LAMBDA WORLD REGISTER

Newsletter 1/2021

Editors: Bill Jamieson and Sebastian Simar

Emerging Traditions
Learning from the Early Lancias – Part 1

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They have always been difficult, those early Lancias. The cars made before the Lambda impress with imposing size and are overwhelming in their variation. Their history has typically been approached with a focus on model-by-model descriptions, but perhaps now is the time to try a different approach. Can these cars be considered not merely as well-built Edwardian-era predecessors to Lancia's lightweight Lambda, their breakthrough car of 1922, but, more broadly, as representatives of seminal developments in the company's evolution? Might Lancia's early activities suggest pathways to later dramatic breakthroughs?

One might then ask the following questions:

- Is there a relationship between the early work and the Lambda breakthroughs and later cars?
- Does this early history matter, even now, one hundred years later?
- Explaining the Lancia ethos to a broader audience has always been difficult. Can this early work help to explain quintessential Lancia qualities?

Starting Point

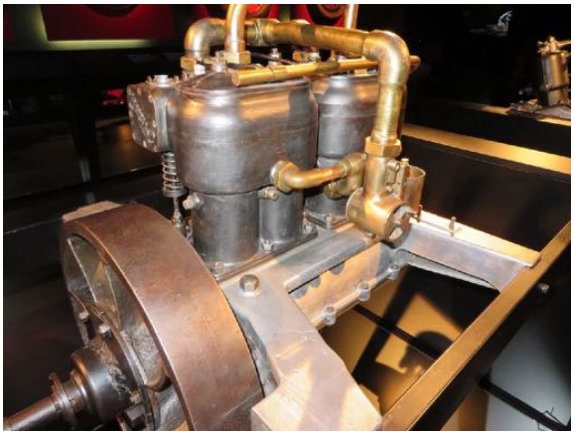
Basic identification of the early cars is less than easy. While they were assigned model names c. 1920 to facilitate identification, in the first 10 years of Lancia cars, the product was available with different bodies. For example, the US concessionaire in 1915 showed 13 different bodies for the Theta, so just looking at bodies is not sufficient to identify the different models.

Original factory literature named the cars with their horsepower, such as 15, 20, or 35hp cars, a method more commonly used in Europe. Yet this presents difficulties, as the horsepower used was the taxable rating, different for each country, and a car could be a 15hp in one

country and 20hp in another. Another possibility is to use basic dimensions to distinguish the cars, but Lancia complicated this by introducing a choice of different wheelbases for their cars, starting with the Gamma. So similar dimensions were used across several models.

The best way to distinguish the early cars is by their engines, as displacement often varied with each model. Almost all used four-cylinder in-line side-valve engines, with a single camshaft in the crankcase close to the crankshaft, with its three main bearings. Intake was with a single carburetor, typically on the right side, as the air crossed the block internally and went up to the valves on the left side along with the exhaust. This basic layout was used in the cars through 1921, with only minor changes in detail.

The 2.5-liter Alpha (1907) was Lancia's first car, with an engine made of two bi-blocks in cast iron, mounted on an aluminum crankcase. It was soon replaced by a cast-iron monoblock as standard, first in the 3.1-liter Beta (1909) and the 3.5-liter Gamma (1910). This was followed by the "midsize" 4.0-liter engines (really 4.1-liter, or 4084cc) used for the Delta, Epsilon, and Eta (1911–1914). The next major revision was a new 5.0-liter engine (really 4.9-liter, or 4942cc) for the Theta (1913) of basically the same design, followed by a same-sized Kappa engine (1919), now with removable head, and shortly thereafter the Dikappa engine (1921), which featured overhead valves. Real changes arrived just a year later with the introduction of a 4.6-liter (4595cc) V8 engine for the Trikappa and the 2.1-liter (2120cc) V4 engine for the Lambda, both as Lancia's first narrow-angle V engines put into production.



The four-cylinder in-line engine of the Alpha with a displacement of 2.5 liters and two cast-iron sub-blocks, mounted on an aluminum crankcase.

The four-cylinder engine was further developed for the Beta; it now has a monoblock. (Pictures by Andrew Torti)

Crankcases were all similar—complicated aluminum castings with a central cavity for the crankshaft, and an overall "X" shape (in plan) with cast legs extended for mounting to the chassis frame rails at four corner locations. The transmission mounted behind the motor, and was also housed in an aluminum box casting with a removable top cover, again, with integral legs to the chassis cast in.

Production numbers for the in-line four-cylinder engines were modest at the beginning, increasing over time:

- 263 2.5- and 3.1-liter engines in the Alpha and Beta[1]
- 258 3.5-liter engines in the Gammas
- 1,145 4.0-liter engines in the Delta, Epsilon, and Eta
- 3,635 5.0-liter engines in the Theta, Kappa, and Dikappa, with 1,696 for the Theta, 1,809 for the Kappa, and about 130 for the Dikappa[2]

1 This includes 5 Corsas, but not the 23 six-cylinder DiAlphas (1908).

In total, then, Lancia made over 5,300 four-cylinder car engines, with production ramping up over time.[3] The 5.0-liter engine from the Theta, and its successor in the Kappa, was used in their commercial vehicles. Truck production reportedly began around 1912, with an Eta chassis converted to a flatbed; the more-official truck production started in 1913 with the Theta-type motor, although with different castings, as no starter or other electrics were fitted. Several different truck versions followed, varying largely in chassis dimensions and details. The Jota was followed by the Dijota and Triota, and then, following a change to the Kappa-type 5.0-liter engine, the Tetraiota and Pentaiota remained in production through the 1920s and early 1930s. Lancia's last four-cylinder side-valve truck engine was newly designed for the Ro-Mb in 1936.[4]

Separation and Identity

What trends or characteristics can be gleaned from the first 15 years of Lancia production? The early 1900s were quite busy in the automotive industry, and this was true especially in northern Italy, where a myriad of small companies were each vying to convince the buying public that their version of the automobile was a better product than their competitors'. Lancia was competing in the higher end, along with several other high-quality manufacturers. In Italy, they were in the same league as Bianchi, Diatto, Isotta Fraschini, SPA, and FIAT. From elsewhere in Europe, Hispano-Suiza and Bugatti remain known even now.

