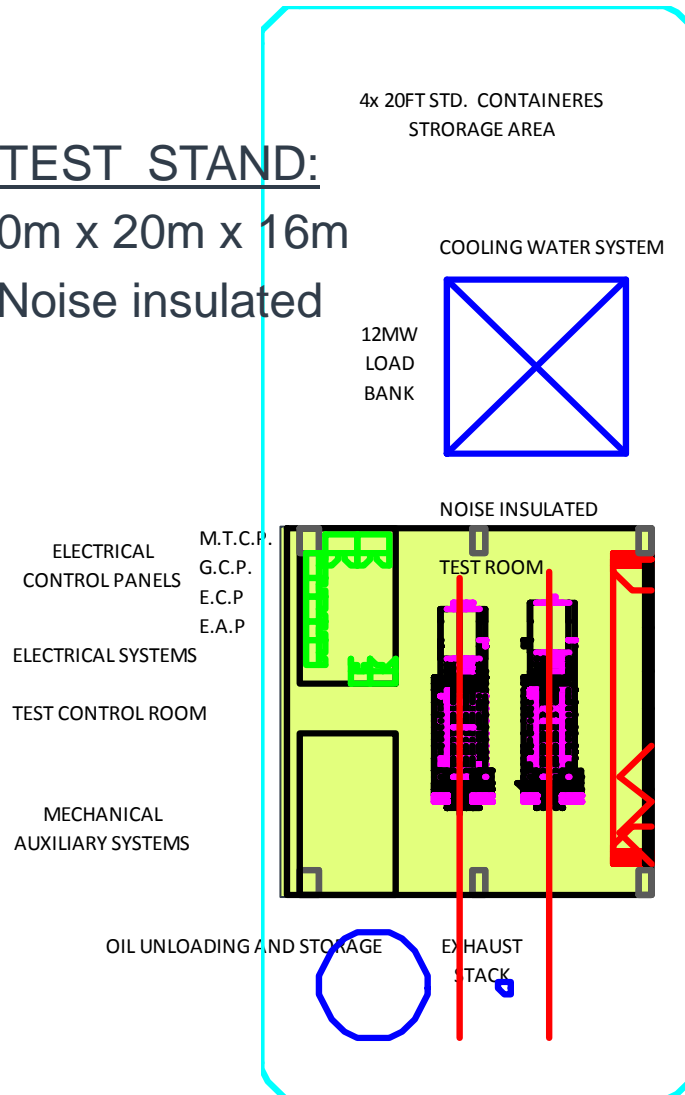
For the small gensets, models: 21/31  
Access Road Condition → Not Restrictive

For the big gensets, models: 32/40 and 32/44CR  
Access Road Condition → **May be Restrictive!**

# Test Facility



TEST STAND:  
20m x 20m x 16m  
Noise insulated



## Auxiliary systems:

- Fuel oil
- Starting air
- Cooling water
- Lube oil
- Intake air
- Exhaust gas
- Sludge treatment
- Electrical panels
  
- Load bank

## Control rooms

# Partnership with Existing Company



We have had talks with other companies to evaluate the possibility of making partnership agreements to use their existing installation and capacity:

