



Alloy Wheel Refurbishment



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1.1 Definition of Refurbishment of Alloy Wheels:

Refurbishment basically describes the professional technical restoration of the wheel, with regard to visual defects as well as potential corrosion attacks, by professional machining, polishing, local grinding, rounding of notches, priming, touching up paintwork and painting if necessary.

This particularly applies to visible surface flaws which would lead neither to technical restrictions nor to specification-relevant defects (e.g. In an MOT inspection according to road traffic regulations) when the wheels are used untreated.

It concerns a high quality, professional and proper mechanical refurbishment of an alloy wheel using high quality technologies, materials and paints.

Visual properties and quality results on a par with new parts are therefore achievable when performed properly.

Like with all other repairs/refurbishments, a slight deviation or difference from the original new part can result.

This catalogue and the requirements defined therein apply for Opel/Vauxhall alloy wheel parts or products.

See the following pages for details and restrictions.

1. Definition of Terms



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1.2 Definitions:

Alloy wheel (colloquially “wheel”)

Cast or forged car wheel without tyre made from an aluminium or magnesium alloy.

Painted wheel:

Wheels are available in different colours and designs and can considerably enhance the appearance of the vehicle. The base coat determines the colour of the wheel, the clear coat provides protection against corrosion and other ambient influences.

Diamond cut wheel:

Diamond cut wheels are given a shiny, reflective surface by a special machining process. In this process, the wheel is turned with a precision tool to cut special patterns, grooves or contours into the surface. This produces a shine and shadow effect which highlights the appearance of the wheel and gives it a special look.

Complete wheel:

(Alloy) wheel with tyre fitted



2. Background Information



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The percentage of alloy wheels has increased considerably in recent years and continues to grow.

This has consequently led to an increase in damaged alloy wheels.

Because of the ecological and economic aspects, proper, professional refurbishment under consideration of the defined repair limits makes sense.

Many companies on the market offer repair services for damaged alloy wheels. However, it must be taken into consideration that the assertions of the vehicle or original wheel manufacturer are observed.

In practice, some companies do not follow the specifications defined by the special "Wheels and Tyres" committee of the Motor Vehicle Technical Committee (FKT) of the Federal Ministry of **Transport**. / [Germany](#)

Unprofessionally refurbished alloy wheels can pose a considerable threat to people and property in road traffic. Furthermore, a vehicle fitted with such alloy wheels could lose its road traffic license.

Opel Automobile GmbH has therefore developed an Opel Directive.

This enables appropriately equipped and trained workshops to carry out proper, professional refurbishment of alloy wheels.

Instructions from this directive in this data catalogue must be satisfied and carried out in full.

This catalogue and the requirements defined therein apply for Opel/Vauxhall alloy wheel parts or products.



3. Scope of Refurbishment



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3.1. General

The following points must be observed in accordance with the Opel/Vauxhall quality requirements for successful quality wheel refurbishment:

- A distinction must be made between a mere wheel painting and a refurbishment of substrate damages.

Refurbishment is not permitted:

- **if the wheel exhibits damages which rule out refurbishment according to the criteria of this catalogue listed below.**

If this is the case, this wheel is no longer fit for the road and must be replaced!

- 1. Wheels that exhibit cracks may not be refurbished and must be replaced immediately.**
- 2. Heat input or build-up welding operations of any kind are not authorised.**
- 3. The correct seating of the wheel on the wheel hub must be checked on the vehicle before disassembly and after reassembly. There may be no damages/deviations which restrict the correct wheel fitting or render the wheel unusable for assembly/driving in any other way.**
- 4. After removing the wheels and their fastening parts, they must be checked for safety. There may be no fractures, cracks, heavy wear, deformations of the bolt holes, other deformations or other features/indications which could restrict the safety of the wheel.**

Note:

- In the case of (partial) tyre assembly, the BG (employers' liability insurance association) information BGI 884 "Safe Tyre Assembly" must be observed.
- The BGI 688 "Noise at the Workplace" must be observed; ear defenders must be worn during tyre assembly.



