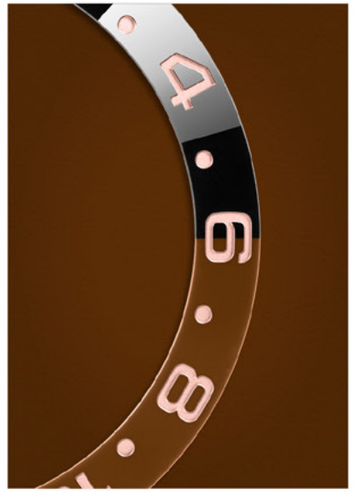
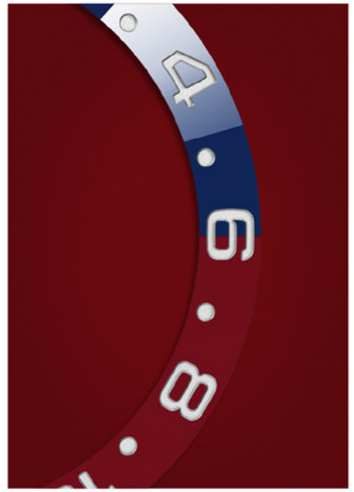
BASELWORLD 2018

ROLEX CERAMIC

ROLEX

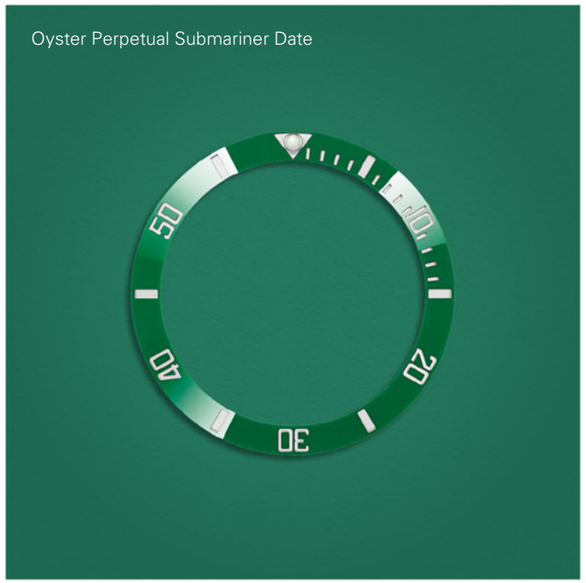


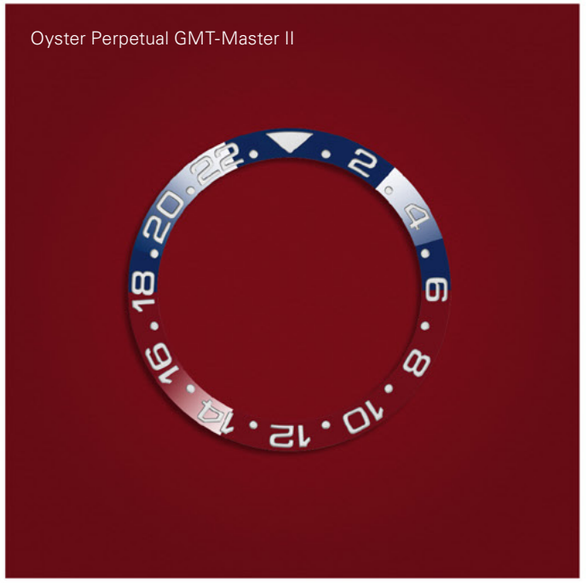


INTENSE, RESISTANT, DURABLE

Mastering the use of ceramic has enabled Rolex to equip its watches with cutting-edge ceramic bezel inserts and monobloc bezels. This expertise, the result of applied internal research and the creation of a manufacturing process unique to Rolex, heralded the beginning of a new era for the brand.

Thanks to the technical properties of the ceramic it is possible to create particularly durable components that are virtually scratchproof and unaffected by the sun's ultraviolet rays. Whether on a Cosmograph Daytona, Sea-Dweller, Rolex Deepsea, Submariner, Submariner Date, GMT-Master II, Yacht-Master 37, Yacht-Master 40 or Yacht-Master II, these ceramic elements make a strong impact on the watches' aesthetic appeal and identities, all while improving their longevity.





PERPETUAL INNOVATION

The brand's desire to use ceramic on the exterior of its watches led to a research and development process marked by several important events.