How did Lancia separate their products from others, and avoid competing head-on with FIAT? What steps did Vincenzo take to develop his own product identity? Suggested here is the idea that the early Lancia cars were distinguished not by any one particular attribute, but rather by a number of different qualities or characteristics. Lancia products were not unique in most of these distinctions; what separated them was the combination of approaches, which gave Lancia a particular and unique place among other auto manufacturers, as summarized below.

1. Engine development and production

Lancia standardized a single engine approach, and largely stayed with one design for the first 15 years of the company's production. Its character was recognized as early as 1908 by the English magazine, *The Autocar*:

> *. . . they are, in fact, the antithesis of a racing machine, having been designed and constructed to give a maximum of quietness and flexibility. They belong, in a word, to that class of vehicle which is appreciated by the more refined motorist who values the qualities of quiet, smooth running. . .*

With Lancia focusing on careful improvements, this was a conservative approach, reinforcing development over innovation. There was an early commitment of the company to products that worked, as opposed to the introduction of new and untested ideas.

A side benefit to this was that with their work on engine development, they became more interested in increasing production of parts in-house, which eventually included casting many of their own products. Their casting capabilities, greatly increased with new, more-formalized workshops c. 1917, allowed them to make changes and refine engines rapidly and in small production runs. Their interest in casting production extended beyond engines, as they also made firewalls and detailed trim panels around the engine bay.

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2 Some sources mention as many as 803 Dikappas were made (1921).

3 Only 30 Zetas are included; sources mention between 30 and 91 may have been made.

4 The Ro-Mb has the same basic architecture as all of the earlier engines, but internally, its dimensions are quite different, as the camshaft is relocated in the block.

Molds at factory

Vincenzo at Targa Florio

The trimming of the engine bay with more elegant and permanent surroundings had other consequences: The fixed size of the aluminum trim plates effectively required the frame and body manufacture to be "made to a fixed dimension." This became a requirement of Lancia production, with roots in their very early products. Their imposition of dimensional control was more befitting a large operation than that of smaller companies. More control meant better definition, both leading to increased refinement.

2. Chassis design

From their beginnings, Lancia's chassis were well built. They relied on lightweight C sections for most of the chassis, a well-regarded and relatively conventional answer, improved by their own forged end pieces for additional strength. The chassis rails were typically curved, bent, and reshaped for compactness around the engine. While not significantly different from other high-end products from Italy at the time, it has been noted that all the mounting points were precisely located and drilled, and everything was fitted to an exact dimension, a sign of Lancia's interest in precise fabrication. Again, from *The Autocar* in 1908:

> *. . . the lines of the chassis, which [show] character and distinction . . . [feature a] special and unusual design . . . formed and splayed . . . [with] exceptional strength and stiffness, while keeping the frame itself narrow . . . [The] flanges are widened to afford the [strongest] sections at the points of greatest stresses.*

Notable was the front axle design of the Lancia car, a lightweight C section with forged ends riveted on, providing additional strength and weight only where needed. This design was highly regarded at the time as quite unique and thoughtfully designed. It was significantly stiffened when the engine and gearbox were bolted in, in part due to their integrally cast mountings.

3. Standardizing variation

Small production numbers with much variation were common in the early years of auto manufacturing. It was not until the 1920s that focus on standardized production became more widespread. However, from a very early date, Lancia developed their own particular approach to production and variation. Beginning with the 1909 Beta and the 1910 Gamma, cars were offered with first four, then five different chassis configurations, with wheelbase lengths available as 2740mm, 2932mm, and 3227mm, and two different angles for the steering column. Choice was now standardized between comfort and more-sporty arrangements. Shortly thereafter, in the Theta of 1913, the steering column angle was adjustable.

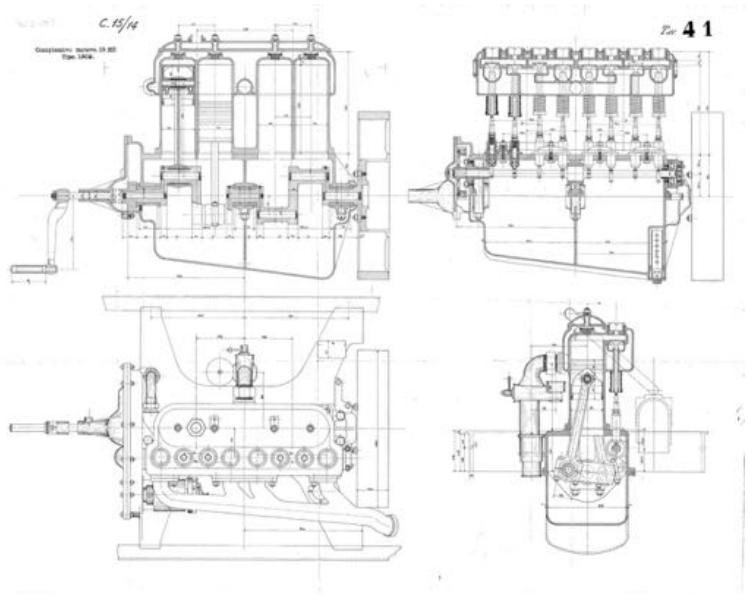
Lancia offered these changes as complete products. Each variant was provided with its own torque arm made in three lengths as needed for each different chassis. So, too, rear spring arrangements were modified depending on which chassis was provided, Lancia having thought through the requirements of each length.

