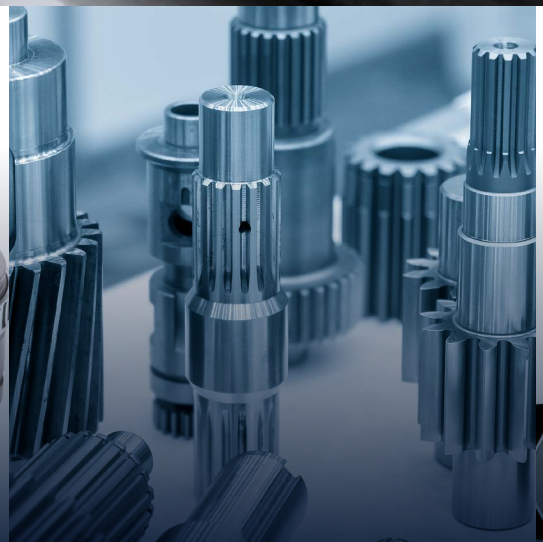
BONDERITE®

HENKEL BONDERITE PULS PROCESS

ENABLING EFFICIENT AND SUSTAINABLE COLD FORMING



COLD FORMING

Often known as cold roll forming - cold forming is a forging technique used to shape metal materials at near room temperature to retain or enhance the tensile strength and hardness of the material, while still allowing high levels of manipulation.

While heavily used in automotive component processing, traditional cold forming can result in high energy consumption and phosphate sludge generation. Additionally, the process is lengthy, involving up to 10 individual steps.

Henkel's BONDERITE PULS* Process uses a polymer-based cold forming lubricant, which simplifies the process to 3 steps, while enabling benefits related to energy savings, waste reduction and water use.

*Parker Ultimate Lubrication System Licensed Technology from Nihon Parkerizing, Japan

Process Simplification

The multitude of steps in traditional cold forming includes initial degreasing, pickling, activation, zinc phosphating, neutralization, soap and frequent, intermediate rinsing.

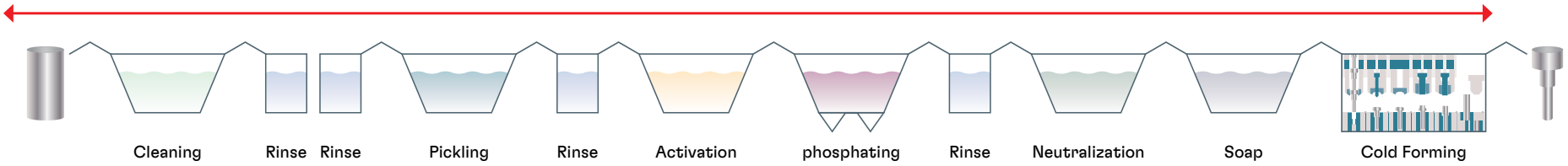
In the **BONDERITE PULS Process**, Henkel's polymeric cold forming lubricant reduces processing steps by combining the three traditional layers that make up the coating - the non-reacted soap, reacted soap and phosphate.

As a result, just three steps are needed, including:

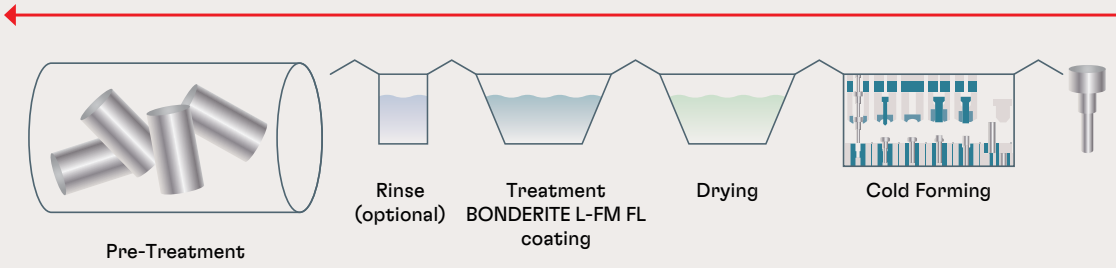
1. Pre-treatment (Shot-blasting or Pickling)
2. Treatment using Henkel's BONDERITE L-FM FL coating
3. Drying

Due to the reduction in processing steps, the BONDERITE PULS Process can reduce cycle time by more than 20%.

Traditional Cold Forming: Up to 10 steps



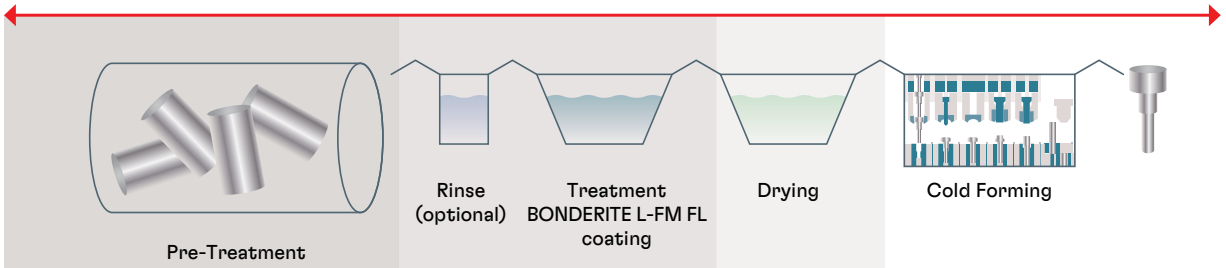
BONDERITE PULS Process: From 10 to 3 steps



Reduced Manufacturing Footprint

3 Steps of the BONDERITE PULS Process

BONDERITE PULS Process: From 10 to 3 steps



Reduced Manufacturing Footprint

PRE-TREATMENT

During pretreatment, rust and annealing scale is removed from the metal in order to ensure a uniform surface to improve adhesion of the BONDERITE L-FM FL PULS process coating.

