CNC
series 900
series 1000

CNC TECHNOLOGY

BDF DIGITAL

100% ITALIAN TECHNOLOGY MADE IN ITALY

CNC900 / CNC1000
The advanced numerical control.

Thanks to its **expertise in numerical control,** BDF Digital (ECS CNC Division) presents its **CNC900 CNC1000** product families.

The versatile and highly performing architecture characterizing the **CNC900** and **CNC1000** series enables their use in various technological sectors: **milling, turning, waterjet cutting, plasma cutting, oxy-fuel cutting, 2D/3D laser cutting, and sheet metal bending.**

The hardware structure is modular and modern: with the management of different field buses, these CNC can control drives and both local and remote I/O interfaces.

Advanced algorithms for motion control with maximum speed and precision, combined with simple but powerful programming functionalities, make these CNC suitable for any type of machine tool.

All models are based on a standard operating system (Windows) and provide various connectivity technologies, ideal for Industry 4.0.

General technical specifications

- **Monitor (CNC900):** 15"/ 19" (4:3)
- **Monitor (CNC1000):** 19" (4:3) - 15,6" / 18,5" / 21,5" (16:9
- **Integrated touch screen**
- **Up to 32 interpolated axes**
- **CPU Intel 4 Core** 4GB Ram/HDU to 32GB (opz.128GB) SSD
- **Alphanumeric** keypad: membrane keypad (heavy-duty), or long-stroke keypad (ergonomic)
- **Machine keypad or push buttons:** membrane or industrial buttons, available with different layouts (handwheel, joystick
- **Field-bus connectivity:** EtherCAT (integrated), BDFLINK (gateway), Mechatrolink® 2 (gateway), SERCOS (gateway)
- **Analog and digital interfaces** (up to 2048 I/O): via EtherCAT modules
- **Hardware ports:** 3 x COM configurable ports / 2 x USB
- **Control loop:** speed or position
- **Support to gantry and tandem axes** (anti-backlash)
- **High compatibility with market devices** (I/O, laser sources, cutting and milling heads, etc.)
- **High ease of retrofitting:** interfaces for all previous ECS systems and third-party CNC.

CNC1000

Equipped with our **HMI Prime**, to feature a new human machine experience.

CNC1000 series features the new **HMI-Prime**: our gateway to cutting-egde human machine interaction. Ergonomic, easily customizable, multi-resolution capability, and available in all screen sizes and aspect ratios (4:3, 16:9, horizontal and vertical).

CNC901

The **CNC901** is the ideal numerical control for **milling, boring and drilling machines.**

The powerful programming geometry allows macro-instructions to realize, with just a few lines of program, complex features, such as: **ruled surfaces, circular and rectangular pockets**, deep slots, 3D surfaces defined by a flat profile and multiple section profiles and other complex geometric functions.

The **built-in editor**, in addition to the classic profiles, allows the guided programming of conversational macro: simply by filling in fields containing technological values, the machining can be performed with parametric macros or fixed cycles.

Technical specifications

- **RTCP (heads and tables)** - up to 7-axis machining
- **RTCP Auto Calibration** - by means of automatic cycles for kinematics measurement
- **HSC (high speed cutting)** – for standard dynamics management, or through FVS smoothing, or using polynomial curves (G69 mode)
- **Real-Time Graphic (RTG)** – for 3D visualization of the toolpath in wire-frame mode
- **Graphic simulation** – to verify the result of the programming
- **Graphic search** - to determine the starting point of the machining directly from the graphics
- **Turning cycles** – for turning operations on milling machines (combined machines)

Four programming languages:

- **ISO** (DIN 66024), (DIN 66024), a standard for programming of 2D profiles characterized by defined entities
- **GAP**, based on non-oriented geometry, allows to define profiles also characterized by geometric elements that are not fully defined
- **EXPERT**, based on oriented geometry and a extremely simple and intuitive syntax
- **LIP**, allows the creation of parametric programs (macros) that can be recalled

