

Entering New Markets with Diesel- and Gas Engines

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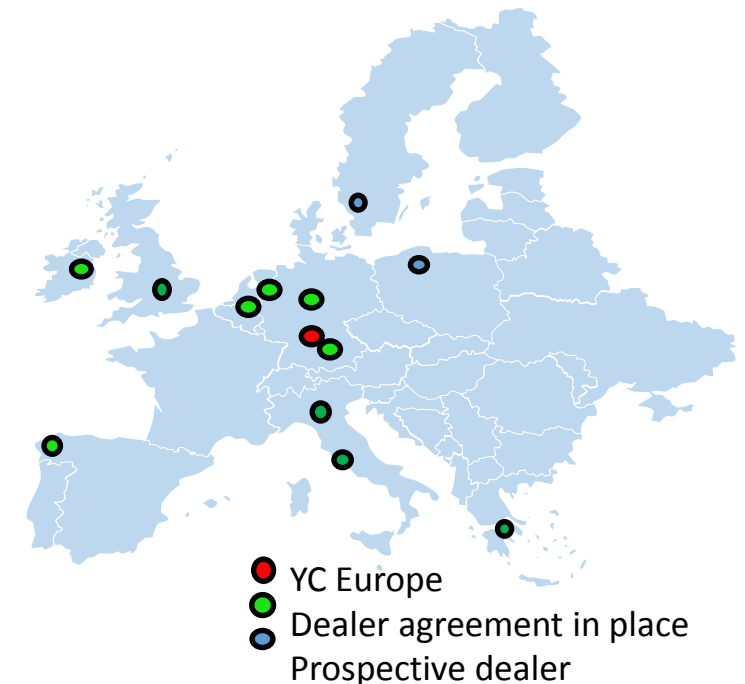
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YC-Europe GmbH was born in 2015 and is since 3 years in the engine business



- YC- Europe is the European sales organization of Guangxi Yuchai Machinery Co. Ltd for the European Community market
- Founded in mid 2015 in Rödermark, close to Frankfurt as 100% subsidiary of Guangxi Yuchai Machinery Co., Ltd.
- Main office in Rödermark
- External office in Italy
- Warehouse for spare parts in Rödermark (1,100 parts in stock plus 6,300 parts in consignment stock)
- Warehouse for engines in Drentwede, close to Bremen harbor (around 50 engines in stock for quick delivery)
- Staff: Three German, one Italian and four Chinese employees
- Products: Mainly diesel- and gas engines for G-drive and marine applications, limited range of industrial engines
- Status April 2018: relations to 23 OEMs and 10 dealers