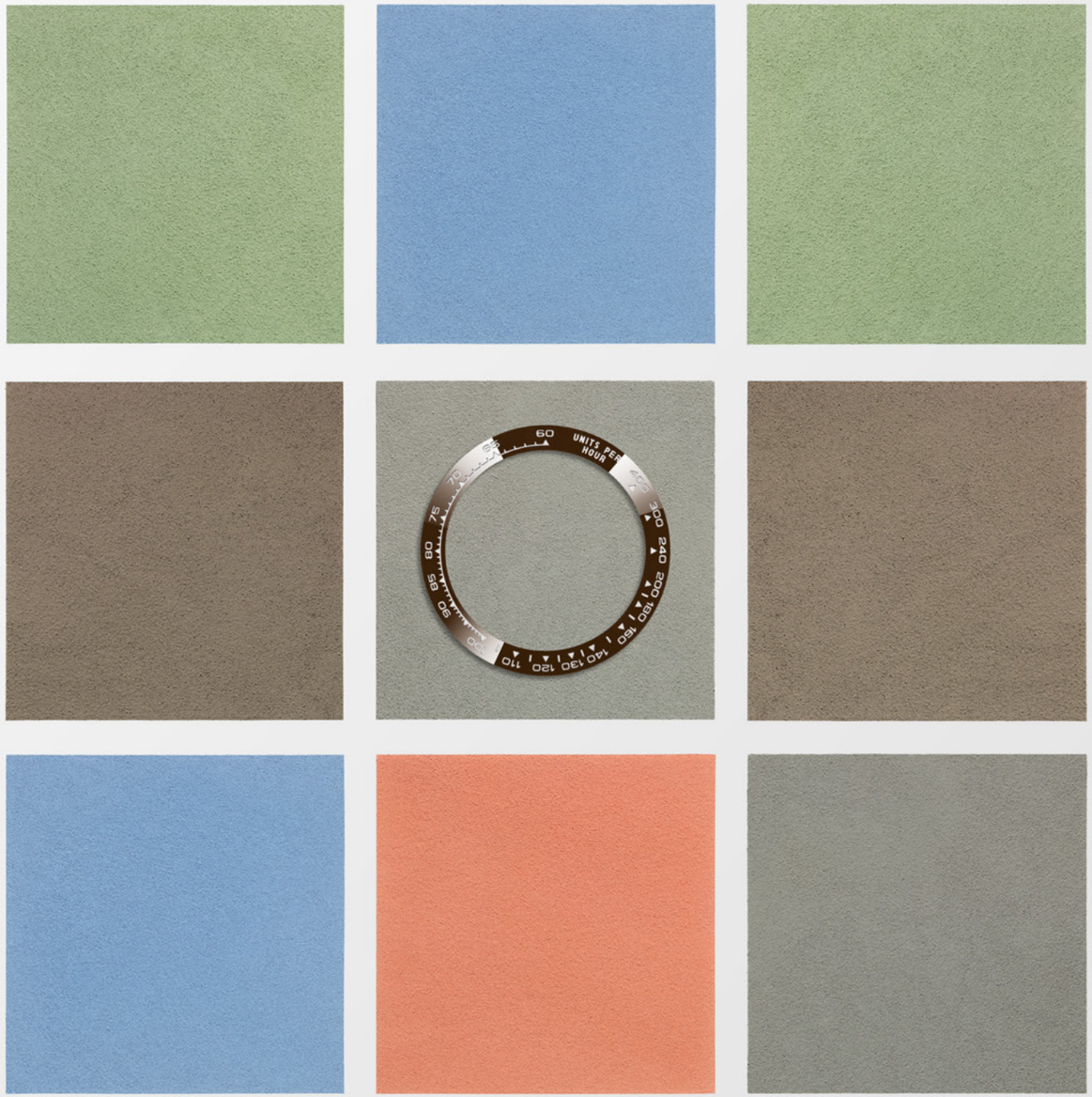
In 2005, Rolex unveiled its first watch with a ceramic insert: an Oyster Perpetual GMT-Master II in 18 ct yellow gold with a bidirectional rotatable bezel and a 24-hour graduated insert in black ceramic. In 2007, a blue ceramic insert was introduced on the Oyster Perpetual Yacht-Master II, a brand new regatta chronograph with a programmable countdown. In the same year, Rolex registered the trademark "Cerachrom". The brand's ceramic components are now known as the "Cerachrom bezel" and the "Cerachrom insert". In 2010, green ceramic appeared on an Oyster Perpetual Submariner Date for the first time. Three years later, in 2013, Rolex presented its first pioneering two-colour ceramic insert – with blue on one half and black on the other – on an Oyster Perpetual GMT-Master II. The same year, the brand also launched its first monobloc bezel in chestnut brown ceramic on the Oyster Perpetual Cosmograph Daytona. In 2014, the GMT-Master II was fitted with a two-colour Cerachrom insert in red and blue ceramic, a significant technical feat. The brand's latest innovation is a two-colour insert in brown and black ceramic. It is unveiled on two new versions of the GMT-Master II – one crafted entirely from 18 ct Everose gold, the other an Everose Rolesor version (combination of Oystersteel and 18 ct Everose gold) – at Baselworld 2018.