Shot blasting – mechanical cleaning process that uses spheres of iron to remove oxides and other debris; preferred for BONDERITE L-FM FL PULS process as there is no potential for bath pollution or metal oxidation.

Pickling – traditional way to remove oxides from metal surfaces by using concentrated acids; neutralization bath before BONDERITE L-FM FL coating recommended.

TREATMENT USING BONDERITE L-FM FL COATING

The BONDERITE L-FM FL coating is applied to the metal by dip, flooding or spraying at concentrations between 60-100 percent and temperatures between room temperature and 50 degrees Celsius. An optional demineralized water rinse can help remove shot-blasting residuals.

DRYING

Before cold forming operations, water must be completely removed by heat drying.

Environmental Impact

Water Use

BONDERITE L-FM FL COATING is a non-reactive, water-based polymeric coating. Since the coating adheres to the surface physically without any reaction, the only evaporates produced in the subsequent drying step prior to cold deformation are aqueous. As a result, no rinsing steps are required as part of the BONDERITE PULS Process - saving water and reducing energy demand.

BONDERITE L-FM FL PULS

Optional Rinse

More than **90% less** water comsumption

Up to 25.000 m^3
in water savings per year

Up to 18K €
in water savings per year

Waste Reduction

The make up of the BONDERITE PULS Process eliminates up to 6 tons of sludge per year and 10-12 m^3 of soap disposal per tank per year. As a result, customers can save 40,000 to 100,000 Euros in cleaner and disposal savings per year, while reducing required labor, cleaning and maintenance – typically required 6 times a year.

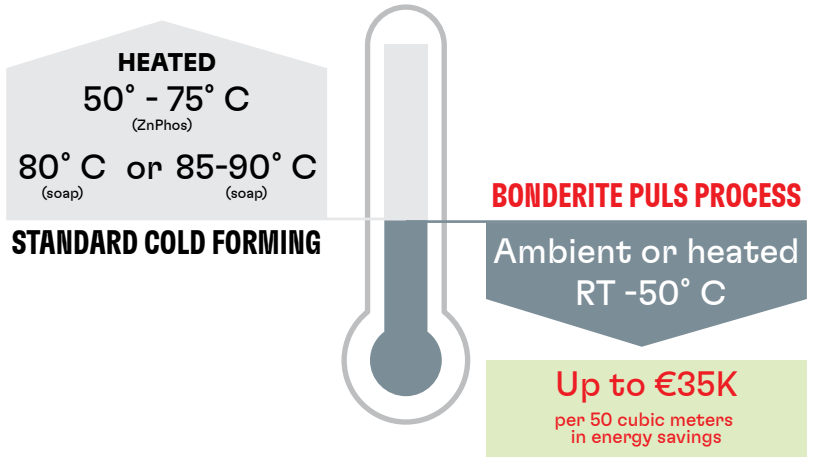
NO SLUDGE

No soap disposal

€40K - 100K
cleaner & disposal savings per year

Energy Savings

Standard cold forming processes require heating. Henkel's BONDERITE PULS Process operates at ambient or reduced heating of 50 degrees Celsius. As a result, heating efforts and pump power are greatly reduced, enabling customers to save up to 35,000 Euros per 50 cubic meters in energy savings per year.



BONDERITE PULS Process

With Polymer-based Cold Forming Lubricant

Product	Cold Forming Performance	Boron	Zinc Phosphate	Applications	Easy to Remove
BONDERITE® L-FM FL 744™	Medium	Yes	Yes	Bolts, Powertrain, Wire, Bars	Yes
BONDERITE® L-FM FL 755™ ACHESON	Medium	Yes	No	Powertrain, Bolts, Bars, Coining	Yes
BONDERITE® L-FM FL 735™	High	Yes	Yes	Bolts, Wire, Bars	Yes
BONDERITE® L-FM FL 835™	High	Yes	Yes	Powertrain, Bars	Yes
BONDERITE® L-FM FL 623™	High	No	No	Tubes, Fittings, Galvanized Wire	No
BONDERITE® L-FM FL 2020™	High	No	Yes	Powertrain, Bars, Fasteners	Yes
BONDERITE® L-FM FL 2021™	High	No	Yes	Bolts	Yes

Henkel's Surface Treatment and Cleaners & Lubricants business for automotive components offers process solutions across the value chain, from liquid metal to final part. Our robust process expertise is available globally, enabling customers around the world to effectively use our products with stable, quality results.

BONDERITE®

SHAPE, DEFINE, PROTECT

THE FUTURE OF SUSTAINABILITY

Automotive Component Processing Solutions

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