Yuchai has a production capacity of 800,000 engines per year

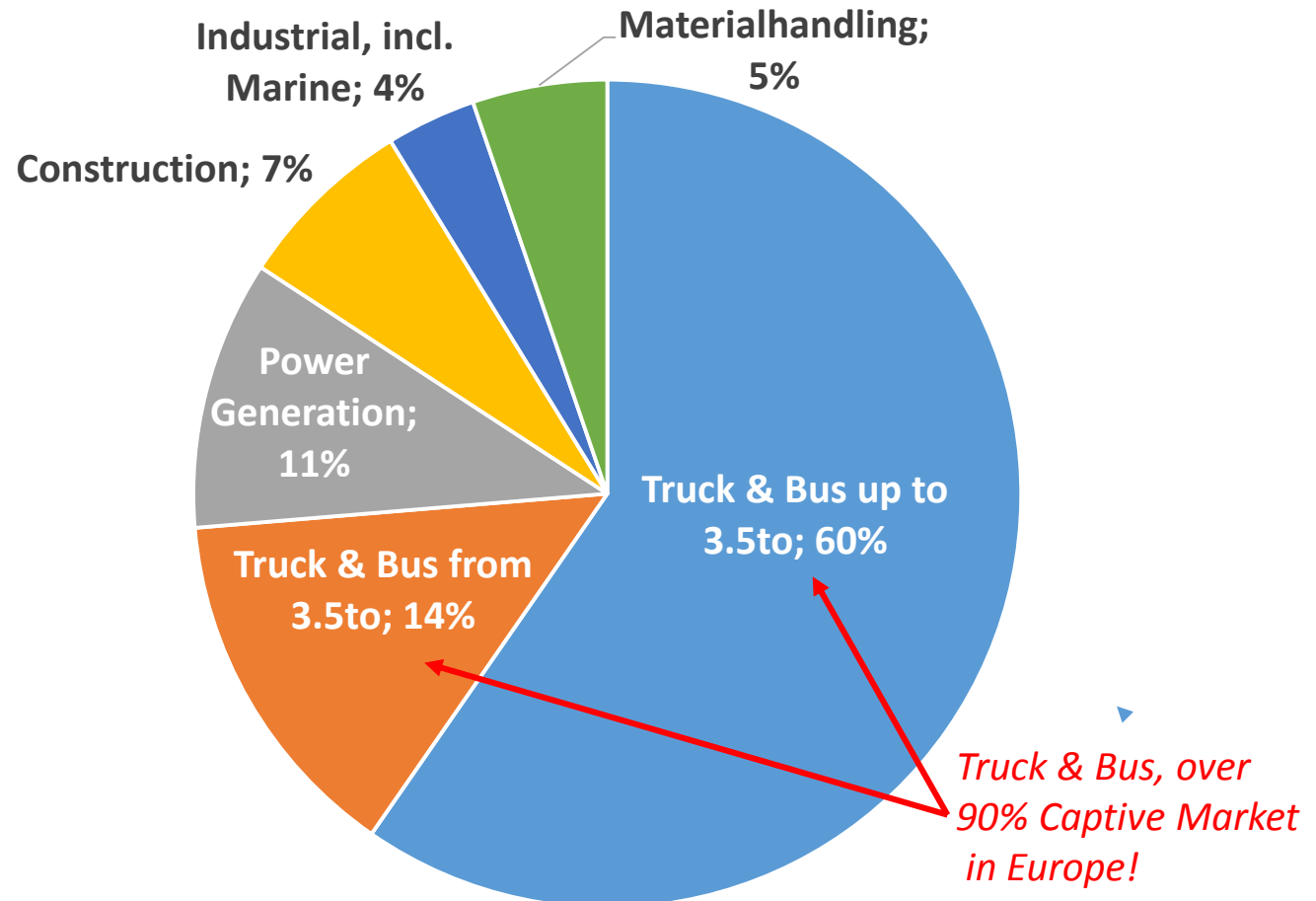


- Established in 1951
- New York Stock Exchange listed in 1994 (CYD)
- Largest diesel engine manufacturer in China with 19.2 billion RMB total assets
- Headquarter in Yulin, Guangxi Province, South China, 6 factories in China
- 9,530 employees, 3,100 engineers, 300 master degree, 31 Doctor of Science, 12 professors & experts, 4 with national allowance
- Full range of diesel engines (30 to 3,500kW) and gas engines (30 to 1,350kW)
- 90% engines sold in China, only 10% export with growing tendency
- Market leader in bus engines, over 120.000 units per year, 70% market share
- Market leader in Marine engines with 7,000 applications per year
- Most modern foundry in China with high grade of automation, robot application, automatized mold handling
- Full range of R&D and testing equipment, like 3-D-CAD systems, deep temperature impact test, 45 performance test cells (20 for gas engines), 12 emission test cells (5 for ETC cycle Euro VI)
- Most advanced engine technology with 14 new engines for the national China IV on road standard (equivalent to Euro VI)
- Reliable engines with a life cycle of more than 1,500,000 km
- Over 2,600 service stations in China, 150 service partners overseas



The first diesel engine was born in 1893 and has more than 125 years experience

Market for Commercial Diesel- and Gas Engines in Europe



Total Sales of Diesel & Gas engines above 5kW in **Europe**:
2.9 mill. units per year

*(Total Sales of Diesel & Gas engines above 5kW in **China**:
around 6 mill. units per year)*

There are 5 Reasons to Enter the European Market with Engines built in China

1. Generate reasonable sales in the EC within 5 years
2. Learn from “difficult” market requirements
3. Gather Know How in technology, marketing and structure
4. Acquire partners for expanding business
5. Help European customers to expand to China