PRODUCING AND PERFECTING THE MATERIAL

In the field of advanced ceramics, the conventional definition of a “technical” ceramic is a material that is made up of crystallized minerals and produced at a very high temperature. It is primarily used in the aerospace and medical industries.

In the watchmaking sector, ceramic began to be used to create watch components in the mid-1980s. Although the technical characteristics of this material undeniably opened up new horizons, knowledge at the time meant that only single-colour components were available, in either black or white ceramic.

True to its constant quest for excellence, Rolex carried out its own research on the material – firstly to master the creation and production processes, and then to develop new colours.



A blend of powders

The ceramic used by Rolex is made of zirconium dioxide. Also known as zirconia, this oxide is derived from zircon, a hard, naturally occurring mineral. To obtain a coloured ceramic, zirconia must be mixed with other chemical compounds, primarily mineral pigments. Rolex engineers and researchers learnt the art of these basic ceramic preparations, which are always in powder form, in order to produce ceramics of deep colour.

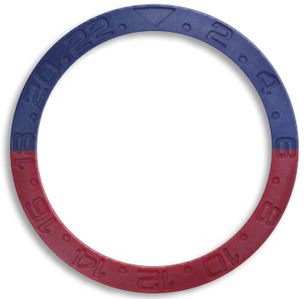
However, producing a red colour required a different approach with regard to the initial ceramic mixture. This is because no stable mineral pigments exist that can be used to colour zirconia red in a way that is pure. The brand therefore undertook significant research to develop an alternative using alumina, another mineral oxide, in place of zirconia.

ROLEX CARRIED OUT PIONEERING RESEARCH TO DEVELOP A RED CERAMIC CORRESPONDING TO ITS AESTHETIC AND QUALITY CRITERIA.