CNC902

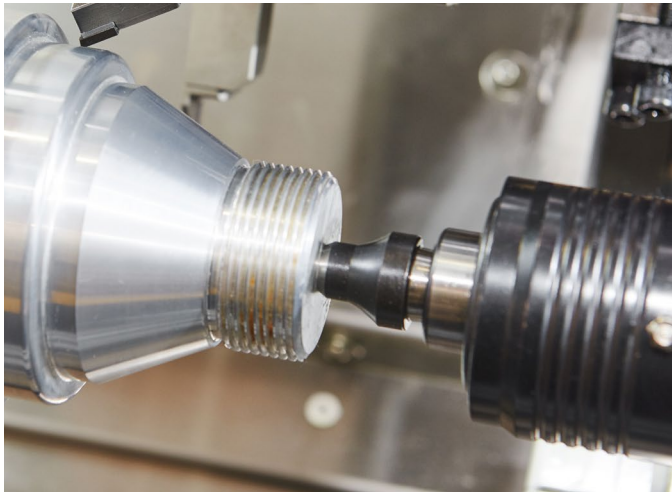
It's the **numerical control** designed **for turning.**

Equipped with a user-friendly human-machine interface, it groups the main functions according to the operational context, guiding the operator in selecting the right keys and thus improving ergonomics.

The built-in editor allows you to easily program even complex geometric profiles using the advanced programming languages available.

Real-time graphic provides a visualization of the **solid** of **revolution** (workpiece cross-section) that is representative of the result of the turning machine.

The **software** is then completed by the **management** of the **turning tools** (plates with tool orientation) **and cycles with C axis** on the spindle, for front (face) and lateral (skin) machining of the cylinder to be machined.



Technical specifications

- **Standard turning cycles** - for easy programming of common machining operations
- **Milling cycles** – for milling operations on lathes with a motorized tool
- **Real-Time Graphic (RTG)** – wire frame visualization of the revolution solid defined by the machining path
- **Plate tool management** - depending on tool orientation
- **C -axis management** – for front (face) and side (skin) machining of the cylinder
- **Graphic simulation** – to verify the result of the programming
- **Graphic search** - to determine the starting point of the machining directly from the graphics

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CNC905

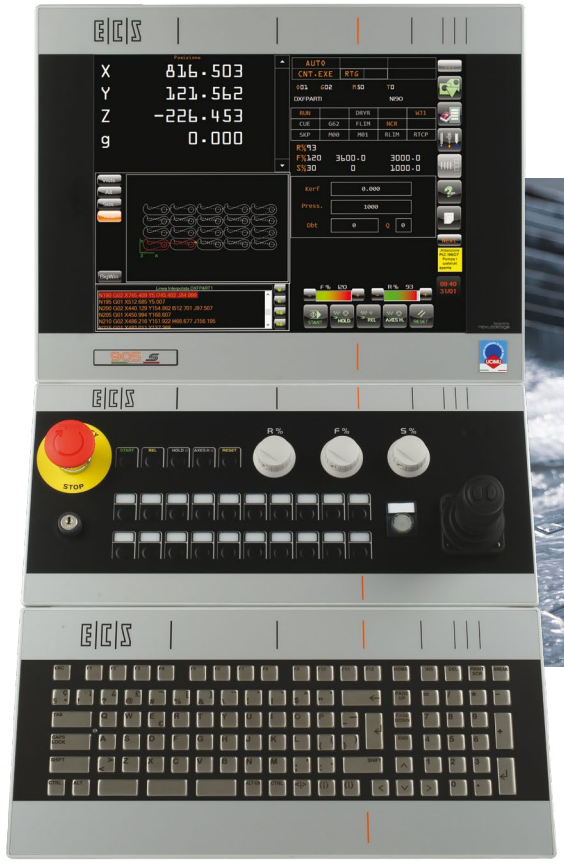
CNC for **cutting machines.**

The **CNC905** is the variant of the 900 family, ideal for application in **cutting machines** (waterjet, plasma, oxyfuel).

The CNC can be equipped with **Shape CAM**: a simple but powerful CAM® specific for cutting, which **guides the operator in machining**, and allows you to first choose the profile to work on, and then define the starting and ending points, along with their parameters.

It also allows you to intervene on a series of attributes of the chosen profile, with a **graphic simulation of the machining.**

Thanks to a suitable preview of the program, it is possible to save the processing and then recall it later.