1. Generate reasonable sales in the EC within 5 years



2. Learn from difficult market requirements

China will follow the European Emission Regulations and almost skip stage IV

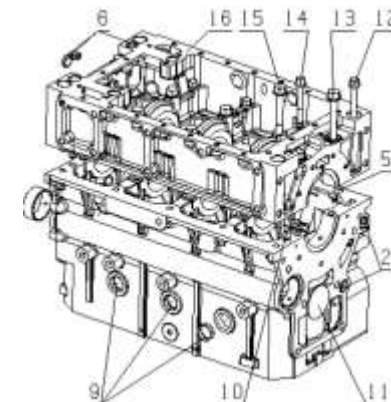
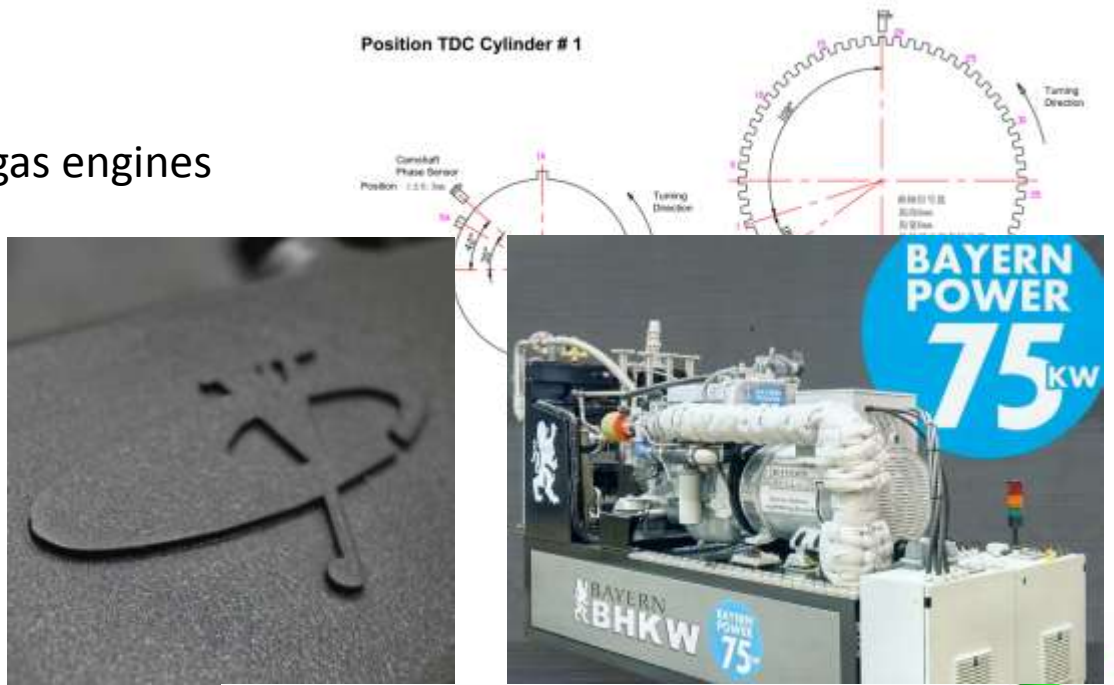
Europe																																
功率kW	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022														
P < 8															(7.5) /8/0.4																	
8 ≤ P < 19															(7.5) /6.6/0.4																	
19 ≤ P < 37				(7.5) /5.5/0.6											(4.7) /5.0/0.015/1 × 10 ¹²																	
37 ≤ P < 56					(4.7) /5.0/0.4					(4.7) /5.0/0.025																						
56 ≤ P < 75								3.3/0.19/5.0/0.025				0.4/0.19/5.0/0.025				0.4/0.19/5.0/0.015/1 × 10 ¹²																
75 ≤ P < 130				(4.0) /5.0/0.3																												
130 ≤ P ≤ 560			(4.0) /3.5/0.2					2.0/0.19/3.5/0.025			0.4/0.19/3.5/0.025				0.4/0.19/3.5/0.015/1 × 10 ¹²																	
P > 560															3.5/0.19/3.5/0.045																	
					Stage IIIA								Stage III B								Stage IV								Stage V			
CHINA																																
功率kW	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028														
P < 8	(10.5) /8/1													(7.5) /5.5/0.4																		
8 ≤ P < 18 ^a	(9.5) /6.6/0.8													(7.5) /5.5/0.4																		
18 ^a ≤ P < 37	8/1.5/5.5/0.8													(7.5) /5.5/0.4																		
37 ≤ P < 56					(4.7) /5/0.4									(4.7) /5/0.025																		
56 ≤ P < 75	7/1.3/5/0.4				(4.7) /5/0.4									(4.7) /5/0.025																		
75 ≤ P < 130	6/1/5/0.3				(4) /5/0.3									3.3/0.19/5/0.025																		
130 ≤ P ≤ 560	6/1/3.5/0.2				(4) /3.5/0.2									2/0.19/3.5/0.025																		
P > 560	/				(6.4) /3.5/0.2									3.5/0.4/3.5 ^o /0.1																		
	中国二				中国三					中国四				中国五																		