3. Scope of Refurbishment



Aftersales Engineering

3.1. General

The following points must be observed in accordance with the Opel/Vauxhall quality requirements for successful quality wheel refurbishment:

- When using the repair machine:
 - Refurbishment may only be carried out by a trained, certified specialist who has been instructed on the defined repair machines.
 - Attendance of the repair system manufacturer training must be documented appropriately by the refurbishing company and archived for easy access and permanently.
 - Contact data can be found on the last page of this document.
- The abrasives and work steps specified by the manufacturer must always be observed; e.g. grain grades must not be skipped.
- The assembly instructions for wheels/tyres for the appropriate vehicle must be observed.
- The processing instructions must be observed.
- **No warranty claims may be brought against the wheel manufacturer after wheel refurbishment has taken place!**



3. Scope of Refurbishment



Aftersales Engineering

3.2. Technical Restrictions

- **Only cast or forged alloy wheels may be refurbished.**
- **Wheels that have already been refurbished in the aluminium substrate may not be refurbished again.**
- **Material reshaping is not authorised.**

Generally:

- In order to ensure that there are no deformations at all in the rim flange or tyre seat area, the radial and axial run-out deviation must be determined prior to refurbishment.

Values of 0.5 mm are considered here as the maximum authorised recommended value. It is recommended not to drive with this wheel any longer in case of higher values.

- Higher values are only acceptable with knowledge and under consideration of the actual production tolerances.

Painted alloy wheels:

may only be refurbished, in the case of damages in the aluminium structure, with the repair machine

- **“WheelDoctor RST”** – rotation grinding technique of Cartec Autotechnik Fuchs GmbH - Germany
- or another machine with totally identical properties with a TÜV-tested process.

Diamond cut wheels:

may only be refurbished, in the case of damages in the aluminium structure, with the repair machine

- **“WheelDoctor RST”** – rotation grinding technique (with extension for diamond cut wheels) of Cartec Autotechnik Fuchs GmbH-Germany
- **„WheelDoctor DDC”** – Digital Diamond Copy Technology of Cartec Autotechnik Fuchs GmbH-Germany
- or another machine **with totally identical properties with a TÜV-tested process.**



3. Scope of Refurbishment



Aftersales Engineering

3.2. Technical Restrictions

- A damage depth in the base metal of maximum 10% of the cross-section (rim flange width), but in no case more than 1 mm, must not be exceeded. With a rim flange width below 11 mm (narrow rim flange “Form J-N”), the remaining wall thickness may not fall below 10 mm.
- The design of the wheel must be taken into consideration in the refurbishment. If there are design indentations between the diamond cut surfaces, these must be refurbished manually under consideration of the named criteria (see 3.1 and 3.2). Automatic refurbishing could endanger the design or technical requirements.
- Professional refurbishment up to a maximum damage depth in the base metal **of 1 mm is only authorised in the range of 50 mm in radial direction from the outer flange.**
- In the range above 50 mm from the outer flange to the centre, outside the areas to be refurbished, **only refurbishment of the paint coats is authorised.**
- Due to the reduction in the notch effect at the damaged places, there are no reservations up to the specified maximum depth especially thanks to the professional, rotation-symmetrical, mechanical processes.
- The contact surface of the wheel, wheel fastening holes, centre hole, valve seat and the inside surfaces of the spokes and the rim bed may not be refurbished or painted.
- See the vehicle instruction manual for wheel bolt tightening torques.



3.2. Technical Restrictions

- It must be ensured in the course of refurbishment that the manufacturer identification and the type approval code (DVLA number, ECE-code) remain unchanged in their original form.
- The tyre seat surfaces on the wheel must not be refurbished or painted because of the danger of slipping and must be covered by suitable materials. On the other hand, there is no need for reservations about applying a paint spray mist in the area of the rim flange for refurbishment purposes.
- If paint is removed from the wheel, new coats of paint must be applied.
- A maximum working temperature of **80°C** may not be exceeded during painting.
- Powder coatings with their required higher temperatures are not authorised.
- It is recommended to replace any valves after painting because of the application of heat and/or wetting with paint.
- Processing of wheels with sand blasting devices which alter the aluminium structure and thermal paint removal are not authorised.
- There are no reservations about using machines which only create a mechanical surface matting of the coat of paint.
- When removing paint from wheels, make sure that it can be verified that there are no changes in the material structure and its mechanical properties.



3. Scope of Refurbishment



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3.3. Identification of the refurbished Wheels

The refurbishing company must permanently mark the wheels after refurbishment with a suitable adhesive film label (see information leaflet of the Federal Motor Transport Authority for test requirements for plates, adhesive labels and printed identifications according to road traffic regulations) or other non-notching processes on the inside of the wheel.