Technical specifications

- **Retrace mode** - to reposition the cutting head
- **Automatic zoom/shift** of real-time graphics
- **TWA (Automatic RTCP)** - automatic head tilt calculation
- **Graphic search** - to determine the starting cutting point directly from the graphics
- **DRF mode** - real-time translation of the part-program origin
- **Technological database** - for the management of cutting parameters according to materials, cutting quality and technology
- **Surface mapping** - performs a preventive measurement cycle of the surface to cut
- **Machine management with multiple technologies** in different combinations: plasma+oxyfuel, waterjet+plasma...
- **Double gantry machine management** (2 CNCs communicating with each other)
- **Generator management integrated** with various fieldbuses: serial, EtherCAT, Ethernet, etc.
- **Automatic workpiece** alignment
- **Laser pointers management** for zeroing origins, also available on machines with double carriage
- **RTCP self-calibration cycles** - by means of automatic kinematic measurement cycles (head rotation centers).

CNC1011

CNC for **marble and stone** machining

CNC1011 features our **HMI Prime** version, the human machine interface specifically designed for touch screen, that lead the user to a new and exciting user experience. Besides, the **software architecture based on the APP concept**, that allows you to segment the features installed on board, make this model the perfect controller for **marble** and **stone cutting, milling and turning machines.**

In particular, the **CNC1011** is designed to control 3, 4 and 5-axis bridge milling machines; allows the complete on-board machining process management, starting from the import of the drawing, the digitalization of the slab with the camera, the placement of the cuts according to the grain, the slab cutting (also with automatic nesting), up to the 3D machining with cutting disc (by means of troweling cycles).

Technical specifications

- **Up to 32 interpolated axes**
- **Monitor** 15,6" / 18.5" / 21,5" (16:9 form factor)
- **Built-in touch screen**
- **QWERTY and/or machine keyboard support:** membrane (for heavy-duty), or long-stroke/ single buttons (ergonomics)
- **Keyboard accessories:** handwheel and/or joystick
- **Modular SW architecture:** features segmentation via APP architecture
- **CAM "ready":** to natively host thirdy parts CAM software
- **Manual cycles:** Multiple, inclined and 5-axis cuts also available in jog
- **Disk and cylindrical tools:** for cutting, profiled shapes, and 3D milling operations
- **Cutting & Disk-shaping:** Cutting and profiling cycles by means of disc tools
- **Photo management:** Origin setting, and marble grain management taking photo of the slabs
- **Vein matching:** Material grain-dependent cutting and machining
- **Import of DXF profiles:** integrated
- **Suction cup management:** for automatic slab handling

CNC1015

The **CNC** for **laser cutting.**

The **CNC1015** is the BDF Digital control for laser cutting machines, **for 2D flat cutting and 3D tube cutting.**

The **HMI Prime** human machine interface, provides unparalleled ease of use to CNC1015. Besides, it integrates all the features to control any state-of-the-art laser cutting machine. The management of a wide range of laser sources and heads, along with (constant) height control, make this CNC the ideal controller for laser machines.

It can be easily configured to manage fiber lasers of different brands, with analog sensors or directly via EtherCAT.

Preview functionality to view the profile to cut directly exploring the hard-disk, together with the **task scheduling** of machining sequences without opening or modifying the part-program, highlight the advanced technology of this CNC.

Technical specifications

- **Part-program preview -** to display the cutting profile
- **Machining scheduler -** to run a sequence of cutting programs
- **Technological Data Base -** for the management of cutting parameters
- **Height calibration cycles -** for automatic calibration of the height sensor
- **Fly-cut -** for matrix "on the fly" cutting (requires fast digital output)
- **Retrace mode -** to reposition the head on the cutting point
- **DRF mode** – allows real-time translation of the profile origin
- **Height control management** - to maintain the programmed focal distance
- **Automatic zoom/shift** of real-time graphics
- **Automatic resumption** of interrupted machining
- **RTCP head** 5-axis laser cutting with bi-rotary head
- **RTCP self-calibration** - by means of automatic kinematic measurement cycles (head rotation centers).

CNC900 Compact

The CNC based on compact architecture

The **CNC900COMPACT** family is designed for applications on compact, low-cost machines, but without sacrificing performance, maintaining the versatile, **high-performance architecture** of the CNC900 systems.