Ceramic insert blank

Insert after impregnation
with aqueous solution

Insert after sintering

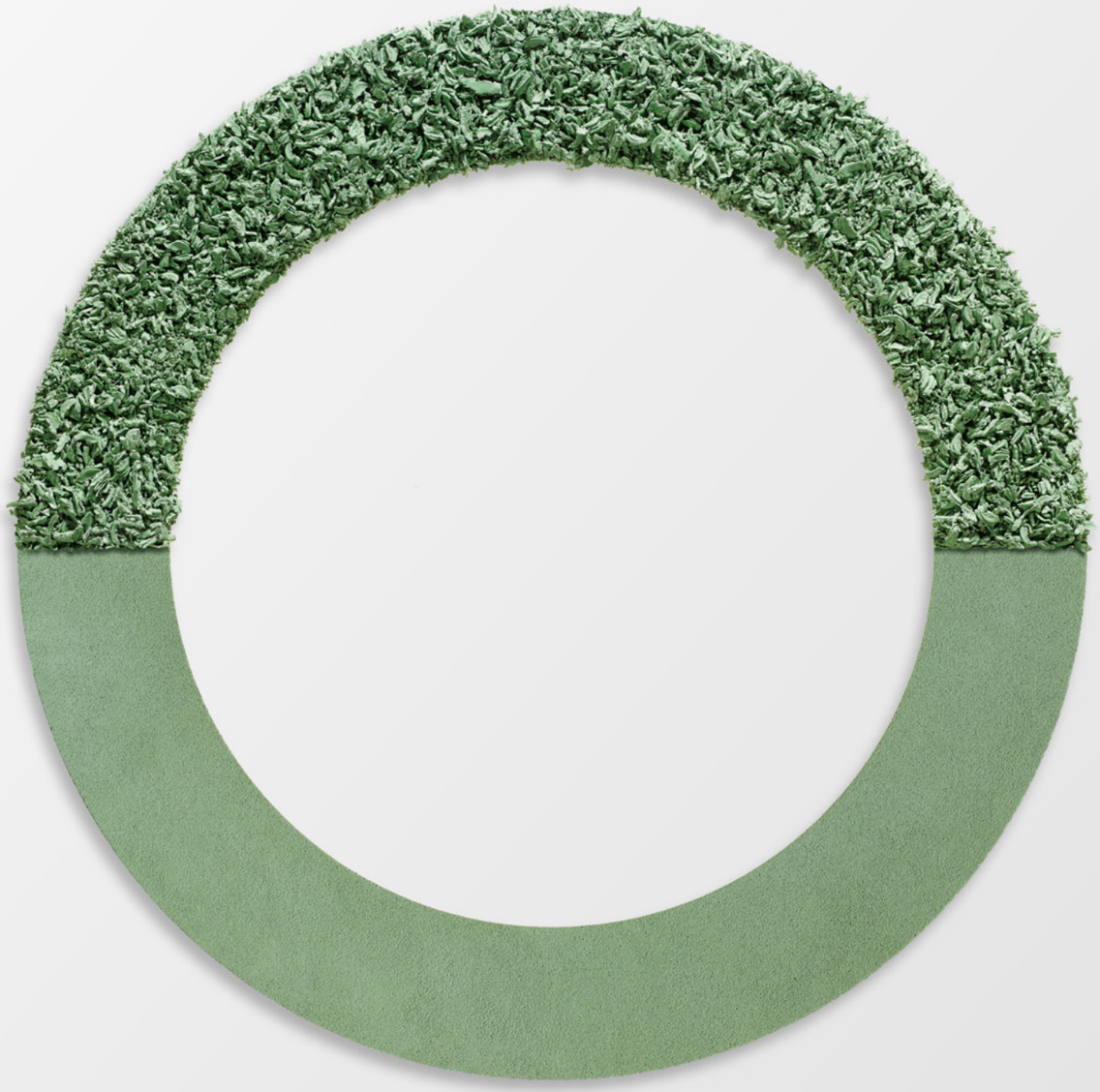


Insert after resizing

When alumina is mixed with chromium oxide and heated, it transforms into a deep red translucent ceramic, which is normally used in watchmaking to create tiny hollow stones. Known as synthetic rubies, these stones are designed to reduce the friction between mobile and fixed components inside a watch's movement.

To create red ceramic case components, Rolex added magnesium oxide to chromium oxide to obtain an opaque red material corresponding to the brand's aesthetic criteria. A rare earth oxide was also added to give the finalized ceramic exceptional mechanical properties. The development of this brand new, patented formula for the basic ceramic preparation demonstrates Rolex's skill at finding innovative solutions to meet its exacting technical and aesthetic requirements.

Rolex engineers and researchers learnt the art of basic ceramic preparations, which are always in powder form.



Production

Binding agents are added to the powder preparations, which include a mixture of zirconia and colour pigments or alumina. The mixture is heated and then injected into the moulds at high pressure to create a blank. This step gives the piece its shape and moulds the numerals, graduations and inscriptions. Once the blank is removed from the mould, it undergoes debinding, a heat treatment to remove the binding agents. It is then fired at a very high temperature – up to 1,600° C depending on which basic preparation is used – to harden the ceramic and reduce its volume by approximately 25 to 30 per cent. Known as sintering, this firing process, during which the components take on their final colour or colours, lasts over 24 hours. It must be perfectly controlled

to ensure that the ceramic hardens and shrinks evenly, giving the component its resistance and durability. Final precision machining with diamond tools, the only tools strong enough to use on ceramic, gives the piece the precise shape and size needed for it to be friction fitted onto the middle case.

Physical Vapour Deposition (PVD) is used to colour the bezel's moulded numerals, graduations and inscriptions. During the process, the ceramic is completely coated in a one-micron-thick layer of metal – either yellow or pink gold or platinum depending on the material of the watch. A final polish removes the metal from the surface of the ceramic and gives the bezel its shine. The precious metal coating on the numerals, graduations and inscriptions remains, making them clearly visible.

