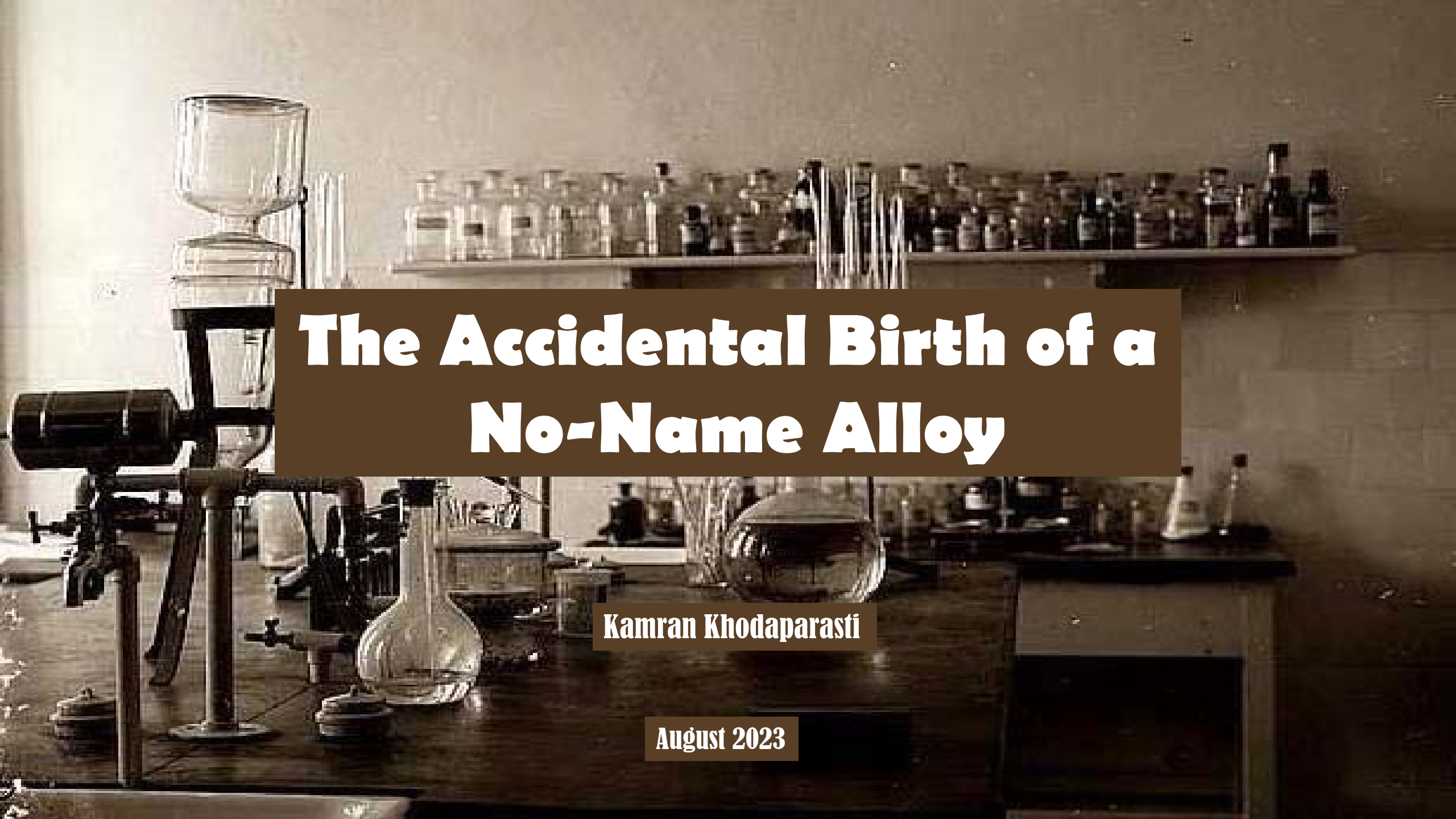

The Accidental Birth of a No-Name Alloy

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In 1906, a German research metallurgist, **Dr. Alfred Wilm**, was commissioned by the Prussian government to invent an alternative to the metal then used in cartridge cases.