4. Documentation

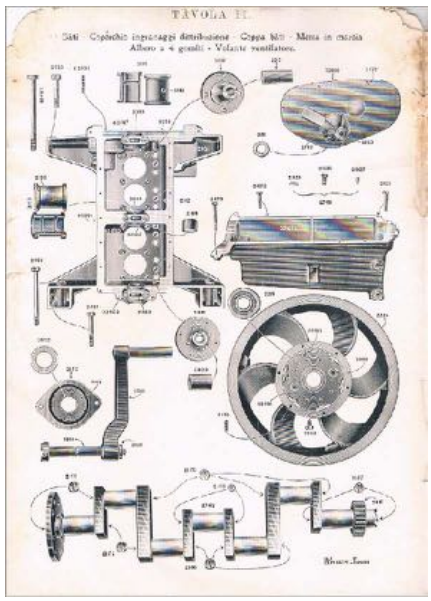
Starting with the 1910 Gamma, Lancia provided a small but complete parts book, which was not commonplace at that time. The book offered information on all the parts of the car, including telex identification so that the owner could order replacement parts directly. This provision of organized information on all the parts in the car was noted by *The Autocar* in April 1910:

> *The owner of a Lancia car is particularly blessed . . . representations of every single part, from the smallest screw upwards, are given, numbered and indexed, with price and code. . . . **We have never seen anything of the kind more compelling or more satisfactorily done** [emphasis added].*

The Gamma parts book was followed by books for the Eta, Zeta, and the Theta, including yet more detail. Over time, Lancia's parts books became widely appreciated for both their clarity and detail, as they accurately identified all of the variations for each model.



Cross-section of the 1909 Lancia Beta engine



Excerpt from the spare parts book for the Lancia Gamma, 1910.

5. International exposure

Lancia's approach to marketing outside of Italy was unusual, as Vincenzo embraced foreign markets from the very earliest days of his company. Working in the shadows of the larger FIAT organization nearby, he realized the market for his product in Italy was limited, and he would need to reach outside of the country for customers. This realization came about from the beginning, as evidenced by the first-ever road test of a Lancia done in England in the fall of 1907, practically as production started.

Vincenzo was personally familiar with the larger world stage from his travels in his earlier racing career. He had visited the United States several times, racing in the Vanderbilt Cup in 1905 and 1906. US sales of Lancia cars began as early as 1908, with five cars and a chassis shown in Boston in 1909, a remarkable commitment just two years after Lancia started making cars.

6. Adaptable production

Lancia began with their production much like many of the other small manufacturers, of which there were many in Turin. But unlike some of the others, the company quickly began to evolve into a more complex and fruitful model, using both artisanal practices and industrial models of production (like nearby FIAT). Lancia began to develop their own solutions to take

the best of both worlds, operating "in-between", in some cases making small changes very quickly, while in other cases, they used production standards from mass industry as their criteria.

Small variations were an early strength of the Lancia company. Even while the basic design of their cars remained largely the same, continuous changes were made in details. One example could be seen in their engines, with three different block castings used in just the three years from 1909 to 1911. Their early truck motors were based on the car engines, but were revised with different castings, now without mountings for starters. And later truck engines had taller detachable heads to provide more cooling for their heavier loads. Each problem got its own appropriate and well-made solution.

Such changes were possible because their manufacturing plant was vertically organized, optimized for small production runs. Changes could be made quickly, providing small niche solutions in response to client desires and fixing problems as they arose. While in later years their ability to make variations was to prove troublesome, in these early years their flexibility was noteworthy. J. Lucas, writing at length for the American Machinist in 1928, described Lancia's production as industrial craftsmanship, quite different from the mass production of Ford or Fiat.[5]

Lancia also explored making more than just cars. Their trucks have been mentioned above, with production starting in 1913. They also made stationary engines, some of which were used for tramway hoists, and even ventured into design of aviation engines during World War I.

Another example of their flexible approach to production can be seen in the SGV, an American-bodied car on a Lancia chassis. Made from 1910-1915 in Reading Pennsylvania in the former Acme plant, SGV was a small company run by people from New York, who had previously been importing Fiats and Lancias. The SGV collaboration is noteworthy also because it happens very early, just three years after Lancia started production. The Lancia engines used in the SGV had small detail differences, with simpler carburetor and exhaust mountings for the American market. These changes required different block castings, evidence of Lancia's willingness to make adjustments. One further twist: most all SGVs with Lancia motors were RHD, but a LHD version was introduced in 1913. This car's engine was mirror-reversed (not merely rotated), suggesting the factory was willing to accommodate more complex requests.[6]

7. Niche marketing

Early on, Vincenzo showed an ability to find niches in the market and to respond to those needs. He was not unique in this—other small manufacturers were also nimble—but he was able to combine flexibility with big-league standards of refinement and development while also offering variations. He did this by changing details as needed for remote markets, including wheels and tires, and revised front axles for the "Russian Market," with greater ground clearance for their difficult road conditions.

