



COMPANY HISTORY

The engine, the heart of the tractor



The engine is the tractor's most vital organ, it is what each and every agricultural operator relies upon to take him home at the end of the day, 365 days a year.

To build a successful tractor it is essential that all of its components are of top quality. However the choice of the correct tractor for each of its models has never been an easy one for Antonio Carraro. Not only in terms of the engine type suitable for compact tractors, but also for the quantity of lots that the company requires for the fragmented production of 80 models, divided up in turn into 10-12 power ranges.

It is difficult to find important high quality suppliers capable and willing to invest in and collaborate on this complicated task of engineering (selection and fitting of the engines) with a company that, when all said and done, produces a limited number of lots.

In this sense, Yanmar has always been, and is to this day, a long-term special partner for Antonio Carraro, who has always believed and continues to believe in this Italian brand, by contributing in a concrete way to the development of AC's most innovative tractors currently available on the market.

Twenty years after the beginning of the Italian-Japanese partnership it is nice to look back on certain events that have galvanised this union. Numbers, technical data and mathematical calculations are important in every company, but what counts above all are the people whose work, passion and choices determine the success of this company and its products.

Here is a brief history, human rather than epic, of the AC/Yanmar link, which could inspire a story with the Japanese title :
誰が農業を助け、人類を助けるのか ("He who helps agriculture, helps humanity".)



誰が農業を助け、人類を助けるのか

HE WHO HELPS AGRICULTURE, HELPS HUMANITY!

In 1988 Yanmar Europe was founded in Holland. At the time Yanmar was already a giant in Asia, but in Europe it was a little known brand in the agricultural sector. By the middle of the 1990s, in order to expand, Yanmar Europe signed a joint venture with the Italian company Cagiva (owned by Ducati). Antonio Carraro was the Japanese company's first European customer.

At the time it was Mr. Borghi of Ducati who recommended the Yanmar engines to Antonio Carraro. Already intrigued by the efficiency, precision and quality of the Japanese products, they went in person with their collaborators to the Yanmar factory in Japan. They were met by a group of technicians who they explained the reasons for their visit to: research into a compact, high performance engine with low fuel consumption, which was above all reliable, for a new tractor in the pipeline.

The Japanese, in the eyes of the Europeans, are known for their rigour and precision, but also for their respect for hierarchy: the boss is the only one able to give the final word on anything. This is why decisions are never immediate, as the various levels of the hierarchy must be consulted. Furthermore, the Japanese, always in the eyes of the Europeans, don't deal easily with articulated projects requiring flexibility. We Italians, instead are less ordered and precise, but definitely more creative, flexible and elastic. The Japanese and Italian mentalities were to some extent in contraposition to each other, but turned out to be a winning, synergistic combination if they worked together.

The Japanese manufacturers, renowned for construction quality, were not very keen on engine customisation, especially if the quantity was not very significant. However, working with Yanmar would have meant a leap in quality for Antonio Carraro: they would no longer be a semi-artisan factory, but a large company, where in addition to the separate bases and the technical data, it was essential



to have the project planning, delivery and installation system of the engine on the tractor without hitches. Fitting a Yanmar engine meant, and still does today, offering a guarantee of extraordinary reliability. It meant building the "best tractor in the world" (the objective of every AC product) with the best engine in the world which for Antonio Carraro is the engine that in addition to being "the best", has to get the operator home 365 days a year!

At the time Yanmar was renowned for its excellence: it was the first automated factory in the world for the fitting of engines, already quite flexible by Japanese standards; it was capable of carrying out specific fittings even on a single engine, provided that the technicians and their bosses believed in the project.

Well, that time the Yanmar technicians shocked Antonio Carraro: they examined the project and their bosses gave it the immediate go ahead. Apparently they said: "Send us the tractor. We'll give you an answer in 30 days." And so it was.

A great collaboration began there and then. Yanmar turned out, unexpectedly, to be a great partner willing to fit an engine on a tractor from a small Italian company.

It was an uphill struggle at the beginning in that there were misunderstandings or simply differences in mentality. However both parties were committed to carrying on, by getting to know each other.