Minimum scope of the identification: Company name and address

The adhesive film label must be affixed to the inside of the wheel to the right of the valve seat/TPMS sensor. (See figure)

This marking specification applies generally for all professionally, technically refurbished wheels.



Max Mustermann GmbH
Musterstraße 1
73655 Musterhausen
Phone.: 12345 6789



Wurde nicht
übersetzt/ "
Mustermann"



3. Scope of Refurbishment



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3.4. Liability Notes

- This document contains basic rules and work steps for the refurbishment of alloy wheels. Every user is personally responsible for the evaluation and proper execution.
- In case of doubt whether a wheel is suitable for refurbishment, refurbishment should be abstained from.
- Opel will accept no responsibility for improper refurbishment. Liability for printing errors is excluded.
- Where equipment manufacturers, parts and/or accessories are mentioned in this documents, they are always recommendations only.
- The recommendations are made based on experience. Opel will accept no liability for the quality, safety and continuing suitability of the equipment, parts and accessories mentioned here insofar as such equipment, parts and accessories are concerned that are not offered by Opel.



4. Damage Categories



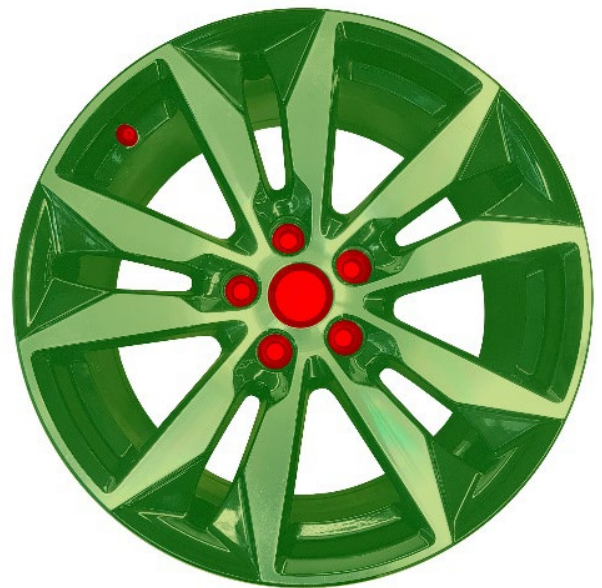
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Damage types of category 1 and 2 are suitable for refurbishment

Category 1:

Damage in paint, priming

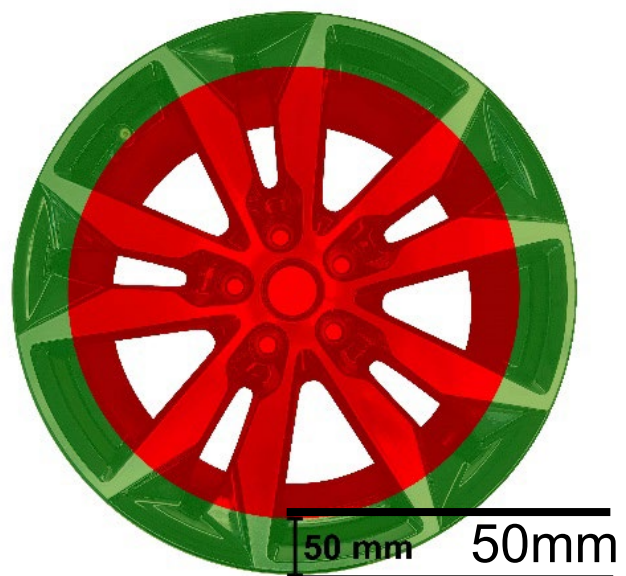
- **No** damage in the material structure
Both diamond cut and conventional.
- Area: Complete front and inside drum **except** category 3 areas.



Category 2:

Damage in the material structure

- up to **max. 1 mm deep**, measured by a suitable method.
- **Area:**
Visible side, starting from the outside of the rim flange up to 50 mm in radial direction.



4. Damage Categories



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**Damage types of category 3 and 4
excluded from refurbishment!**

Category 3:

- **Damage in the paint and/or material structure.**
- **Area:**
Wheel bolt hole, wheel centre hole, valve hole, wheel contact surface, contact surface of the brake disc/drum, tyre contact surface (rim flange inside, rim shoulder, hump), rim deep bed, inside of spokes.



Category 4:

- **Damage in the material structure**
(more than >1 mm deep).
- **Area:**
Complete design side
(visible wheel side).