Vincenzo had an early interest in remote sales, selling in both England and the United States within a year of their first cars being made, demonstrating that they had a vision beyond Italy. Cars were exported to Russia, Australia, and, at one point, extensively to South America. In addition, Vincenzo had an entrepreneurial instinct. In 1917, the American importer announced plans for a plant in the United States to make Lancia aero engines, although this did not come

5 Lucas wrote 23 lengthy articles on Lancia, published in *American Machinist* in 1928–1929. They have been reprinted by the author as *Lancia Machining*

6 A left-hand drive Theta engine has been seen in photos. Period documentation on SGV engines was quite vague but noted that its main parts were made by Lancia; the blocks appear to be Lancia castings.

to pass. Remote manufacture was to remain an interest, with the debacle of the 1920s Dilambda to come a decade later, along with their successful assembly plant of the 1930s at Bonneuil sur Marne in France.

Vincenzo's eye toward expansion was noted in a factory article on how the company survived these early years, while two other manufacturing concerns, founded by Nazzaro and Storero, notable FIAT racers and colleagues of Vincenzo, did not:

> *Lancia did it. It was obviously not luck or chance: Lancia had a different* "*balance*," *already breathed in from the family, an intelligence that enabled him to propose and successfully create new and original solutions, then copied all over the world. He had an entrepreneurial and managerial disposition naturally inherited from his industrial father, which his other colleagues had to invent on the spot instead. He was accustomed, as a boy, to a broader vision of problems, not to stop at mere mechanical data, to take nothing for granted, to think big while remaining anchored to reality: all qualities that only his father Giuseppe, who still at ninety years of age churned out inventions, could have transmitted.*[7]

Ed. note: To be continued.

7 Thanks to Donatella Biffignandi, former curator at MAUTO, for this quote.

Emerging Traditions
Learning from the Early Lancias – Part 2

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Early Research and Development

In these early years, it is possible to see Lancia's research and development evolving along two different pathways. One, which could be called the conservative way, was that of steady development. It is evident in the sequence of engines carefully built and improved upon earlier versions. The development of the in-line four-cylinder motor, in continuous use by Lancia from 1907 through 1936, reflects this approach. Yet there was also another path that operated in parallel to this and was more restless and engaging in a broader search for new answers. These two pathways together became part of Lancia's DNA and can be seen in their products even fifty years later. They help to explain how the conservatism of the Flaminia could exist at the same time as the innovations of the Flavia and Fulvia. Their more-exploratory approach can be understood with Lancia's interest in several key issues.

1. Performance

Similar to other companies in their early years, Lancia consistently looked for more performance from their engines. Even while focused on solid construction and attention to detail, their motors typically were higher-revving than those of their competitors. At the time of the Alpha in 1907, a four-cylinder motor typically had a limit of around 1,200 rpm, while Lancia was working with 1,400 rpm.

Although details are scarce, Lancia made a few competition cars in the early years. The earliest example was the Alpha Corsa, reportedly with a few examples made. A rare early competition Beta was called the *Lambo* in America, and had a lightened chassis, lightweight cloth fenders, and other enhancements. It is likely they made other changes on Lancias used in European competition, which were running as late as 1910 (winning races in both Europe and the United States). This area is still in need of further study.

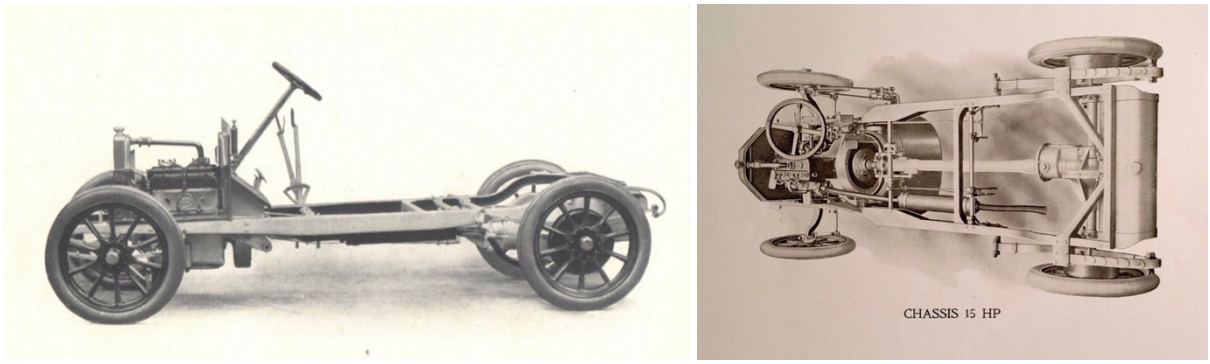
Lancia considered new approaches to their engines for performance, although this quest was largely limited to designs on paper and were rarely executed. In 1908, drawings were created for an Alpha Corsa engine with overhead valves activated with rockers, and long pushrods from the low camshaft. In 1910, Lancia completed a design showing a two-headed side valve which would allow more intake air. While valve sealing was likely problematic, it showed that Lancia understood more air made for more power. In 1913, yet another prototype was drawn up (called the 50hp) with an overhead camshaft driven by an external shaft from the front of the motor and twin spark plugs for each cylinder. While drawings were developed, there is no evidence any of these engines were ever made.

2. Lightness

The Lambda is known not just for its V4 motor, but also for its unit body, a dramatic and lightweight improvement on the traditional "body on chassis" solutions. However, Lancia's interest in lighter cars had deep roots.

