



AGCO POWER REMANUFACTURING

**TAMPERE
MATCHMAKING EVENT
23.11.2017**

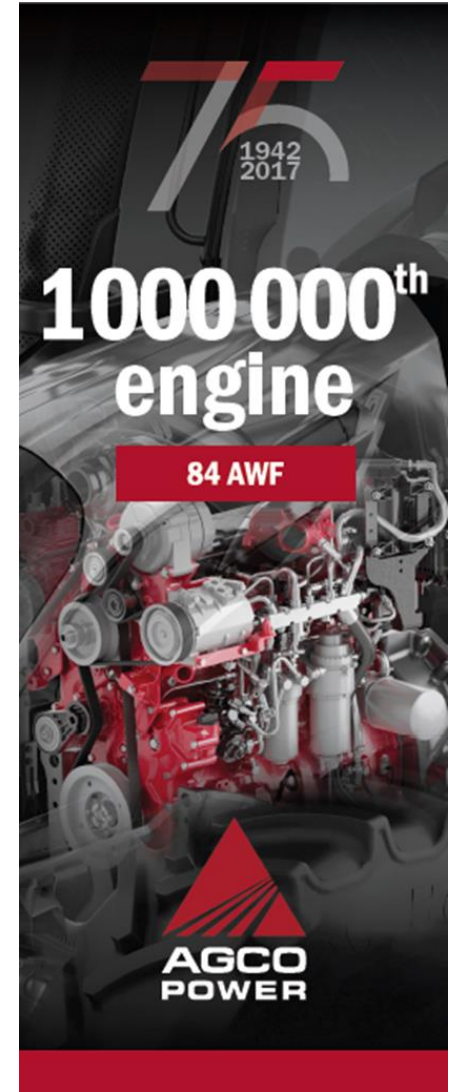
AGENDA

- 1 **AGCO Power Inc. as company**
- 2 **AGCO Power REMAN portfolio**
- 3 **AGCO Power REMAN process**