5. Repair concept



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5.1. Liability Notes

- The products of Cartec Autotechnik Fuchs GmbH satisfy the visual and technical requirements of Opel/Vauxhall.
- OPEL/Vauxhall accepts no liability for third-party products. These are only product recommendations.
- The repair concept and work values as well as the entire data catalogue are based on the use of the repair system from CARTEC Autotechnik Fuchs GmbH - Germany.
- Other manufacturers could offer similar or better repair systems. The user is therefore recommended to study the market closely.

5.2 Repair Procedure

Note:

- Full work instructions are included with the repair set.
- This document merely provides a brief overview of the repair procedure.



5. Repair Concept



Aftersales Engineering

5.3 Design variants and average required time

Variant 1:

Painted wheel/ → complete
**Processing of the damage area and repainting
of the front visible surface
(base coat and clear coat).**

→ See chapter 5.4 for the procedure

Repair time: approx. 30 minutes



Variant 2:

Diamond cut wheel/→ rim flange
**Processing on the rim flange only (edge variant),
no processing of spokes.**

→ See chapter 5.5 for the procedure

Repair time: approx. 15 minutes



Variant 3:

Diamond cut wheel→ complete
**Complete processing of the front visible surface
(damage zone including clear coat area of
the spokes) and clear coat painting.**

→ See chapters 5.6 and 5.7 for the procedure

Repair time: approx. 30-45 minutes



- Time specifications are all net refurbishment times.
- If the wheels are mounted on the vehicle, about another 24 minutes must be allowed for removal, assembly and balancing.



5. Repair Concept



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5.4 Painted Wheel

Processing with the WheelDoctor RST

Step 1:

Check and measure radial run-out, axial run-out and damage depth.
If damages in the base metal are deeper than 1 mm, the wheel must be replaced and may not be refurbished.



Step 3:

Fine grinding with the grey grinding disc.

CARTEC item no. 266302



Step 5:

Grind joints flat with the mono-eccentric grinder with P240 and then with P500.

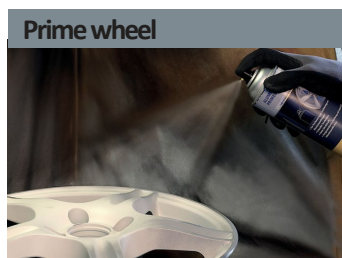
CARTEC item no. 410540



Step 7:

Apply several thin coats of aluminium primer and leave to air.

CARTEC item no. 266745



Step 9:

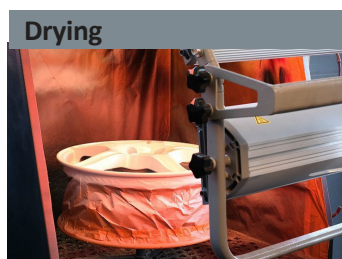
Pre-paint the wheel with CARTEC base coat spray or for the paint spray gun and leave to air for approx. 10 minutes.

CARTEC item no. 266701 - 266783



Step 11:

Let the wheel dry with an infra-red lamp or in a painting booth for about 30 to 45 minutes.



Step 2:

Completely remove the kerb damage roughly with the grinding disc.

CARTEC item no. 266301.



Step 4:

Matting with the WheelBlower for optimum paint adhesion.

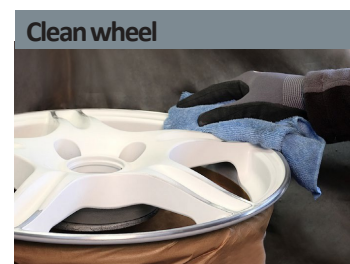
CARTEC item no. 480500



Step 6:

Clean and rub down the whole wheel with the foam cleaner and a micro-fibre cloth.

CARTEC item no. 266730



Step 8:

Intermediate grinding and thorough cleaning if necessary. No aluminium may be visible. Rub down the surface carefully with the dust-collecting cloth.



Step 10:

Paint with the selected clear coat until you can see a shine. The matt effect appears as it dries.

CARTEC item no. 266831



Step 12:

Grind out/polish entrapped dust with matting discs P2000/P3000 and finish improver.



5. Repair Concept



Aftersales Engineering

5.5 Diamond cut wheel edge variant Processing with the WheelDoctor RST

Step 1:

Check and measure radial run-out, axial run-out and damage depth.
If damages in the base metal are deeper than 1 mm, the wheel must be replaced and may not be refurbished.