The original four-cylinder Alpha was a small and light car for its time, with period marketing material highlighting its engine weight of 342 pounds and chassis weight of 1,700 pounds. Over the next eight years, the cars got bigger and heavier. While we have no information on Vincenzo's thoughts about this, his actions are revealing. In 1910 work began on a smaller, lighter car, called a *voiturette*, different from the larger cars the company was making. Finished in late 1911 and early 1912 (with a 1912 road test in *The Autocar*), it was called the Zeta, and was quite a radical proposition.

The Zeta's overall engine design of 2.6 liters was smaller than the other current Lancia motors, and it had several unique details for simplicity. The forward-mounted fan was driven by a water-powered impeller; its crankshaft had only two main bearings with double ball bearings located at each end, none in the middle; and its sump was cast integrally with the crankcase, a complex single casting with fewer joints.[1] Even more radical was its transmission, rear-mounted and integral with the differential as an early transaxle. Its internals were heavily rethought, with two lay shafts and two crown rings and pinions, and a unique gear arrangement to minimize its size.[2] First and second gear used one ring and pinion, third and fourth, another. Shifting gears was done by moving two tubes that were overlapping around the driveshaft. Only a few were made, between 30 and 80 (the numbers are unclear), with one even shown in America.[3] The Zeta can be understood as a sign of Vincenzo's own frustration with the growing weight and size of his cars.



The unsuccessful but innovative Zeta chassis

While unsuccessful, the Zeta was Lancia's early notion of a light car and can be seen as a harbinger of the Lambda, which followed a decade later. Vincenzo's continued interest in lightweight cars was to resurface some years later with work on the Lambda's unit body begun only three years after Zeta production appears to have stopped in 1915.

3. New sectors, new answers

By 1913, in addition to the Zeta, Lancia committed to yet another larger engine, a 5.0-liter for

[1] With the sump and crankcase as one complex casting, the crankshaft was installed from the rear with an end closing plate. This construction also mandated a special sequence for installing pistons and connecting rods.

[2] Early reports in Autocar incorrectly outlined the operations of the gearbox. Lorenzo Morello's more-careful analysis of the drawings has yielded correct diagrams, to be found in Lancia: A History of Technological Innovation. [AU: OK, or provide add'l publishing info here for this source?]

[3] The Zeta was mistakenly omitted in factory documentation prepared in the early 1960s and largely forgotten, until recovered by Nigel Trow in his book, The Shield and Flag. No examples have survived, although one motor and driveshaft have been found.

the Theta, which was marketed as a complete chassis with full electrical system and starter. It was soon exported to the United States and other markets. In addition, the larger engine anchored Lancia's move into the commercial sector, as the company began to make trucks as well as their cars.

Just a year later, Lancia pursued making engines for airplanes. While none of their designs made it into serious production during the war, they worked on three different aero engines (as best we know) from 1914 to 1918, each with different V angles. This work sponsored significant research and design energy and introduced new engine configurations to a company previously committed to a single engine type.

Work began in late 1914 on a 15.0-liter V8, the previously unknown *tipo 3*, known from drawings that were recently found.[4] Its water-cooled cast-iron cylinders were bolted onto a large aluminum crankcase. Its valves were paired on top of the cylinder on the inside, horizontal to the bore axis, activated with long rocker arms running on a single cam located just above the crankshaft. The valve arrangement was patented in 1914 and owed its design to the racing 1914 Delage.[5]

Lancia's next aviation engine was the *tipo 4*, which had basically the same configuration as the earlier motor, but was now a 25.0-liter (24,715cc) V12. Worked on from 1915–1917, its V angle was now reduced to 50 degrees, and was noted on the drawings as having 358hp at 1,470 rpm. Its crankshaft was laid out with offset crankpins adjusted to the angles. This engine appears to have been fitted to a CEMSA Caproni prototype and was surprisingly tested at length in the United States in 1918.

The last aero engine designed was the yet larger *tipo 5*, a 38.0-liter (38,170cc) V12 from 1918. It kept the same general configuration, valve layout, and 180mm stroke as both earlier engines, but its bore was increased to 150mm from 120mm. Power was listed at 600hp, known only from internal testing results. More interestingly, its V angle was 53 degrees, with its crankpins at 120 degrees, now without offsets, which resulted in a lumpy sound (as reported by Falchetto in his diaries). Lancia struggled with crankshaft strength in their V12s, and this engine featured a "fork and blade solution," as the big end of one rod fits in between the split big end of the opposite cylinder. This solution was unique for Lancia, and likely was adopted from the Hispano-Suiza V8 aero engine, which was very successful and made under license in Turin by Itala and Ceirano.

Overall, Lancia missed out on the aero market: By the end of World War I, the Allies had used 50,000 Hispano-Suiza engines, 5,000 Rolls-Royce engines, and 20,000 Liberty V12 engines. Fiat was also involved, and made some 14,000 engines, mostly straight sixes.[6] While Lancia's aviation engines did not make it into production, the design energy invested in these engines enabled Lancia to rethink engine layouts, and in 1918, they brought this new thinking to their cars.

4. Research

Lancia had always pursued technical innovation, patenting numerous solutions that they included in their cars, such as their lightweight front axle, a specialized oil pump for pressurized delivery varying by engine speed, and carburetors of their own design. The scope of their studies expanded around the time of the Zeta to include transaxles, CV joints, and

[4] Thanks to Centro Storico Fiat for this information.

[5] W. F. Bradley noted in The Automobile, in January 1916, that the combustion chamber of the Lancia V12 was based on the well-known Delage competition engines, which won at Indianapolis in 1914.