Agenda: CO/HC/NO_x/PM/PN: CO=Carbonmonoxide, HC=Hydrocarbons, Nox=Nitrous gases, PM=Particle Mass, (in g/kWh) PN=Particle Number

3. Gather Know How in technology, marketing and structure

Example Gas Engine Development:

- Acquiring customers for further development of bare gas engines
- Extensive field testing under various conditions
- Regular visits to exchange information
- Choose lead partner for R&D activities
- Establish database for test results
- Adapt design changes done in Europe
- Finalize documentation
- Certification to BDEW, VDE etc.
- Feasibility study “European Products” in China



4. Acquire partners for expanding business

- The Joint Venture between Guangx Yuchai Machinery Co., Ltd. and MTU (MTU Yuchai Power Co., Ltd. was established on 4th of April 2017
- The mission of the Joint Venture based in Yulin (GYCL's headquarter) is to built engines of version 03 of MTU's highly successful Series 4000, which will be suitable for Oil & Gas and power generation industries.
- Production machinery will have a capacity of 1,500 units per year
- On 7th of April 2018 the first engine was produced in Yulin factory
- The new assembly hall with "state of the art" equipment and highly efficient processes is able to assemble the versions up to 20 cylinder. The test cell has a capacity of 3,500 kW.
- A high "local content" supply is targeted

4th of April 2017

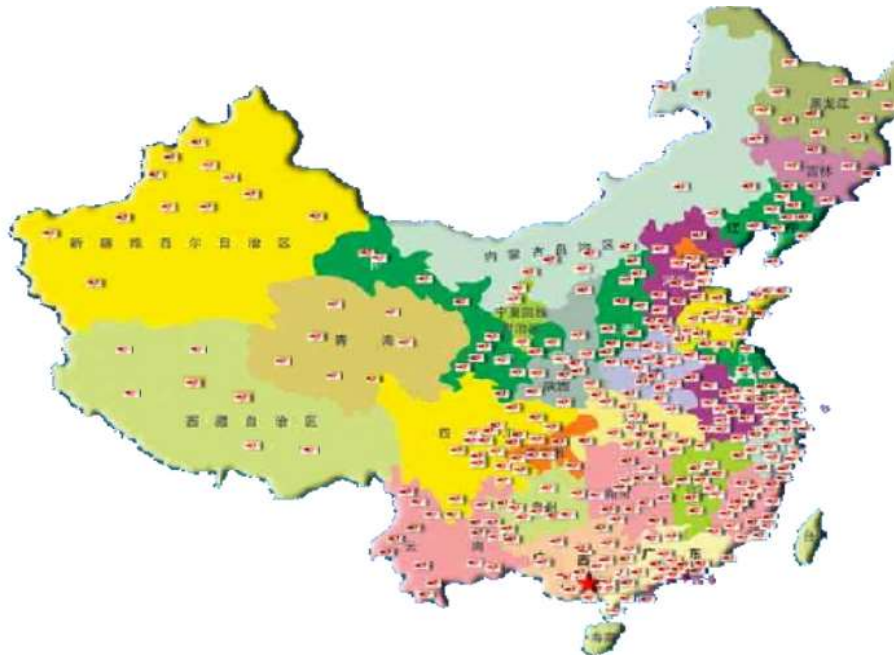


7th of April 2018



5. Help European customers to expand to China

- Due to the fact, that in most cases the engine is the most valuable and complex component in an agriculture, power generation and construction machine, service could be facilitated by using local supplier in export markets.
- Yuchai offers a wide range for all machine applications and has a huge population of engines and service network in Asia.
- We are open to work for European OEM who wants to export their machines to Asian markets