Step 3:

Fine grinding with the grey grinding disc.

CARTEC item no. 266302



Step 5:

Polish the rim flange on the WheelDoctor.

CARTEC item no. 260866



Step 7:

Restructure with fine/coarse grinding pads.

CARTEC item no.
260882 - 268883



Step 9:

Seal with 15 drops of CARTEC glass-ceramic sealant.

CARTEC item no. 266760



Schritt 2:

Completely remove the kerb damage roughly with the grinding disc.

CARTEC item no. 266301

Coarse grinding



Step 4:

The surface must be optimally prepared for polishing. Final grinding is performed with P240, P400, P1000.

CARTEC item no.
266910 - 266914

Final grinding P1000 wet

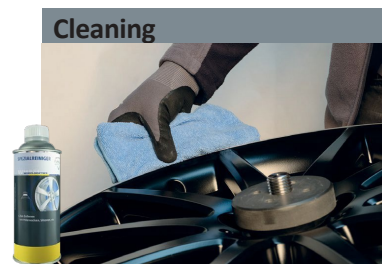


Step 6:

Clean the wheel with the special cleaner.

CARTEC item no. 260864

Cleaning

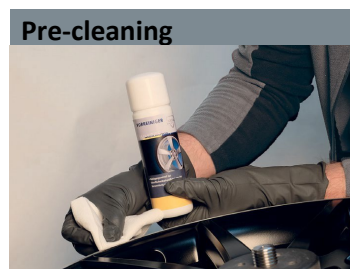


Step 8:

Pre-clean the structured surface with pre-cleaner from the CARTEC glass-ceramic sealant set.

CARTEC item no. 266760

Pre-cleaning



Step 10:

Dry with infra-red lamp for approx. 1 hour.

Infra-red drying



5. Repair Concept



Aftersales Engineering

5.6 Diamond cut wheel complete processing Processing with the WheelDoctor RST

Step 1:

Check and measure radial run-out, axial run-out and damage depth.
If damages in the base metal are deeper than 1 mm, the wheel must be replaced and may not be refurbished.

Assess and check damage

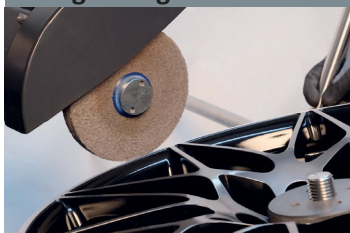


Step 3:

Fine grinding with the grey grinding disc.

CARTEC item no. 266302

Fine grinding



Schritt 5:

Remove clear coat with the special CARTEC mini-gear eccentric grinder.
(First P240/P500/P1500/final grinding P3000 wet)

CARTEC item no. 410570

Perfect surface grinding



Step 7:

Clean with special cleaner

CARTEC item no. 260864

Cleaning with special cleaner



Step 9:

Clean the wheel with CARTEC special cleaner.

CARTEC item no. 260864

Cleaning with special cleaner



Step 11:

Paint the wheel with 2-component wheel clear coat.

CARTEC Art. No. 266831

Paint with 2-component clear coat/spray gun



Step 2:

Completely remove the kerb damage roughly with the grinding disc.

CARTEC item No. 266301

Coarse grinding



Step 4:

Matting with the WheelBlower for optimum paint adhesion.

CARTEC item no. 480500

Matting with the WheelBlower



Step 6:

Polish the spokes until you get an even shine.

Polishing



Step 8:

Restructuring with the CARTEC structure pads fine/coarse.

CARTEC item no.
266855 – 266856

Preparation with grinding pads 22 inch

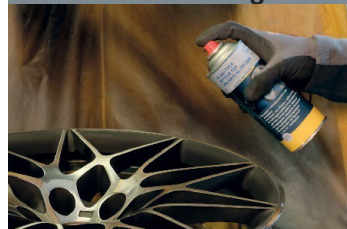


Step 10:

Apply 1-component adhesion agent to form a thin film coating.

CARTEC Art. No. 266342

Aerosol adhesion agent



Step 12:

Dry with infra-red lamp for approx. 30 – 45 minutes.