08 Polishing

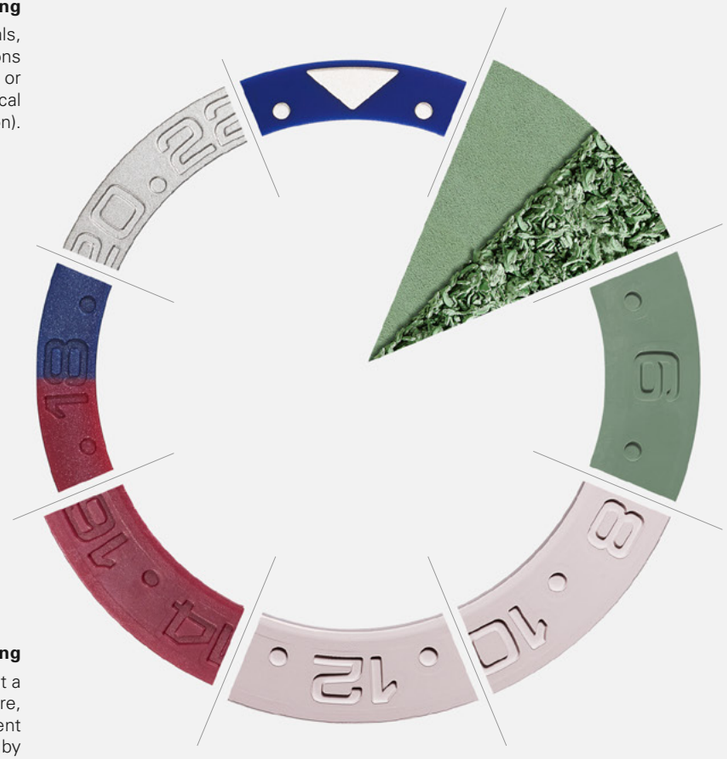
Polishing removes the metal from the surface of the ceramic and gives the bezel its shine.

07 Coating

Moulded numerals, graduations and inscriptions are coated with gold or platinum via PVD (Physical Vapour Deposition).

01 Basic preparation

Basic ceramic preparations come in a powder form, to which binding agents are then added.



06 Precision machining

Precision machining with diamond tools gives the component its final shape and size.

02 Injection moulding

The mixture is heated, then injected into a mould to create a blank.

05 Sintering

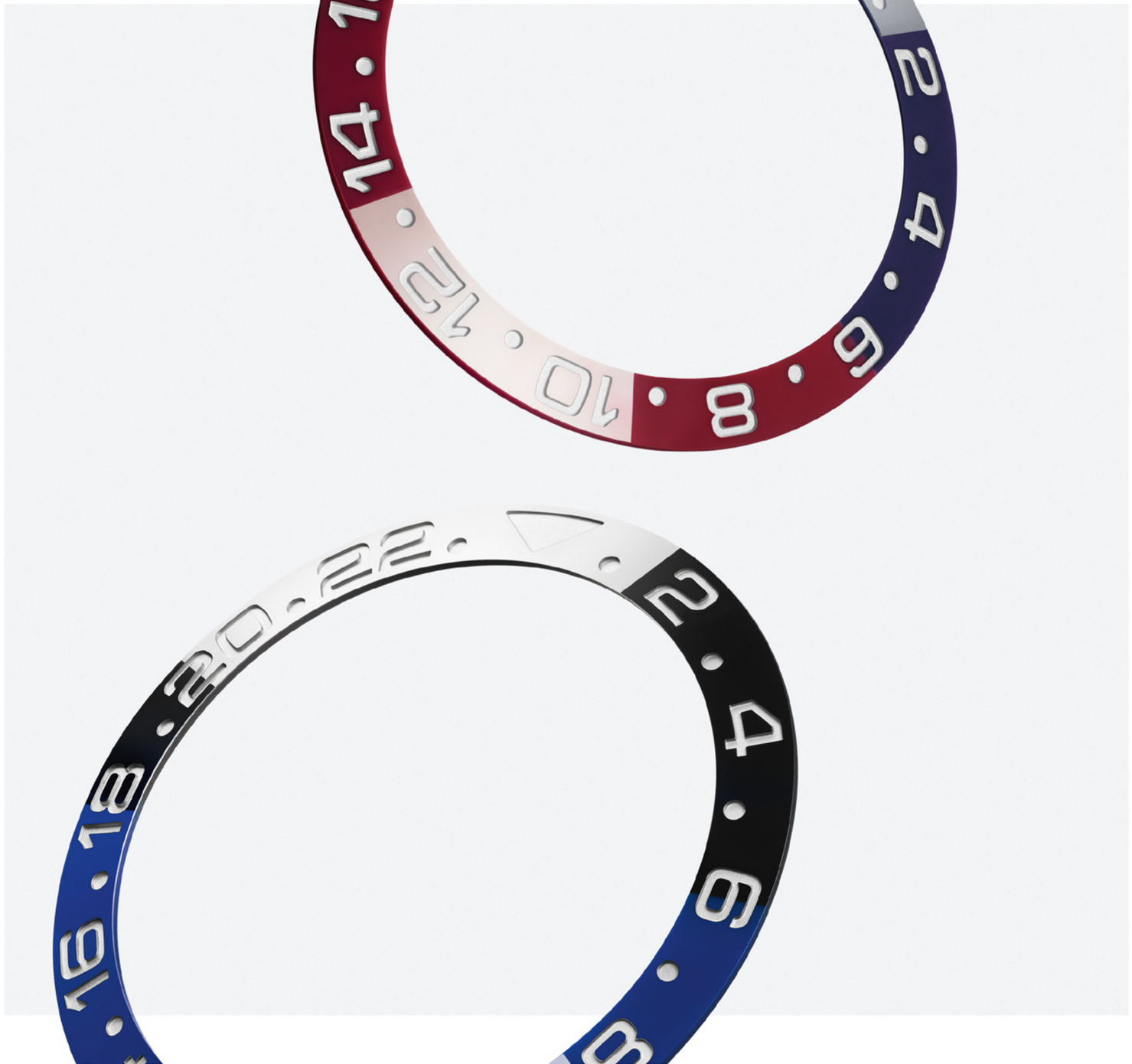
Sintering, firing at a very high temperature, hardens the component and reduces its volume by 25 to 30 per cent. During this step, the ceramic takes on its final colour.