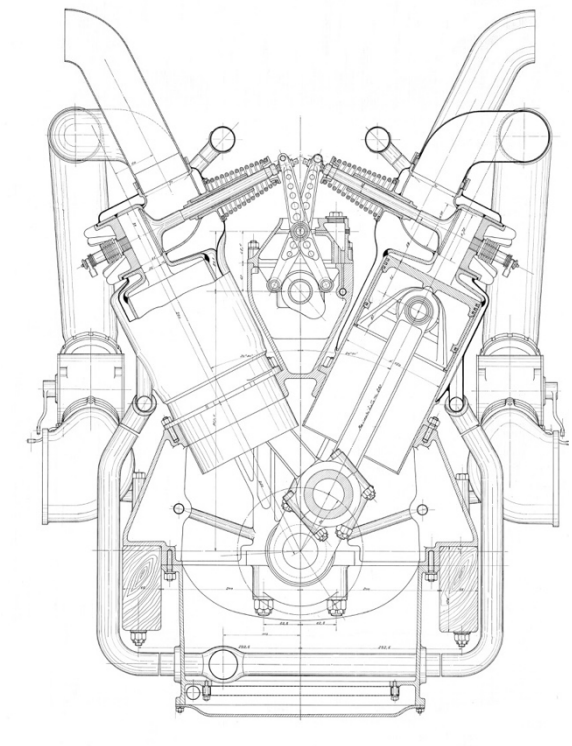
[6] From *L'industria automobilistica e le origini del motore aeronautico in Italia,* by Federico Filippi, ATA, November 1986. Thanks to Sebastien Faures for this information.

new clutch designs. While not alone in such explorations in the early years of the automobile, Lancia's research was at a high level, operating on several fronts.

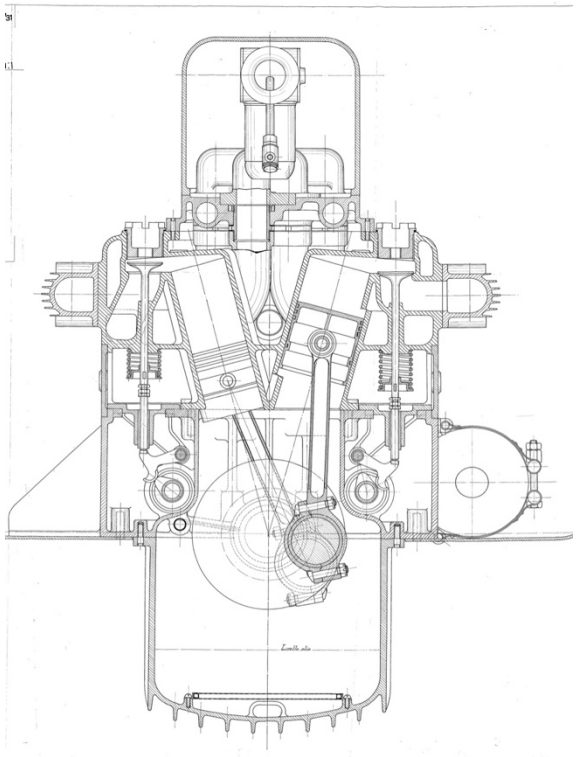
Work on the aero engines spawned further research into the fundamentals of engine design. The first indications of this new direction were the 1914 patents on combustion chamber design and valve actuation, but these were largely derivative and their uniqueness questionable. However, the V configurations started them thinking about crankshaft layout and the relationship of crankpins to engine timing. Their first patent on crankshafts was in 1915, followed by additional work in 1917 and then again in 1919, as the different V angles led them to understand that bore angles could be separated from crankpin location, and allow for an offset (or decentered) crankshaft, such as in the 1919 V12 and subsequent narrow V engines.[7] The work was not limited to crankshafts; they also patented unit body, suspension mountings, and new head designs in 1919. Lancia's depth of engineering was that of a major manufacturer, not a medium-sized one.

New Products

As World War I wound down, Vincenzo turned his attention back to cars. At first his interest was in a new design for a large-scale luxury car. Taking advantage of earlier research on V engines, work began in 1918 on the "50hp" (not to be confused with the earlier 50hp of 1913), a 30-degree V12 of 6.5 liters displacement (6456cc, 80 x 107mm), making a reported 120hp at 3,000 rpm. Known only through drawings, each of the engine's two banks had six cylinders, complete with their own side valves and camshafts. The layout is a thoughtful modification of their traditional four-cylinder in-line engine. It can be understood as here being stretched to six cylinders, then mirrored with each side pivoted 15 degrees off center to make this V12, with its rather indirect intake flow and complex block casting.



***Tipo 5** : 38l 53° V12 (1918)*



50 HP 30° V12 design with side valves (1918)

[7] The 1919 V12 is the first engine to have the crankshaft offset, with its centerline located unconventionally above the apex of the cylinder bore angle. This was meant to lessen the overall height of the engine, and was done for all of Lancia's subsequent narrow V engines.

The complexity of this solution was quickly replaced in 1919 by a new and totally different approach, which, in one set of moves, resolved many of the issues that had been troublesome in all the earlier V engines. The design was for a narrow-angle V12 with the cylinders only 14 degrees apart, cast into one block. Its valves and camshaft were all overhead, making for a more-direct airflow and a simpler construction.

The importance of this V12 engine cannot be overstated. Its narrow V solution was the beginning of a line of thought continued by Lancia for the next half-century. One breakthrough was that its V angle was determined not by some theoretical agenda, but rather by an assessment of the complete package, considering the engine as a whole. Vincenzo was interested in reducing the overall size by compressing the engine's length and width, achieved by placing its cylinders closely to one another with the narrow V design. In so doing, Lancia also rethought its intake and exhaust distribution: Using a single head, the gases were centrally distributed and accessed neatly at the rear of the engine. It was an approach used on the Lambda just a few years hence.