WEG

STEMAC

VOITH

JARAGUA

SCHULER

SIEMENS

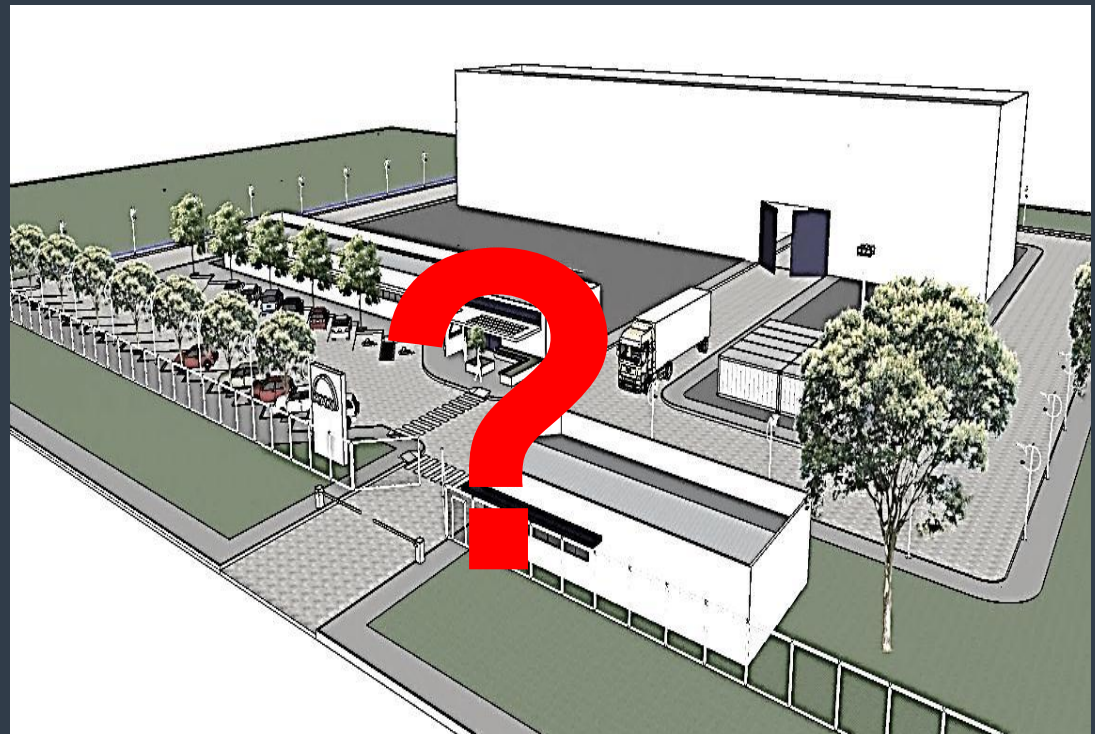
NR

NG

NUCLEP

Latin America

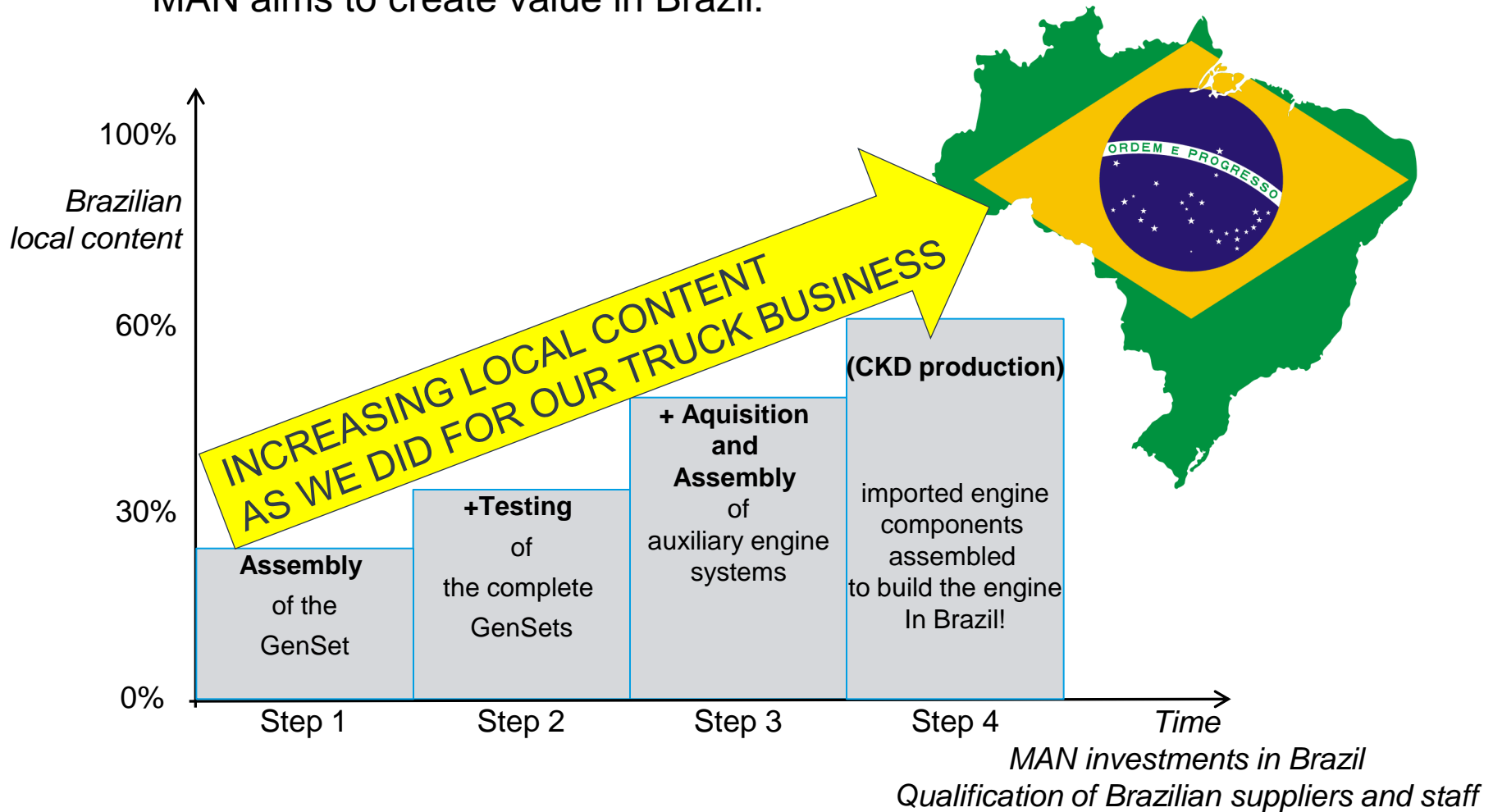
DELP



# MAN Diesel & Turbo Investments Plans



MAN aims to create value in Brazil:



*Illustration qualitative*