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PREMIX DEPARTMENT

Daniel Schuhmacher (left) and Ruben Amaral use the dissolver to make color pastes out of pigments and bulk materials. The pastes are sent straight to customers or kept for further processing.



PRODUCTION

Masterful touch

Producing automotive paints is an art. Experience and a hands-on approach are crucial, as shown by a look at Wörwag's production plant in Stuttgart.

By Michael Thiem; photos by Frederik Laux; illustrations by cybertakel



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GRINDING ROOM

Christian Wiesing uses a grindometer to measure the particle size of semi-finished and other products. Then he decides whether the results meet the specifications and can be further processed.

The paint production process has a number of cyclical elements. Some of them move rather swiftly. Daniel Schuhmacher and Ruben Amaral are working on the formulation. They set the dissolver, a mixer with a disc-type blade, at 330 rpm. The actual blade looks like one from an oversized saw with its teeth bent upwards. The dissolver is used to combine raw materials, solvents, and additives.

Schuhmacher and Amaral pick up a 25-kilo sack, cut it across the width, and start pouring pigment into the 1,200-liter container. "Careful. Not too fast. Otherwise it'll clump up," remarks Schuhmacher. "You quickly develop a sense for how much and how fast," he adds. In this case, 900 kilograms of titanium dioxide pigment are needed to make 1,600 kilograms of white color paste. The two colleagues

repeat this step of the process several times in a row. Half an hour later they increase the mixing speed to 1,200 rpm. The "dance of the pigments" has begun.

Making paint is like baking a cake. If the recipe is sound, the ingredients are good, and everyone follows the process, the result will be a success. But if someone steps out of line, the result will be ruined.

When the order has been received and planned, the first material step in production is dispersion. This takes several hours. During this time, Schuhmacher and Amaral monitor both the

temperature and the particle size, which can be anywhere from 50 to 300 micrometers depending on the recipe. Timo Dorigo, who is in charge of wet paint production, knows the importance of continuous quality control. "We have to respond immediately to any →

Making paint is like baking a cake. The recipe, ingredients, and process all have to be right.

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MIXING STATION

Roland Cuno receives orders directly from the sales department. He enters industrial paint formulas at the mixing station, does samples, checks them, fills the product into containers, and prepares them for shipping.



→ irregularities,” he says. Because nearly every product takes a slightly different route through the production process, it’s extremely important for everyone involved to communicate well with each other. “With 3,000 to 5,000 active formulations and many overarching processes, we constantly have to check the status and progress of our production processes.”

For this reason, daily routines are marked by tight shop-floor management. Every morning the department heads meet for a “paint round” in which they go through the production steps together. “We immediately see if we have to intervene somewhere. It keeps everyone informed and we all know if there’s a problem,” says Dorigo. He insists on a clear focus. “We start by talking about anything that’s not working right. Afterwards, I’m just as eager to

hear the success stories.” The best result of this measure to improve communications has been a considerable increase in production. The company can also do more reliable planning to utilize the plant’s capacity.

New machinery in the grinding room has shortened throughput times for the bead mills. Endurance is of the essence here too. For some products, a hundred or more hours are needed to grind the materials down to the desired particle size. Christian Wiesing does regular tests with a grindometer.

This device looks like a thick ruler made of stainless steel. A channel has been machined into it, with a depth that decreases at a linear rate from 200 micrometers to zero. A few drops of paint are put into the deep end. Wiesing uses a squeegee to pull the paint toward the zero end, and watches for the

The new “paint round” practice has led to a significant increase in productivity

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SLURRY

Sampson Apler (left) and Karim Abachi need not only a lot of scales, but also a great deal of experience. They compile the ingredients, weigh them, and mix them together.



first smears in the paint film. A scale shows him the particle size of the paint in micrometers. “We also have to keep an eye on the temperature when grinding,” he adds. “We can’t let it exceed 70 degrees Celsius, or the paint will be ruined.”

The semi-finished products and color pastes are then stored for further processing or filled into containers and sent to customers. Roland Cuno prepares industrial paints for shipping. At the mixing station, he draws raw materials from tanks of five to 500 kilograms. “I enter the formulation, do the mixing, paint a test panel, check the result, and put the finished paint into containers,” he says. He is currently working on an ultramarine blue. “It’s great to see customers order colors other than silver, black, and grey,” he says with a smile.

Every gram counts

Cuno can mix paints by pressing keys on a computer, but base coat production still requires real hands-on work. Sampson Apler’s

great treasure is his experience. He uses a large scoop to weigh special-effect pigments for “Valencia Orange.” This recipe lists five ingredients, although other paints can have up to twenty. The amounts are listed on a production order with an A4 (approximately letter-size) format, which accompanies all steps of the process. “We have to work precisely,” Apler emphasizes. Some of the ingredients for this base coat have to be weighed down to a few grams. That corresponds to the exactitude of a letter scale. A scanning system helps to ensure that all the raw materials are included.

Depending on the product, there can be as many as 20 steps to go through. On a typical day, one hundred metric tons of primer, base coat, top coat, and clear coat, including semi-finished products, leave the factory—in containers ranging from one kilogram to a metric ton in size. The main plant in Stuttgart will be expanded by 2,000 square meters by the end of the year. “That will mean shorter distances,” says Daniela Off, who heads base coat pro- →



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PAINT CENTER

Juliana Donner has a colorful job. To check the quality, she has test panels painted in all the production tones, simulating customer applications as precisely as possible.

→ duction. As Dorigo adds, “We’re optimizing our material flow, and we’ll have better transport routes and sufficient buffer zones.”