The chassis for this larger car was initially proposed using the earlier 30-degree engine but was ultimately shown only with the later narrow V12. At the time, it was considered as interesting as the engine, with a unique rear suspension that combined a lower cantilevered spring with a semi-elliptic spring above. The semi-elliptic was special, being only one leaf, its width reducing from 4 inches to 2.8 inches, and with special shackle mounts to simplify replacement. The upper and lower springs were connected by a steel cable that would operate differently with a minimal load than when it was fully loaded, as described in *Automobile Magazine*: "*This car was as easy riding with a driver and only one passenger at the rear as with its full load of nine."*

The narrow V12 engine and chassis were shown in Paris and London in 1919, and although the engine is extant in Turin, detailed information remains scarce. Period reports of its displacement varied, from 6.0 to 7.2 liters, depending on which stroke was used (several were reported, and it's possible different versions were considered). Regardless of how interesting this engine and chassis were, the market for large luxury cars collapsed following the war. Vincenzo remained interested in this solution as late as 1921, but soon delivered a very different answer.

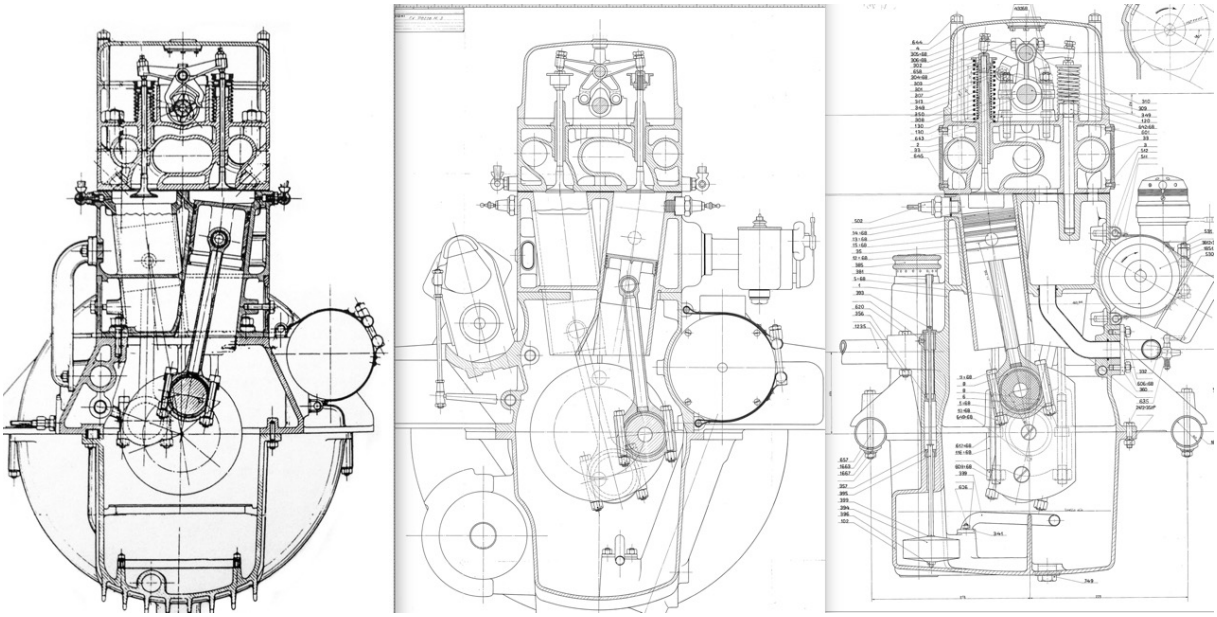
Trikappa and Lambda (1922)

In 1922, Lancia introduced two new engines, the first being the 4.6-liter V8 for the Trikappa. Its design was similar to the earlier V12, but with its carburetor on the side, the intake air ran through the block, similar to the earlier four-cylinder cars. Underappreciated today, in its day the Trikappa was a fast and quiet grand tourer of 98hp, capable of 80 mph.

Featured later that year they introduced their second new engine in a new car, the Lambda, one of Lancia's most significant breakthrough products. Its features are well known, with its narrow V4 engine, a unit body of pressed steel, and independent front suspension. Smaller and lighter than their previous cars, the lightweight Lambda can be considered as a total rethink in the vein of the earlier 1912 Zeta, here fully resolved. It is worth noting that each of its inventions had partial roots in earlier work:

- The V engine is derived from the 1919 narrow V12. Lancia began working on V engines in 1914, and the 1919 engine is the culmination of ideas developed in four earlier V engines, (three aero, one car), each with different angles.
- Suspension design had long been of interest at Lancia. While Falchetto's suspension studies for the Lambda were unique, the unusual rear suspension of the 1919 V12 chassis was initially shown in a 1917 patent.