1. AGCO POWER INC.

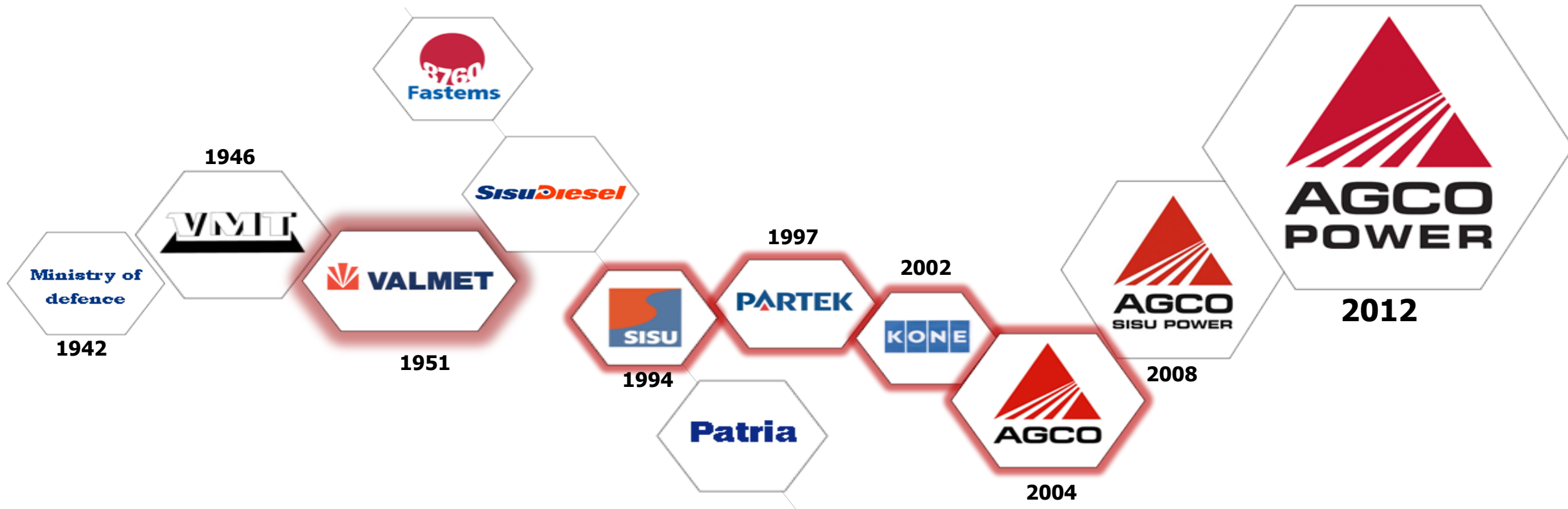


- Factory was established on year 1942 at Linnavuori Nokia Finland
- Just recently celebrated company's 75 years history
- Manufacturer of diesel engines for off-road applications, engine components, gears and transmission components
- All together AGCO Power has been manufactured 1 000 000 engines, from which 700 000 in Linnavuori factory. Nowadays also manufacturing sites in Brasil, China and Argentina.
- More than 1 500 000 gears / transmission components produced per year and for example 100 000 complete transmissions to Bombardier for snowmobiles from Linnavuori factory over the years
- Also producing diesel generating sets, diesel pump sets and offering service / maintenance solution for these applications
- Remanufacturing of engines / engine components, already four decades , annual volume 1500 engines / 5000 components such as fuel injection equipments
- Part of global AGCO corporation since 2004. AGCO official brands are Fendt, Massey Ferguson, Valtra, Challenger and GSI
- AGCO Power main office and global R&D center located in Linnavuori . Approx. 1000 employee globally, of which 750 at Linnavuori plant