On the back of the success of the first Yanmar engine (3TNE88, 3 cylinders, water cooling system) the AC technicians returned to Japan to ask for other, more powerful engines. That time the answer shocked the Italians because the Japanese technician that made it, after careful consultation of the AC dossier, said candidly: "This question wasn't expected!" It wasn't in Yanmar's plans to extend the collaboration with Antonio Carraro to the supplying of new models.

The main problem was that Yanmar was too serious a company: customisation (substantial



modifications to the engines to be installed on the tractors, necessary to reach maximum efficiency) meant tests and authorisation that required serious studies. The task could be carried out, but only according to the book and the rules necessary to supply an engine that would not disappoint anyone: not Yanmar, nor Antonio Carraro and especially not the final customer.

The AC technicians didn't give up and doggedly managed to get a new engine from Yanmar, exactly as they wanted, more powerful, "with structural torque and forced lubrication": perfect for AC tractors with the ACTIO full chassis with oscillation.

It was thanks to this experience that the AC technicians became fond of Yanmar, which turned out to be a great factory with a "human face", with people capable of listening to and

catering for the Antonio Carraro customer. Yanmar, in effect, was a giant company but with an owner made from flesh and bone, Mr. Yamaoka, along with his family and collaborators. A simple industrial set up, even if in different proportions, to that of Antonio Carraro, driven by its owner and his team of technicians. People with an industrial mission, which placed the needs and expectations of the final customer in the centre.

For Yanmar, their customer was the Italian company making specialised tractors while for AC, the customers were from the vineyards in the Langhe, the Peloponnese or the Iberian Peninsular that required specialised compact tractors **fitted with an engine that would bring them home, every day, 365 days a year!**

Since then, around 20 years ago, AC has fitted more than 25,000 Yanmar engines. It was a winning choice that brought about a real upgrade in AC production. A magic rise in



the qualitative standard of the tractors that the final customers were able to perceive immediately.

It was thanks to the quality, performance and efficiency of the Yanmar engines that AC managed to produce such excellent products with great performance and low consumption, but above all unbeatable reliability, to meet the expectations of the most demanding agriculturalists.

THE PRODUCT > TRACTOR PEOPLE



With the introduction of the electronic running system on the latest generation of engines, ahead of other brands, Yanmar, over the years, has allowed the AC technicians to explore new avenues in the evolution of hydraulic and continuous transmissions, integrated with the engine. A great feat of engineering that has led to the development of highly technological tractors with unique characteristics that no other company has been able to imitate.

Today we can say that Yanmar's contribution (from the customisation and validation of the engine assembly, up to the after-sales service) has led to a marked improvement in the qualitative standards of AC tractors, which translates into a real contribution to the agricultural operators' activities around the world. And as an old Japanese saying goes:



"HE WHO HELPS AGRICULTURE, HELPS HUMANITY!"

誰が農業を助け、人類を助けるのか

YANMAR 4TNV88-B ENGINE

Today Yanmar produces around 600,000 diesel engines a year at its Biwa plant. A third of these (around 200,00 units) are engines with the abbreviation 3/4TNV88-B. They are highly versatile and reliable engines used in various fields of use: from Antonio Carraro tractors to generators, sailboats and even refrigerated lorries which as we know have to function 24 hours a day, for many consecutive days.



The buyer of a compact tractor does not usually have a degree in engineering. If a car or a tractor is appreciated for its configuration and performance, it is a given that it also has a good engine. But what does a good engine actually mean? It could mean an engine that provides excellent performance, it has low consumption and minimal pollution or it might mean that the engine takes the operator from his home to the field every day, 365 days a year.

Well: the Yanmar 4TNV88-B engine is an excellent engine for all those reasons. It is exceptional in terms of efficiency, performance and consumption while at the same time being super reliable. It is an engine that you forget about and that brings you home every day, 365 days a year.

Big claims, we realise this, especially when printed in black and white. This is a guarantee that it is no fruit of our imagination, but rather the truth that explains the great success of the 5800 AC tractors.