A single operator panel, housing the 12" screen, is sufficient to set up the entire machine: QWERTY keyboard for program editing (complete with biliteral keys for rapid input of instruction blocks), 5 machine keys and 1 PLC key (all with protection against accidental pressure), 3 potentiometers (feed, rapid, spindle) on the right-hand side, plus USB socket and two customisable switches on the left-hand side (e.g. emergency and key). In addition, digital and analogue I/Os are integrated, in order to cut costs of the whole machine.

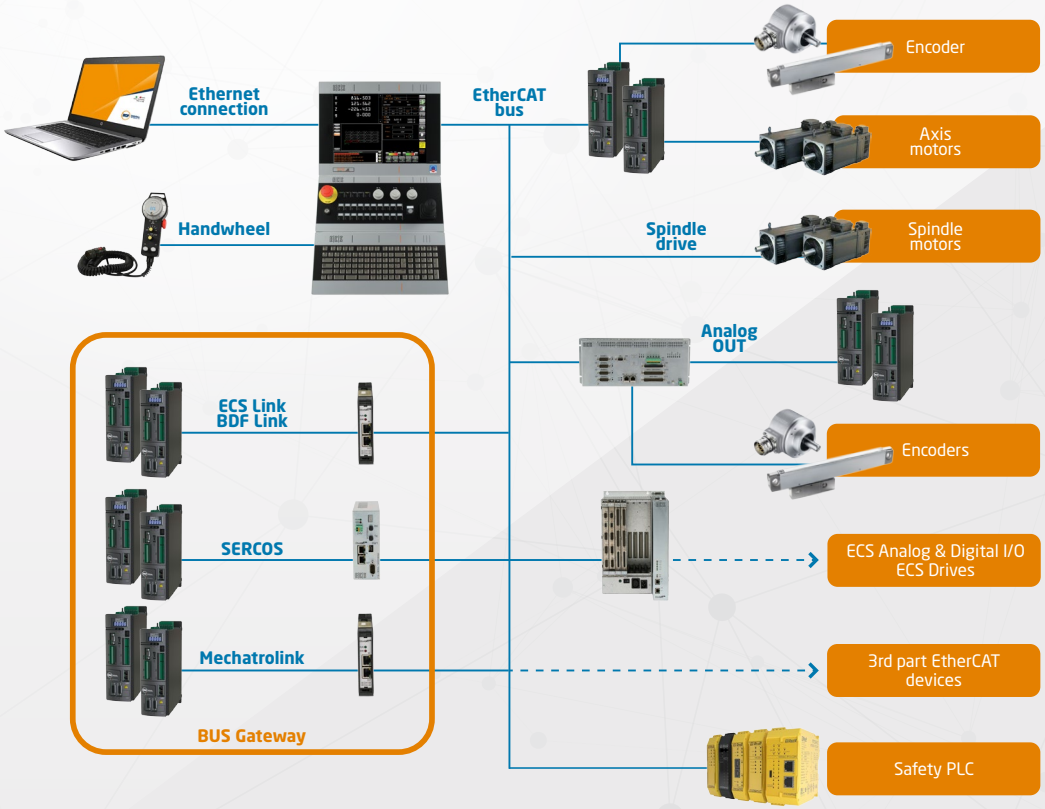
MILLING TURNING CUTTING

Technical specifications

- **Variants:** CNC901C (milling), CNC902C (turning), CNC905C (cutting)
- **LCD monitor with touch screen:** 12"
- **Max interpolated axes:** 3 (turning) / 4 (milling, cutting)
- **Integrated membrane QWERTY keyboard**
- **Integrated front USB port**
- **Integrated mini machine keyboard** (5 predefined machine keys + 1 PLC key with LED)
- **Front panel accessories:** pre-drilling for 3 accessories (e.g.: emergency stop, key, buttons, etc.)
- **Integrated analog and digital interfaces**
  - 16 digital inputs (opto-isolated; 24Vdc)
  - 8 digital outputs (opto-isolated; 24Vdc; 500mA)
  - 3 joystick inputs
  - 1 portable pendant input
  (+11 digital inputs for selectors and buttons)
- **Field-bus connectivity:** EtherCAT (integrated), BDF Digital Link (gateway), Mechatrolink® 2 (gateway), SERCOS (gateway)
- **Intel 4-core CPU** / 4GB RAM / 32GB SSD
- **Configurable COM ports**
- **1 x USB 3.0 + 1 x USB 2.0**
- **Remote EtherCAT analog and digital interfaces:** up to 2048 I/Os
- **Control loop:** velocity or position
- **High ease of retrofit:** mechanical compatibility with ECS CNC1800, and interfaces for all previous ECS and third-party CNCs.