FIRM's Network enabled YC Europe to get access to potential partners

- Our "Lean" YC Europe organization needs strong partner for service and aftermarket supply
- The FIRM network is an ideal platform for the search
- Engine Remanufacturing companies have all necessary resources to offer service and spare parts handling, even with uncomplete documentation
- Flexibility and customer focus is one of the key issues for the success of handling a "new" and un known brand
- Spare parts documentation, storage and handling can be integrated in the workshop system of the partner
- Customer specially in the marine business like the knowledge and the capabilities of Remanufacturing companies
- Yuchai in Suzhou, China operates the most modern engine reman plant (former Caterpillar Joint Venture) in China and is aware of the reman business in Europe and in China, see next chapter



Yuchai operates a huge engine remanufacturing plant in Suzhou, China

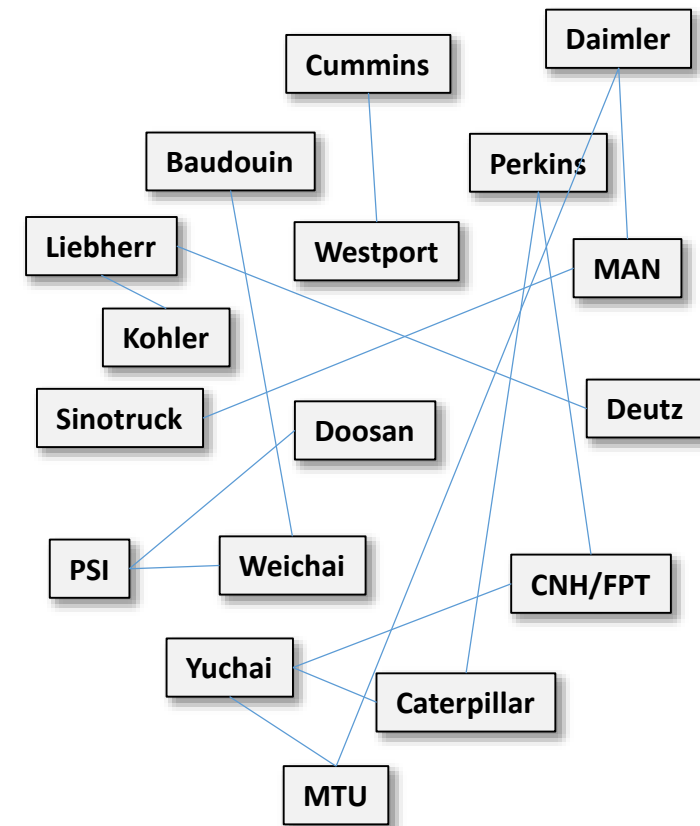
- Establishing Reman business is pushed by local and national governments in China
- Yuchai Remanufacture Industry was a former Joint Venture between Yuchai and Caterpillar with an investment of 50 million US dollars
- In on road and off road heavy duty engine applications overall reman is still not accepted by the end customer, so more or less the aftermarket is dominated by new parts
- Some OE tier one supplier like Bosch offer reman parts for diesel injection systems which are accepted now as a cost efficient “value to life cycle” solution
- The export of reman parts and the import of cores components is highly restricted in China, so for the near future YC Europe will rely on local reman partners, having limited access to reman parts and components from China
- Yuchai distribution of reman engines in China goes through their dealer and service network
- Price level for new spare parts in heavy duty engine business is a much lower in China compared to the European market



In the next five years we will see more changes in the heavy duty diesel and gas engine business

- The major “world” engine business is dominated by the 8 biggest companies, among them a limited number will survive as independent companies in the future
- Smaller engine manufacturers are forced to cooperate due to high cost in R&D for new technologies and emission standards
- The number of different engine types will decrease due to complexity in technology and exhaust gas treatment
- Some engine manufacturers will leave some segments due to the lack of volume production and high emission standards like marine engines for inland vessels in Europe
- Cross company projects will save cost and enable better use of service networks worldwide (f. e. Deutz-Liebherr-Cooperation)
- More engine manufacturers will extend the engine business by producing machines like Yanmar and Kohler in power generation

Cooperation among engine manufacturers



Thank You!