03 Debinding

Once the blank is removed from the mould, it is heat treated to remove the binding agents.

04 Impregnation (two-colour inserts only)

A defined area of the insert is impregnated with a solution containing metal salts.



THE CHALLENGE OF THE TWO-COLOUR INSERT

Rolex continued its research with the aim of bulk colouring the ceramic to create two-colour inserts for the Oyster Perpetual GMT-Master II. The challenge was to find a way to colour the ceramic in specific areas without altering the material's intrinsic properties.

The solution developed by Rolex engineers makes use of the ceramic's state just after the binding agents have been removed. At this stage in the process the ceramic is extremely absorbent, allowing chemical compounds dissolved in an aqueous solution to be introduced into selected areas. During sintering, these compounds interact with the oxides present in the ceramic, causing the colour of the area to change.

TWO-COLOUR CERACHROM INSERT IN BLUE AND BLACK CERAMIC.

In 2013, Rolex introduced an Oyster Perpetual GMT-Master II with a two-colour Cerachrom insert in blue and black ceramic, and a year later, the watch was released with a two-colour Cerachrom insert in red and blue ceramic. Each two-colour combination on a single-piece ceramic component was a world first.

The two-colour Cerachrom insert in blue and black ceramic is a blend of zirconia and a blue pigment. Before sintering, a solution containing different metal salts is applied by hand to the upper half of the insert (running from 18:00 to 06:00 on the 24-hour graduation). When heated, the salts react with the blue pigment to create a new black colour.

TWO-COLOUR CERACHROM INSERT IN RED AND BLUE CERAMIC.

The Cerachrom insert in red and blue ceramic required a different approach, and new techniques were developed. In order to change the ceramic from red to blue, an aqueous solution containing cobalt must be used. This reacts with the alumina and chrome present in the ceramic, turning it blue during sintering. The pigment impregnation process calls for great delicacy and precision. A method was therefore specially developed to control the amount of solution delivered – which determines the opacity of the colour – and to provide a consistent, uniform result.

A SPECTRUM OF COLOURS

Over time, through close collaboration between the Research & Development Division and the Creation Division, Rolex has developed highly resistant single-colour and two-colour ceramics. Today, the palette ranges from brown, a colour introduced in 2018, to black, green, blue, chestnut brown and red. Clear, deep and intense, these coloured ceramics bring a unique vibrancy to the watches.

2005
Oyster Perpetual GMT-Master II

2007
Oyster Perpetual Yacht-Master II

2010
Oyster Perpetual Submariner Date

2013
Oyster Perpetual GMT-Master II

2013
Oyster Perpetual Cosmograph Daytona

2014
Oyster Perpetual GMT-Master II

2015
Oyster Perpetual Yacht-Master 40

2018
Oyster Perpetual GMT-Master II

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