Drying



5. Repair Concept



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5.7 Diamond cut wheel complete processing

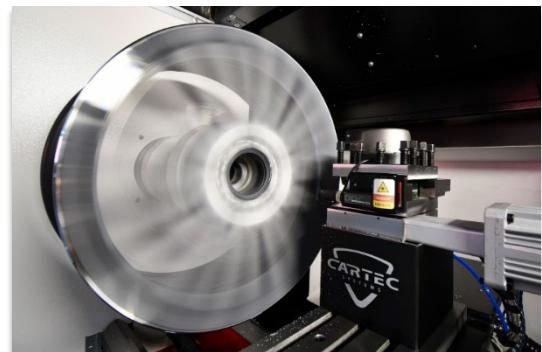
Automatic processing with the WheelDoctor DDC

The WheelDoctor DDC Digital Diamond Copy completely replaces the manual entry of processing parameters.

- This automatically keeps all **pre-defined** limit values.
- Manipulation and operating errors are **technically** ruled out.

Step 1: Mount the wheel in the WheelBlower, CARTEC item no. 480500

Step 2: Clamp and centre the wheel in the WheelDoctor DDC



Step 3: Measure unbalance

The actual unbalance of the wheel is measured by laser.

A maximum limit of 0.5 mm is authorised.

No further processing is possible on exceeding this limit; the software generates a workshop repair report.



5. Repair Concept



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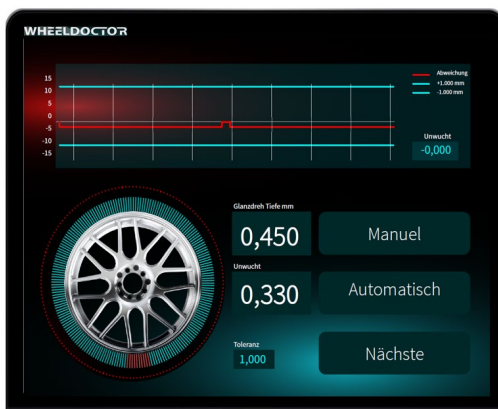
5.7 Diamond cut wheel complete processing Automatic processing with the WheelDoctor DDC

Step 4: Measure damage

The depth of the kerb damage is measured by laser.

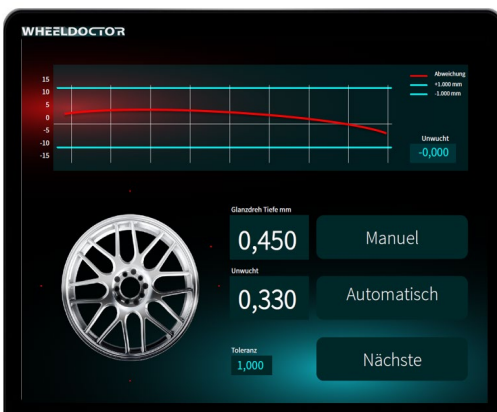
A maximum limit of 1.0 mm is authorised.

No further processing is possible on exceeding this limit; the software generates a workshop repair report.



Step 5: Scan contour

The contour of the diamond cut surface is scanned by laser. The software then performs tamper-proof calculation of the contour route of the wheel refurbishment.



5. Repair Concept



Aftersales Engineering

5.7 Diamond cut wheel complete processing Automatic processing with the WheelDoctor DDC

Step 6: Repair kerb damage

- Start the automatic repair process.
- First the kerb damage is eliminated within the limit catalogue:
→ Max. 1 mm damage depth in the range up to 50 mm from the rim flange.



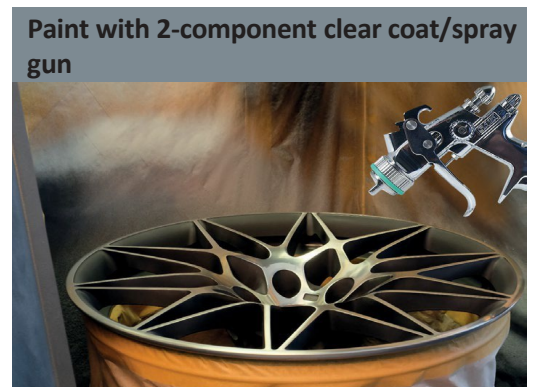
Step 7: Repair kerb damage

- Then the clear coat on the spokes is removed ($\varnothing$ approx. 0.2 mm)
- The machine operator can select the perforation/surface structure of the diamond cut surface. Three pre-set designs (fine/medium/coarse) are available.



Step 8: Apply clear coat

- Apply 1-component adhesion agent CARTEC item No. 266342.
- Paint the wheel with 2-component clear coat CARTEC item no. 266831.
- Dry with infra-red lamp for approx. 30 to 45 minutes.



