

How Does an Espresso Machine Work?

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The buzz and hum of the espresso machine at the local café is a comforting sound for many coffee drinkers. But what is that buzz and hum all about? Have you ever wondered how an espresso machine actually works?

The job of an espresso machine is to control two things that are essential for turning coffee grounds into a good espresso: temperature and pressure. Brewing coffee requires water that is just the right temperature. If the water is too cool it won't extract much flavor from the beans. But if the water is too hot, the coffee will come out burnt and undrinkable. Ideally, the water should be close to the boiling point but not over, about 195°-205°F. Keeping the temperature in this range is one of the most important jobs of the espresso machine.

This is a job that is actually performed just as well by an ordinary drip coffee maker. What really sets the espresso machine apart is pressure. An espresso machine brews coffee by forcing the hot water through the coffee grounds at extremely high pressure – typically about 9 bars, which is nearly four times as much pressure as in your car tires. A drip coffee machine has to rely on gravity to pull the water through the grounds. These days, most espresso machines generate pressure with an internal motorized pump. But some machines still work with a hand-operated pump; you might see one of those on a mobile coffee cart. And the earliest machines generated pressure using steam. These are the gleaming brass giants, like steampunk rocket ships, that you still see at some cafes.

What is the point of brewing coffee this way? One reason is speed: a cup of espresso is ready in seconds, while a cup of drip coffee requires many minutes. (Nevertheless, the Italian name *espresso* means *express* as in 'press out', not 'fast'.) Another reason is that it uses fewer grounds than other methods for making coffee. This is why an espresso actually tends to have less caffeine than a cup of drip coffee. The most important reason, however, is flavor. The high pressure pushes out more of the coffee oils in the grounds, and results in a more intense version of that distinctive combination of sweetness, acidity, and bitterness that coffee lovers crave.