SYSTEM CONFIGURATION	900C	901	902	905	1011	1015
Monitor [Inches]	12	15 / 19			15.6 / 18.5 / 21	
Aspect ratio	4:3	4:3			16:9	
Width [mm]	420	400			399/498/534	
Height [mm]	350	310			248/318/328	
Touch screen	X	X	X	X	X	X
Hard Disk (Standard/Optional) [GB]	32	32/128				
QWERTY alphanumeric keyboard	-	Opt	Opt	Opt	Opt	Opt
Machine push-button panel	Opt	Opt	Opt	Opt	Opt	Opt
EtherCAT field bus	X	X	X	X	X	X
BDF Digital Link, Mechatrolink® 2, SERCOS	Opt	Opt	Opt	Opt	Opt	Opt
Max number of axes/spindles	8	32	32	32	32	32
Operator panel duplication	-	Opt	Opt	Opt	-	-
INTERPOLATION AND CONTROL						
Control loop cycle time [us]	250					
Look ahead blocks	300					
Jerk Control	X	X	X	X	X	X
G69 Polynomial Interpolation	X	X	X	X	X	X
Speed loop control	X	X	X	X	X	X
Position Loop Control	X	X	X	X	X	X
Cross position error compensation	Opt	Opt	Opt	Opt	Opt	Opt
RTCP management of heads and tables	-	Opt	Opt	Opt	Opt	Opt
Automatic head RTCP management (auto TWA)	-	-	-	Opt	-	-
Tool life and wear control	Opt	Opt	Opt	Opt	Opt	Opt
Number of tools / turning plates	200	1000	1000	1000	1000	1000
Anti-backlash management (TANDEM)	-	Opt	Opt	Opt	Opt	Opt
GANTRY axis management	-	Opt	Opt	Opt	Opt	Opt
G31 constant height control	-	-	-	Opt	-	Opt
PROGRAMMING & FEATURES						
ISO/GAP/EXPERT/LIP programming	X	X	X	X	X	X
ON-OFF probe cycles	Opt	Opt	Opt	-	-	-
Remote diagnosis predisposition	X	X	X	X	X	X
Network (ethernet)	Opt	Opt	Opt	Opt	Opt	Opt
Virtual Axis Management	Opt	Opt	Opt	Opt	Opt	Opt
Tool integrity cycles (with touch and laser probe)	Opt	Opt	Opt	Opt	Opt	Opt
Mill-lathe management	-	Opt	Opt	Opt	Opt	Opt
Lathe-mill management	-	Opt	Opt	Opt	Opt	Opt
CAM Turning	-	-	X	-	-	-
Macro G666 Monotonic Roughing	-	-	X	-	-	-
Cylindrical interpolation management	Opt	Opt	-	-	-	-
C-axis turning management (TRANSMIT)	-	-	Opt	-	-	-
Technological database (plasma oxyfuel /waterjet / laser)	-	-	-	X	X	Opt
Part-program preview	-	-	-	-	-	Opt
Tasks scheduler	-	-	-	-	-	Opt
CONNECTIVITY						
i4.0 ready connectivity	Opt	Opt	Opt	Opt	Opt	Opt
CUSTOMIZATION						
HMI customization via HMIPro-Studio	X	X	X	X	X	X
HMI customization via C, C++, C#	X	X	X	X	X	X
PLC Programming	C/C++	C/C++	C/C++	C/C++	C/C++	C/C++

System Architecture



Pre/post sales services

BDF Digital is able to **offer complete support** to its customers in all phases of the machine's life.

Starting with **pre-sales consultancy**, we can provide technical and commercial support aimed at choosing the most appropriate configuration, depending on the type and technology of the machine.

Our technical network can also support commissioning to expedite CNC setup, calibrations, and any necessary customization.

We are able to provide assistance on the installed fleet of machines with **telephone assistance, service and spare parts** on all ECS equipment, even the oldest.