AGCO POWER

75 YEARS HISTORY IN INDUSTRY



AGCO POWER FOUR ENGINE FACTORIES



▲ Linnavuori, Finland



▲ ▲ Mogi das Cruzes,
Brazil

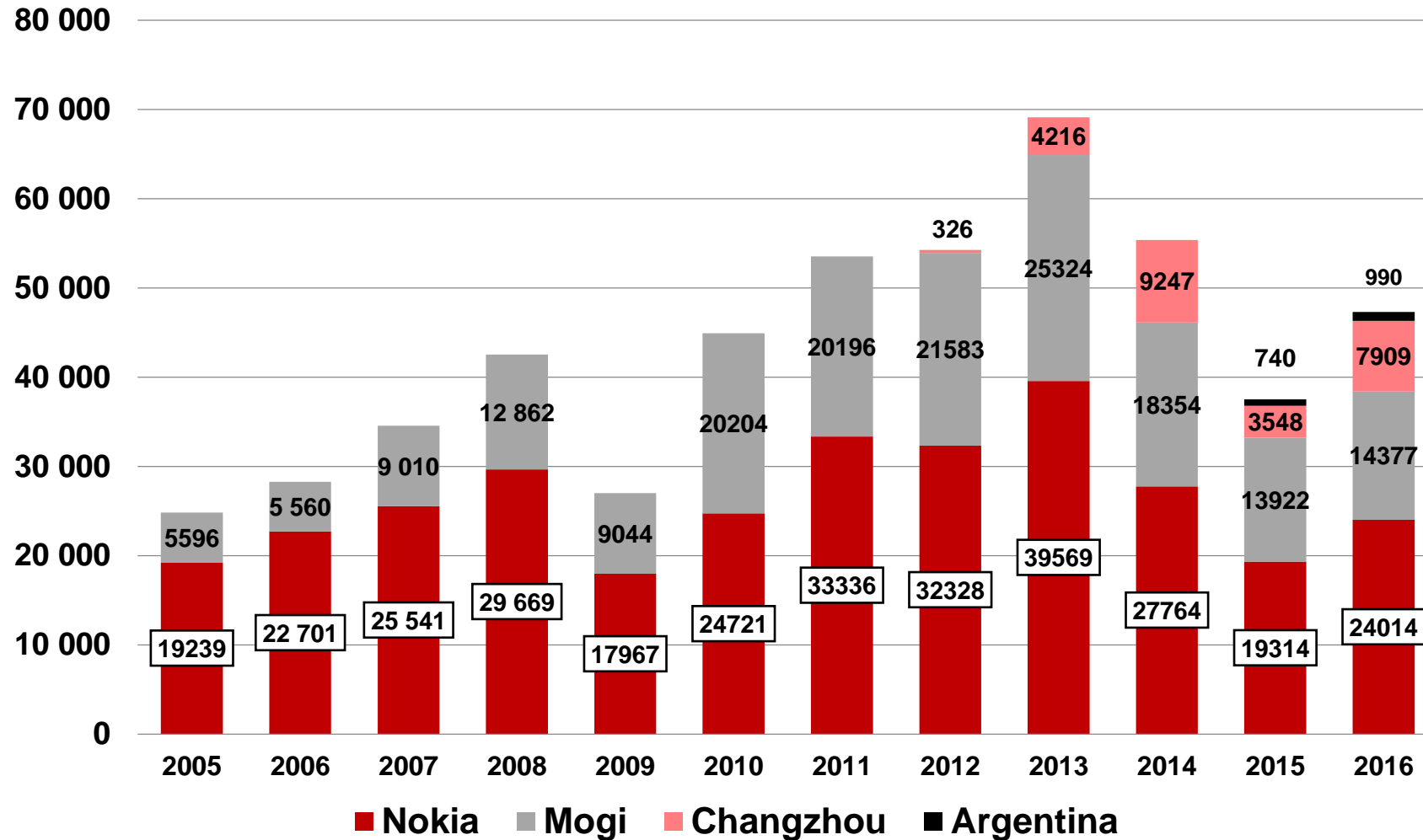


General Rodriguez,
Argentina

▲ Changzhou,
China



AGCO POWER VOLUME DEVELOPMENT



AGCO POWER REFERENCES - TRACTORS



AGCO POWER REFERENCES – AGRICULTURAL APPLICATIONS



SAMPO ROSENLEW



GLEANER



VALTRA

AGCO POWER REFERENCES – OTHER OFF-ROAD APPLICATIONS



2. REMAN PORTFOLIO / BENEFIT VIEWPOINTS



AGCO Power is offering factory remanufactured engines and engine components for it's own products from Linnavuori factory. Originally operation has started based on field-service function, when was noticed demand and business potential for such products.

- Different options like short block, long block or complete engine.
- Engine components like fuel injection equipment's
- Almost all alternatives and engine specifications available that have ever been manufactured in Linnavuori. Few exception, which can be done only from customer's own core. Limited offering for engines manufactured on the other sites
- Whole process is done meeting the standards of ISO9001 for quality and ISO14001 for environment.
- All the works are carried out by high-skilled specialists who have expert knowledge from their own range -> no need for compromising during process
- Sustainable solution
- Cost-effective solution for end customer to extend machine lifespan



○ Why factory remanufactured engine ?

Quality standpoint:

- ✓ complete engine are checked through part by part
- ✓ all parts inspected, re-machined or replaced to meet current specification
- ✓ only genuine spare parts used
- ✓ highly skilled technicians: the personnel in After Sales workshop / remanufacturing plant have the best experience over the plant
- ✓ same warranty terms than for new engine

Quick and flexible delivery time:

- ✓ this enables customer to preplan work arrangements in order to minimize machine downtime
- ✓ average lead times from order; short block two working days, long block four working days and complete engine seven working days

Real Exchange unit:

- ✓ once planning refurbishment project for machine, the best timing for engine replacement can be determined prior to work -> order REMAN engine in advance -> able to minimize machine downtime
- ✓ particularly with complete reman engine customer knows in advance exactly total cost
- ✓ Do not mix up with non-genuine reconditioning / repairing solution or exchange engine

○ Why factory remanufactured engine ?

Upgraded to the latest engineering modification:

- ✓ plenty of improvements done over the years for individual components -> better than original

Test run with the same parameters as new engine:

- ✓ test run period carried out by specialist
- ✓ test run results recorded
- ✓ test run with the same parameters as new engine -> performance as new

Technical specification guaranteed according application:

- ✓ machine performance and behavior as initially

Credit from old engine core

- ✓ Old engine return just after engine replacement for crediting
- ✓ cheaper total cost compared to similar overhaul done at the site with similar content
- ✓ price includes testing and painting, which is impossible to carry out good at the site. Engine also looks like a new!