- The unit body used in the Lambda was developed by late 1918 and submitted for patent in December. A prototype was running shortly thereafter: Thomas Adams, Lancia's US importer, returned to the United States from Italy on February 7, 1919. While in Italy (thus, during January or earlier), he drove "an amazing light four-cylinder model capable of doing 70 miles an hour on the road, its outstanding characteristic being the entire absence of a frame—the body being constructed in such a way to serve that purpose. The design saves about a thousand pounds in weight."[8]



The legacy: Narrow (14°) V12 from 1919, Trikappa V8, and Lambda V4 from 1922

People

Understanding the cars and their development includes some awareness of the people involved. As the work was done more than 100 years ago, it is difficult to know all the players and their roles. Vincenzo was clearly a strong and involved leader, with a big personality. His successful career as a racing driver was remarkable. At the time he was known as a daredevil, a hard driver who went flat out all the time. Vincenzo was well regarded for his passion, and from his father had gained a deep understanding of commerce and running a business, unlike many others who started manufacturing automobiles at the same time. As his inner thoughts are no longer available to us, one tries to get a sense of him and his company from those who were close to him.

Vincenzo surrounded himself with a good team of engineers and designers, many of whom he knew from his Fiat racing days. It's difficult to find details on people from this period, but key staff included Zepegno, who served as technical director until 1925; Rocco, who worked on the Lambda engine beginning in 1906; and Cantarini, who joined Lancia in 1913. The latter two left in 1924. Frassati is known only from his drawings from 1915 through 1924. They were all joined by Falchetto in 1920, who stayed until 1943, and later returned in 1953.

From the beginning, Vincenzo had a close relationship with Claudio Fogolin, a fellow Fiat racing driver, who was nine years his senior. In 1904, the well-regarded Fogolin was racing in the United States, and then became a partner with Vincenzo in setting up the factory in 1906, where he reportedly served as the commercial director of the company. Credited with the design of a Lancia carburetor as late as 1915, he left the company in 1918. While the

[8] *Automobile Topics,* Vol. LIII, no. 2 (February 15, 1919), p. 184.

relationship had its issues, it's worth noting that Fogolin was called upon to write the early history of Lancia in the family booklet memorializing Vincenzo Lancia in 1938.

Family was important: Vincenzo's brother Giovanni worked in the administration of the company. He also kept meticulous diaries, which are remarkably thoughtful and passionate. In 1922, there were three separate and very interesting entries: One from July outlined his withdrawal from the factory that month; a second entry from October described his accompanying Vincenzo to pick up his wife Adele en route to a private wedding ceremony (clearly, Giovanni was still close with his brother). Later that year Giovanni penned another, more-philosophical entry: *The past century has not kept promises made in its beginning to intellectual progress, and if our century has seen the sciences, arts and culture in general fall even further . . . everything has been reduced to money . . .*

Lancia family, c. 1917. Top row from left Giovanni and Vincenzo Lancia, sons of Giuseppe; on the far-right Arturo, cousin of Vincenzo, in uniform. On the bottom row from left is Maria, Giuseppe's daughter and Vincenzo's sister; patriarch Giuseppe Lancia; and Anna-Maria, his wife. (Lancia Family Archive)

Another family member was Arturo Lancia, a distant cousin of Vincenzo's. Born in 1889, he was sent to America by the family in 1912 to work at Duryea and learn about automobile production. Returning to Italy, he served in the Italian military during World War I and then continued working in the auto industry. While not active in the early years of the Lancia company, he set up Lancia's French plant in the 1930s. After Vincenzo died in 1937, Arturo returned to Turin and ran the company with Adele, Vincenzo's widow.

These relationships suggest that Vincenzo surrounded himself with a range of diverse personalities with likely different perspectives: Fogolin brought the racer's passion; Giovanni was concerned with the overall purpose of the company; and Arturo represented an interest in production. There was also the team of talented engineers to consider, described in Falchetto's own recollections from his early years at the company.

Not all of these personalities were present at the same time, but they suggest a working environment that provided a rich context of differing ideas. One gets the impression that Vincenzo was an orchestrator, a conductor of varied personalities, managing different agendas. Closely involved in the business, he had expansive notions for marketing and placing his products. Wisely not competing with Fiat or selling only in Italy, he established a unique path for his company. Interested in the technical aspects of design and production, the products were both thoughtfully conceived and executed.

Conclusion

Seen in broader terms, Lancia's history is delightfully one of continued reinvention. Several seemingly opposing goals were pursued, with a quest for lightness and ruggedness, an interest in both the innovative and the conservative. Committed to the rationale of volume production and the benefits of short production runs, Lancia maintained the flexibility of a small plant alongside the developmental rigor of a much larger company. While some of these dissimilar tendencies were not fully reconciled in the first fifteen years, they were developed and expanded upon over the decades to come. And in some cases, these contra-tendencies didn't go away: In the 1960s, one could purchase a Fulvia HF coupe or a Flaminia sedan—two very different products, and a clear sign that differing agendas were extant in the company.

While the breakthroughs of the Lambda did not come directly from the earlier work, they were an outgrowth of a culture of investigation. Lancia was clearly a place where ideas were accepted as worthy of exploration. In short, the Lambda did not come from nothing, but rather emerged as the culmination of many years of research that ultimately provided Lancia with the confidence to develop a product as unique as the Lambda.

One benefit of conflicting and complicated goals is that no single set of answers will suffice; continued rethinking is built right into the culture. Today, this is recognized as a trademark of a "vital organization," one that constantly reconsiders and adapts. Lancia established these overall trends in their early years, unlike other manufacturers of the time. Vincenzo embraced investigation as permissible, even desirable, with new answers discovered not just in the initial period, but in the breakthroughs of the 1920s, the rich variations of the 1930s, the rebirth in the 1950s, and all the way through the 1970s.

This may be what separated Vincenzo, the person, and Lancia, the company and its cars, from others: It was not just a single breakthrough, or even a few; rather, it was the constant renewal, the pursuit of something more, the steady reinvention. Setting up such a vibrant organization may have been Vincenzo's most powerful work.