Service 840 000 567-1

Retrofitting 840 000 567-2

Training 840 000 567-3

PC-based simulator

The **CNC900/CNC1000 systems** have their own corresponding "digital twin" in the "office PC" version, which allows a **realistic simulation of the machine.**

Useful for the manufacturer for the fine-tuning of the application (PLC and machine data) without having the real CNC, it also allows the machine operator to simulate the **off-line machining**, ideal for training, education, and tests on part-programs.

Available in two versions: "**free**" for your simplest tests or "**full**",that is 100% configurable like the real CNC, for any machine morphology (configurability of: number of axes, spindles, PLC, HMI, etc.).

Connectivity and Industry 4.0

BDF Digital provides a **CNC and/or PLC data export package**, configurable according to the customer's needs, for data exchange with external management systems (MES, ERP).

In addition, in the case of more complex needs, it is available **our COM technology library** for **Windows** that allows direct access to all the data and commands of the CNC Kernel.

Unrivaled Customization

Our CNCs come with a **modern and user-friendly HMI human/ machine interface.**

Through the **proprietary software "HMIPro-Studio"** it is possible to customize the pages already provided by default, or add new ones as well as it is possible to create a totally customized HMI.

Finally, BDF Digital can also supply the **CNC with a customized operator panel** in the console mechanics, for ever greater customization.

Accessories

QWERTY keyboard (membrane and long-stroke keys)

- 88 keys complete with numeric keypad
- IP65 contamination protection
- Maximum typing ergonomics
- CNC connection via RS485

Modular machine keyboard

- Four modular parts including keys, switches and overrides
- Customisable 22 mm diameter holes for electrical terminals
- Panel handwheel / joystick

Membrane Machine Keypad (Handwheel or Joystick Option)

- 5 pre-configured CNC keys
- 20 backlit keys with customizable nameplate
- Emergency button
- Key switch and power button
- 3 override
- Handwheel (option)
- Joystick (optional)

Small-size machine keyboard

- Equipped with override
- CNC Keys
- Keys for special functions
- Emergency button

Portable Handwheel

- Direct connection to the machine keypad
- Selection for up to 8 axes
- Increment selection
- Emergency button
- 2 “dead man” buttons
- Configurable buttons

4-axis analog board

- 4 x 5VTTL encoder inputs
- 4 analog outputs 10V 16 Bit
- 48 x 24V digital inputs
- 8 x 12 Bit analog inputs
- 32 digital outputs 24V 100mA
- EtherCAT communication

BDFLINK bridge

- Bridge for drives with ECS protocol
- Suitable to host ECS I/O on CanBus interface
- EtherCAT communication with central unit

SERCOS bridge

- Bridge for drives with SERCOS protocol
- EtherCAT communication with central unit

Inductosyn card

- +24V Power supply
- 3 Inductosyn® transducer inputs
- 1 Resolver transducer input
- EtherCAT communication with central unit

MECHATROLINK bridge

- Bridge for drives with Mechatrolink 2 protocol
- EtherCAT communication with central unit

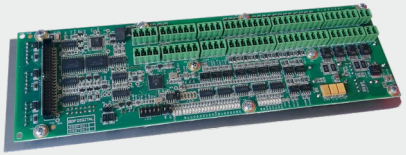
CPU stand-alone (passive monitor)

- 1 x VGA port
- Panel cabinet mounting
- Keypad and push-button panel connection (up to two operator stations)
- Integrated management of the UPS (opt.)
- RS232, Ethernet, EtherCAT, USB

DOCK STATION rack (3/8 slots)

- maximum 3 / 8 cards (both analog and digital I/O cards)
- EtherCAT communication with central unit

RS232 Remote I/O Card



- +24V power supply
- 16/8 Digital I/O (opto-isolates 24V 500mA)
- 1 x Portable Flyer Input (+11 Digital inputs for selectors and buttons)
- 3 Rapid, Feed, Speed knobs with potentiometer or encoder
- 1 x 3D joystick (3 analog inputs 0...5V)
- 6 x 12 Bits analog inputs (0... 5V; 0... 10V; -10V...+10V)

Market & Applications

Automation

GLASS | PACKAGING | PLASTIC | METAL | PAPER | HVACR | ROBOTIC | TEXTILE | CABLEWAY

Energy

WIND | HYDRO | HYDROGEN | SOLAR | STORAGE

Machine Tools

TURNING | MILLING | BENDING | CUTTING | MARBLE WORKING

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