Environmental considerations

- ✓ more than 90 % of components are reused in REMAN process -> rest can be recycled
- ✓ by collecting cores from field, we can prevent waste to end up in to nature

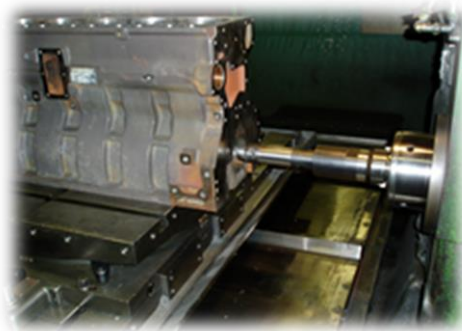
3. REMAN PROCESS

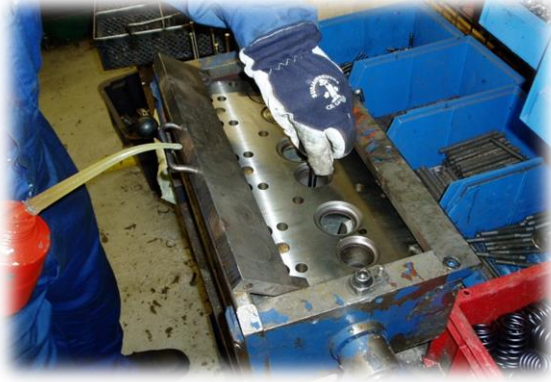




Cylinder block

- inspection of the cylinder block / changed if needed
- replacement of camshaft bearings whenever needed
- machining of head surface if needed (+shortening of pistons)
- inspection of crankshaft centerline offset / machined if out of tolerance
- o-ring area inspection / cleaned and grinded
- grinding of liner seat on the block
- measuring liners protrusion and position -> key factor to avoid head gasket problems
- cleaning all coolant and oil channels





Cylinder head

- inspection of the cylinder head / pressure tested
- replace of all valve guides by current with valve stem gaskets
- replacing / installing (re-machining, if insignificantly wear and tear) of valve seats
- straightening cylinder head by machining
- replacing valves
- inspection / changing of valve springs



Injection system



- dismantled and all parts inspected
- all wear and tear parts replaced
- tested and adjusted to meet specs
 - cam's phase angles (tol. $\pm 0,5$ deg)
 - stabilisation of each cam fuelling qty
 - adjusting fuelling quantity in several checking point acc. pump specification
 - adjusting speed droop, high and low idling speed
 - pressure test
 - visual inspection
 - Agco Power pump setting requirements are more stringent than Bosch ones
-> guaranteed performance and trouble free functioning
- nozzles replaced or injectors remanufactured

Other engine components / assembly

- inspection of crankshaft
 - grinded if needed and use of undersize bearings
 - inspection in case of cracks
 - inspection of vibration damper
 - machining of conrods and main bearing pins (all pins machined to same size)
- replacing all bearings
- replacing cylinder liners and pistons
- oil pump inspection / replacing
- camshaft and camshaft gearwheel inspection / replacing
- timing gear inspection / replacing
- new or REMAN turbocharger
- new or REMAN coolant pump
- new or REMAN generator and starter motor
- new oil cooler
- all gaskets and filters changed



Engine testing



- Engine test run in computer programmed test bench and adjusted to meet as new parameters
 - warming up period
 - oil pressure
 - power
 - torque
 - low and high idling speed
 - smoke
 - fuel consumption
 - visual inspection in a case of leakages or other abnormal behaviour
 - all tested figures are stored into a factory database

Engine painting and delivery



- Painted with 2-component colour, thickness 25 micron (same as new engine) -> new outlook
- Components which have been delivered earlier from production as loose parts customer has to order separately if needed
- For standard delivery is used wooden stillage and plastic protective cover
- Overseas transport with extra anti-corrosion protection and plywood box



REMANUFACTURED ENGINE BENEFITS



SUSTAINABLE /
ENVIRONMENTAL PROTECTION



CUSTOMER SATISFACTION



COMMERCIAL ASPECT



For more information: <http://www.agcopower.com/>