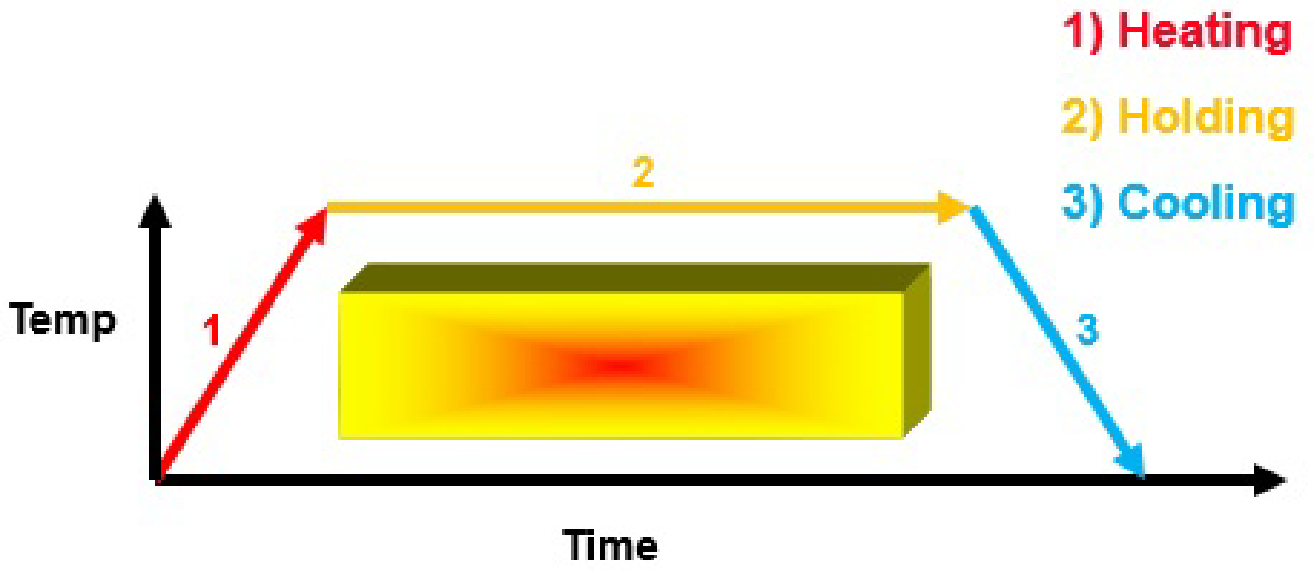
Their preference was for a type of aluminum harder and stronger than anything on the market.

(1869 -1937)

Wilm had concluded that pure aluminum was too soft for the application.

Heat treating was one of the methods being used to upgrade the hardness and strength of materials.

Wilm knew that some of the aluminum alloys were heat treatable, and he chose this route.



The story begins on a **Saturday morning** in 1906 in Dr. Wilm's laboratory.

for his experiment Dr. Wilm:

- Made an aluminum-copper-magnesium alloy that contained 4% copper and 0.5% magnesium.
- Heat treated the metal at a temperature of 520 °C (968 °F) in a salt bath furnace.
- Cooled (quenched) the metal rapidly in water down to room temperature.

While the metal was still at room temperature, he rolled it to a sheet.

Wilm gave a sample of the alloy to his assistant, Jablonski, with instructions to run it through a series of tests to determine its properties.

The time was shortly before noon, and Jablonski asked to put off testing until the **following Monday** because he had an appointment to keep.

Wilm persuaded him to do a quick hardness test before leaving.

Results were less than encouraging: Both **hardness and strength were much lower** than Wilm had hoped they would be.

On the following Monday, much to the surprise and pleasure of both men, the properties of the metal were better than expected or hoped; in fact, they now were outstanding.

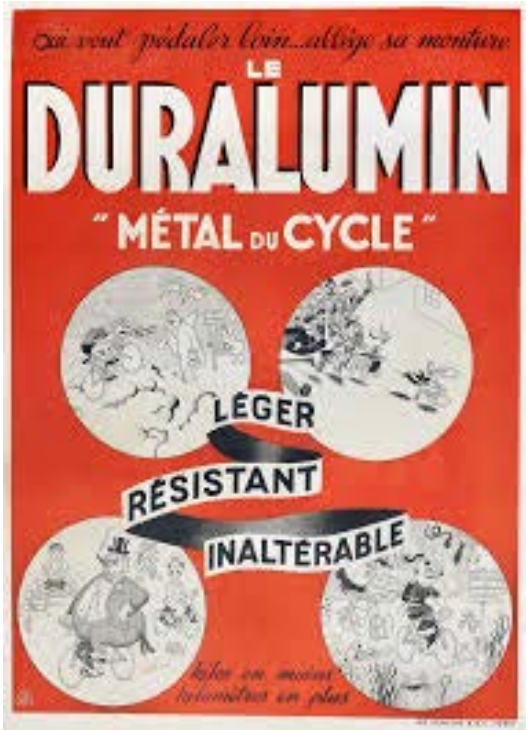
Strength, for instance, was **ten times greater on Monday than on Saturday morning!**

The discovery was accidental and Wilm was unable to explain how and why he had arrived at the result he obtained.