6. Wheel Painting Concept



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6.1 Paint background

- In addition to the mechanical refurbishment, the wheel painting is also decisive for successful and high-quality wheel refurbishment.
- Commercially available clear coats do not achieve satisfactory paint adhesion on bare aluminium surfaces. This adhesion problem can lead to corrosion damage.
- The paint can run in the narrow spaces between the spokes and then require time-consuming rework.

The special wheel paints of Cartec Autotechnik Fuchs GmbH - Germany have been tested by Opel and satisfy the visual and technical requirements of Opel/Vauxhall.

- The CARTEC wheel paints are classified in the “Chemical Ordinance on the Limitation of Emissions” Appendix II 2. Par. e) and approved as special paints for painting alloy wheels.
- The base coats and clear coats are below the permissible limit of 840 g/litre.

6.2 Exclusion of Liability

- OPEL/Vauxhall accepts no liability for third-party products.
- These are only product recommendations.
- The Opel/Vauxhall wheel repair painting concept is designed for the use of materials from CARTEC Autotechnik Fuchs GmbH - Germany.
- Other manufacturers may offer similar or better/poorer wheel painting systems.
- The user is therefore recommended to study the market closely.



6. Wheel Painting Concept



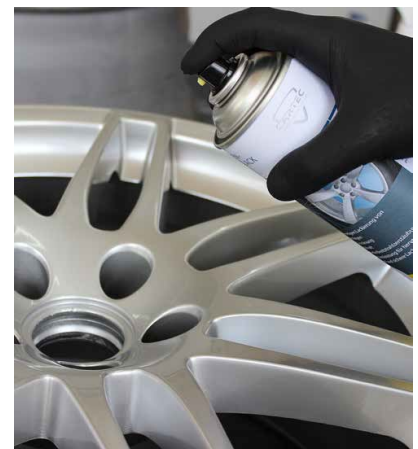
Aftersales Engineering

6.3 CARTEC special paints: **for painted alloy wheels**

- With the colour fan, colour finding and alloy wheel painting is quick and easy.
- The paint portfolio presently includes 30 different acrylic wheel base coats.
- The appropriate colour shades are also available for the diamond cut bi-colour wheels which are painted in colour and visually highlighted between the spokes.
- All CARTEC wheel base coats are available in patented Kwasni Spraymax aerosol cans as well as ready-to-spray paints for the paint spray gun.

6.4 CARTEC special paints: **for diamond cut alloy wheels**

- Due to their thixotropic properties, the gloss and matt clear coats developed especially for bare aluminium are almost totally prevented from running.
- The paint adhesion passes cross cut tests with the best value of GT0.
- The 2-component wheel clear coats from CARTEC ensure that the visual appearance almost matches the original appearance of Opel/Vauxhall wheels.



6. Wheel Painting Concept



Aftersales Engineering

6.5 Preparation for painting with the eddy current rotation method

For optimum paint adhesion, alloy wheels must be roughened prior to painting. The procedure for manual wheel grinding is time-consuming and prone to error with regard to the surface quality.

Especially with very intricate alloy wheel structures with narrow spaces.

- The Opel/Vauxhall repair concept is designed for the use of the “WheelBlower” from CARTEC. (item no. 480500)
- Other manufacturers could offer similar or better repair systems. The user is therefore recommended to study the market closely.
- **Note: Classic blasting, e.g. with sand, is not authorised!**
- With the system for micro-fine matting, coated surfaces can be processed quickly and accurately in the “eddy current method” without manual effort.
- The surface is matted evenly and optimally prepared for paint application.



7. Training and Hotline



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- CARTEC Autotechnik Fuchs GmbH - Germany offers specific training courses on the subject of alloy wheel refurbishment, including “diamond cut wheels”.
- These are held at company headquarters in Plüderhausen/Baden-Württemberg, Germany.
- After successful attendance, participants will receive a personal certificate that entitles them to carry out wheel repairs according to Opel specifications.
- A telephone hotline has been established for technical inquiries.

Contact details:



Daniel Fuchs

Bachelor of Engineering
Mitglied der Geschäftsleitung

Boschstraße 1
73655 Plüderhausen

Tel +49 (0)7181 482 088-0
Fax +49 (0)7181 482 088-28
Mobil +49 (0)170 801 540 7

daniel.fuchs@cartec-systems.de
www.cartec-systems.de

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