MAXIMUM COMPACT TECHNOLOGY

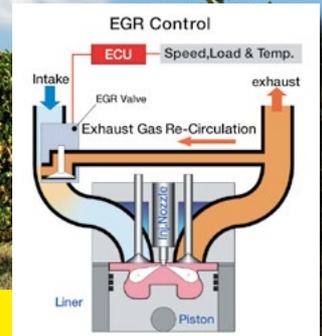
Let's take a closer look at some of this engine's features so that every purchaser can evaluate it and make comparisons.

Combustion chamber > by optimising the fuel flow between the combustion chamber and the injector, mixing is uniform thus providing complete combustion which reduces exhaust fumes.

Injection pump > designed by Yanmar for the most compact engines, this creates modulated and constant injection pressure.

Injectors > the installation angle of the fuel injection nozzle is greater compared with conventional engines, in order to reduce irregular nebulization.

4 valves > 2 inlet and 2 exhaust valves improve aspiration and expulsion of the air.



THE LEGENDARY 5800

Two AC series (Series 21 – Entry Level and T Major Series – Professional Level) make up the legendary 5800. The numbers confirm their legendary status as they are the most sold AC tractors in the world. Indeed the TN 5800 is the best seller in the world.

The five models with this logo have been fitted with the 49.7 hp, 4-cylinder, 4TNV88-B Yanmar engine with contra-rotating shafts; it is a technical solution that provides a reduction in vibration and a subsequent increase in operator comfort. Injection is direct with a water-cooling system. It is a large engine with maximum torque (139 kgm) set at 1800 rpm, which, due to the shape of the combustion chamber and injection system, guarantees low fuel consumption.



5800	21 SERIES ENTRY LEVEL		T MAJOR SERIES PROFESSIONAL LEVEL			
	TIGRONE	SUPERTIGRE	SN V	TN	TC F	TIGRECAR
ACTIO™ CHASSIS	STEERING WHEELS	ARTICULATED	ARTICULATED	STEERING WHEELS	STEERING WHEELS	STEERING WHEELS
TYRES	ISODIAMETRIC				LARGER ON REAR	ISODIAMETRIC
MIN. EXTERNAL WIDTH (mm/in)	1235/48,62	980/38,58	980/38,58	1235/48,62	1335/52,56	1500/59,06
BRAKES	MULTIPLE OIL BATH DISK BRAKES WITHOUT NEED FOR ADJUSTMENT					
WEIGHT (Kg/lbs)	1550/3417	1400/3086	1600/3527	1630/3593	1760/3880	2210/4872
PTO	540 RPM, SYNCHRONISED		INDEPENDENT, 540 RPM, SYNCHRONISED			540 RPM
CAPACITY Kg/lbs)	2000/4409		2200/4894			—
TRANSMISSION	12 SPEEDS: 8 FORWARD AND 4 REVERSE		SYNCHRONIZED 24 SPEED: 12 FORWARD AND 12 REVERSE WITH INVERTER			
MAINTENANCE	FRONT OPENING OF THE BONNET		VERTICAL OPENING ASSISTED BY A PISTON SUPPORT			
COMFORT	STANDARD		ERGONOMICAL, SPATIOUS, COMFORTABLE, EASY ACCESS ABOARD – CONTROL BOARD WITH ELECTRONIC TACHOGRAPH AND OTHER FUNCTIONS			
DESIGN	STANDARD		IN LINE WITH TOP OF THE RANGE TRACTORS			

Nota Bene: The SP 5008 model is also fitted with the same engine. See Groundcare section.

The two, apparently similar series, differ in weight, PTO, lifting capacity, gearbox and transmission, access to the engine compartment, operative comfort and from first impressions in design. The T Major Series is the latest model. However the Series 21 continues to coexist precisely because of its success over the years thanks to it being cheaper than the T Major Series, but above all because of its reliability has become a defining feature in the eyes of agricultural professionals in the countries situated in the Mediterranean basin, where this Series has always been widely appreciated.