The science of metallurgy was in its early stages; and in this case, a scientific explanation for what had happened was unavailable.

Further, the alloy made by the new heat-treating process did not have a name, nor would it have a known use for several years.

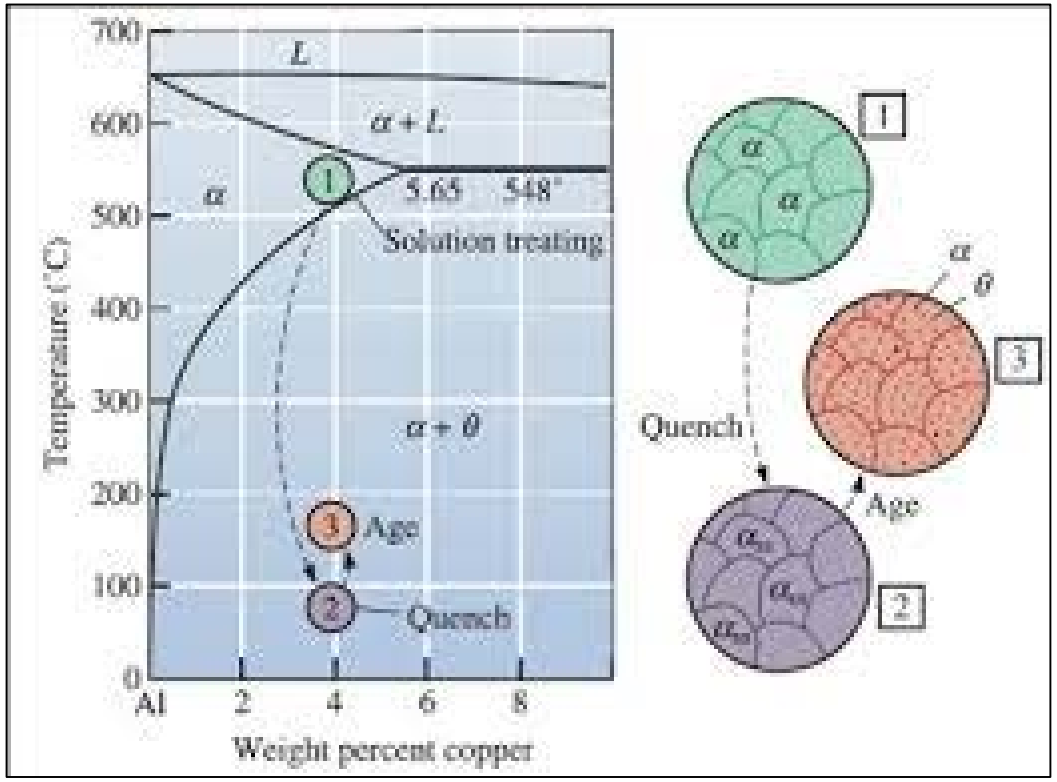
Finally, Dr. Wilm sold his patent rights in 1909, and the buyer, Dürener Metallwerke, located in the Duren district in northwest Germany, chose a name for it: **Duralumin**, which was a combination of the names **Durener** and **aluminum**.



One of the first uses for Alfred Wilm's new alloy arose in 1908, when **Count Ferdinand von Zeppelin** built an airship, the LZ4, in Germany. It had aluminum structural members and an aluminum skin.

The secret of Duralumin remained hidden for many years until a group of American metallurgists led by **Paul Dyer Merica** explain this phenomenon in 1919.

The process that Dr. Wilm accidentally invent is **age hardening**, which is also called **precipitation hardening** and is used today to increase the strength of many alloys such as: aluminum, magnesium, nickel, titanium and some stainless steels.



For years, this process have been used to make **rivets** that you must have seen on the body of airplanes.

These rivets, which are designated with the numbers **2017** and **2024**, are stored in the refrigerator and after being riveted, they need one hour to be harden at room temperature.

In 1919, Wilm that unknowingly discovered **solution treating and age hardening**, retired from research and became a farmer.

He died at his farm on 6 August 1937.

This presentation was developed by Kamran Khodaparasti.

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