

**ENGINE TUNING 2JZ-GE. THE CHEAPEST THOUSAND HORSEPOWER**

*У статті розглядається процес тюнінгу та механізації атмосферного двигуна Toyota 2JZ-GE. Цей двигун є найдешевим способом створення автомобіля потужністю 1000 кінських сил для студентських проєктів. Описано основні технічні кроки конверсії NA-T, заміну внутрішніх деталей, модернізацію паливної системи та встановлення нового блоку керування (ECU).*

**Ключові слова:** 2JZ-GE, тюнінг, 1000 кінських сил, турбонаддув, NA-T конверсія.

*The article discusses the tuning and mechanization process of the naturally aspirated Toyota 2JZ-GE engine. This engine is the cheapest way to build a 1000 horsepower car for student projects. The main technical steps of the NA-T conversion, replacement of internal parts, fuel system upgrade, and installation of a new Engine Control Unit (ECU) are described.*

**Keywords:** 2JZ-GE, tuning, 1000 horsepower, turbocharger, mechanization, NA-T conversion.

The Toyota 2JZ-GTE is one of the most iconic and beloved engines ever produced. Renowned for its exceptional strength and ability to make BIG power, the 3000cc straight-six 2JZ-GTE has become a favourite among racers, tuners, and street heroes across the globe. However, because of its fame, the turbo GTE version is very expensive today. For a young mechanic or a student with a limited budget, buying a GTE is impossible. Therefore, the best alternative is the naturally aspirated version, the 2JZ-GE. It is the absolute cheapest way to build a 1000 horsepower engine.

The 2JZ-GE is a 3.0-liter inline-six engine with a cast iron block and an aluminum cylinder head. From the factory, it produces about 225 horsepower. The 2JZ-GE is well-known for its stout construction, which makes it an excellent engine for high-horsepower modifications.

The cast iron block is almost identical to the expensive turbo version. It features a closed-deck design that provides massive structural strength. Because this base engine is cheap and easy to find in cars like the Lexus IS300 or GS300, it is the perfect starting point for heavy mechanical tuning.

To reach 1000 horsepower, we must perform a mechanical conversion. NA-T, for the uninitiated, simply means taking a naturally aspirated engine – in this case, our beloved 2JZ-GE – and adding a turbocharger. This is a complex engineering task. The first major mechanical problem we must fix is the compression ratio. The standard GE engine has a high compression ratio of 10.0:1. If we force highly pressurized air into a high-compression cylinder, the engine will suffer from detonation and the pistons will melt.

To solve this problem safely, mechanics must open the engine block. We need to install a thicker head gasket (usually from the GTE engine) and replace the factory cast pistons with strong forged pistons. Forged connecting rods are also necessary to handle the explosive force of 1000 horsepower. Once the internal engine components are upgraded and the compression is lowered, the block is mechanically ready for serious turbo boost.

The next step is the air system. Engine power is proportional to the amount of air and fuel that can get into the cylinders. All things being equal, larger engines flow more air and as such will produce more power. Because we cannot easily make the 3.0-liter engine larger, we use a massive single turbocharger to force more air inside. A turbocharger artificially increases the engine's breathing capacity. Volumetric efficiency is simply the percentage of actual cylinder displacement being moved through the engine. We also must install a large front-mount intercooler to cool down the hot compressed air before it enters the engine.

When we add huge amounts of air, we must add a lot of fuel to match it. The OEM 2JZGTE, 2JZGE and 1JZ fuel injectors will not support much power so upgrading to a quality set of high flow injectors is a must. The factory 250cc injectors must be removed and replaced with massive 2000cc or 2600cc racing injectors. Additionally, making 1000 horsepower requires special fuel. Mechanics tune

these engines to run on E85 ethanol fuel. Ethanol burns much cooler than regular gasoline and has a very high octane rating, which protects the engine from dangerous knocking under high pressure.

The final and most important step is computer management. The factory Engine Control Unit (ECU) is designed only for natural air pressure and cannot understand boost. We must completely remove the old computer and install a modern standalone ECU. ECU tuning involves connecting a laptop to the car and writing new software code. The tuner must perfectly program the exact fuel delivery, volumetric efficiency tables, and ignition spark timing. This is where the mechanical hardware and computer software come together to create safe, reliable power.

In conclusion, building a 1000 horsepower engine is a highly technical challenge. It is never truly "cheap," but starting with the naturally aspirated Toyota 2JZ-GE is mathematically the cheapest way to achieve this goal in the world. By taking a strong, affordable factory block and adding forged internal parts, forced induction, racing fuel systems, and standalone computer control, students and young engineers can build a world-class supercar killer on a reasonable budget.

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#### ANTI-CORRUPTION POLICY IN UKRAINE: CURRENT STATE AND PROSPECTS

*У статті досліджується сучасний стан та перспективи антикорупційної політики України, з акцентом на інституційний розвиток, міжнародні оцінки, роль громадянського суспільства та значення для європейської інтеграції.*

**Ключові слова:** *Україна, антикорупційна політика, інституції, європейська інтеграція, прозорість, громадянське суспільство.*

*The article analyzes the current state and prospects of Ukraine's anti-corruption policy, emphasizing institutional development, international evaluations, civil society engagement, and its crucial role in European integration.*

**Keywords:** *Ukraine, anti-corruption policy, institutions, European integration, transparency, civil society.*

Anti-corruption policy in Ukraine is not merely a technical framework of laws and institutions—it is a dynamic and evolving process that directly shapes the daily lives of citizens and determines the country's trajectory toward European integration. Corruption has long been regarded as one of the most serious threats to Ukraine's democratic development, eroding public trust in government, weakening the rule of law, and slowing economic growth. Since 2014, Ukraine has undertaken significant reforms, establishing a network of specialized institutions: the National Anti-Corruption Bureau of Ukraine (NABU), the Specialized Anti-Corruption Prosecutor's Office (SAPO), the National Agency on Corruption Prevention (NACP), and the High Anti-Corruption Court (HACC). These bodies were designed to function as a coordinated system, yet their independence and