The crux of the production process lies in determining the color. But only a few employees have a ‘license to color.’ “It’s the most exciting step,” says Off. “You really have to know what you’re doing. And not everyone can do it.” One person who has been making the right decisions here for twenty years is Michael Körper. “The hardest part is to meet the requirements placed on each individual paint.” One can never claim to know all the secrets of coloring, he adds, because customer wishes are constantly changing.

Körper spends nearly two-thirds of his working day at the computer. He uses measurement values, customer specifications, and his own experience to develop the precise coloring strategy. A color tone navigator that was developed at Wörwag and is continuously optimized helps him in his work. It is essentially a digital color chart. It records every production order, and its

database stores his work for future batches. In making his decisions, Körper draws on proven paint recipes as well as on feedback from the quality center and modified application specifications from customers. “There’s always more to learn,” he observes. “Coloring is teamwork.” The process can take several days, because it’s not only about color. Gloss, special effects, coat thickness, and material properties all have to be taken into account as well.

Several coloring steps are often needed

What Körper works out in theory, his colleagues put into practice. Color samples are repeatedly sent to the paint center. The paint is put on panels measuring 10 by 14.8 centimeters, simulating customers’ large-scale applications as precisely as possible. Juliana Donner, a certified automotive paint specialist, is one of only three women working in production at Wörwag. “I’ve always been fascinated by the huge spectrum of things you can do with paint,” she

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COLORING

Michael Körper needs an extremely good eye. He has the challenging job of giving customers the colors they desire. Sometimes this can take two weeks—or even longer.



says, mentioning the numerous metallic paints with flop effects as just one example.

To do a trial coat, she pours a cup of “Electric Green” into the paint system, inserts a plastic panel for the substrate, and starts the procedure. A maximum of two coats are applied on a light or slate-grey primer. The plate then lands on Körper’s desk. And the process starts from the beginning again: coloring, painting, testing. Until it’s right. Cycle upon cycle. Finally the tone is perfect. A masterful touch. “Metallic blue and orange are the trickiest,” says Off, “especially because producers keep narrowing their tolerance ranges.”

When Körper is satisfied, every batch that leaves production goes to Dirk Langenbahn at the paint lab for a final round of quality tests. The comprehensive check includes physical properties

like the percent of solid matter, pH value, and flow performance. Langenbahn examines the surface of another test panel for hollows, streaks, bumps, and tiny cavities. To do this he creates a paint film with a linear decrease in thickness, which is referred to as a wedge coat.

**The filling process
has to work smoothly too.
Cleanliness is
of the essence.**

Everything has to work in the final step as well. Cleanliness is crucial in the filling department. Branislav Vejin is very careful about this. “There are special sieve requirements for each product,” he says. Random quality checks are carried out here as well—up to three times for large batches

of 2.5 metric tons. When the 10-kilogram, two-handed shipping container is filled, Vejin closes the lid, carefully affixes the label, and then places it onto the pallet. And the production process is complete. ■

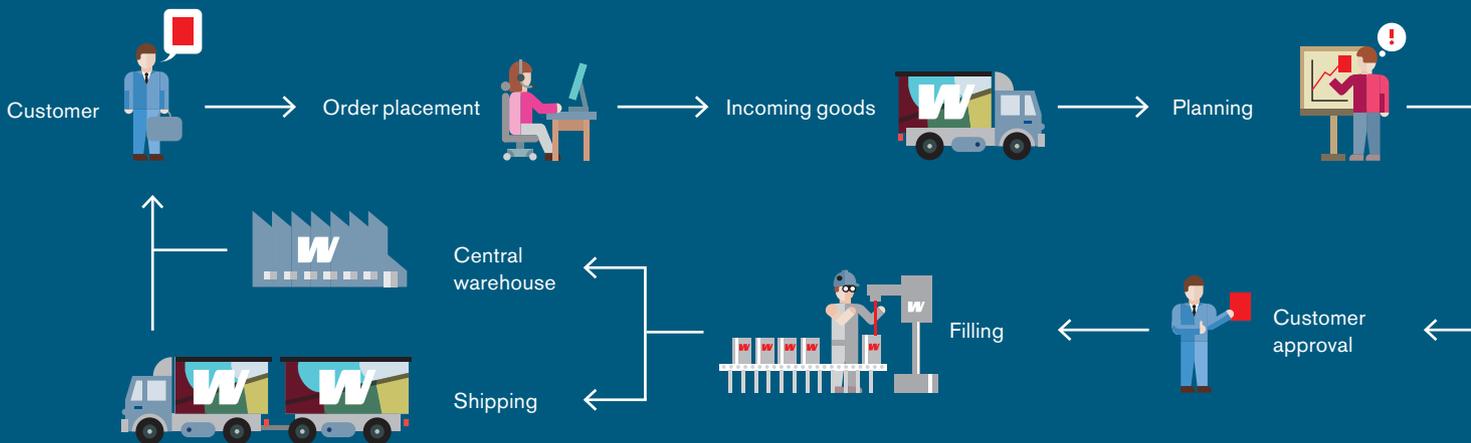


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QUALITY CENTER

Dirk Langenbahn tests all the base coat batches from regular production. He uses test panels with wedge coats to help assess the quality.

HOW DOES THE BASE COAT GET TO THE CUSTOMER?



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FILLING STATION

Branislav Vejin

pays great attention to cleanliness at the filling station. Smooth operations are essential in the last step of production too.

He prepares 300 to 400 containers for shipping every day.

