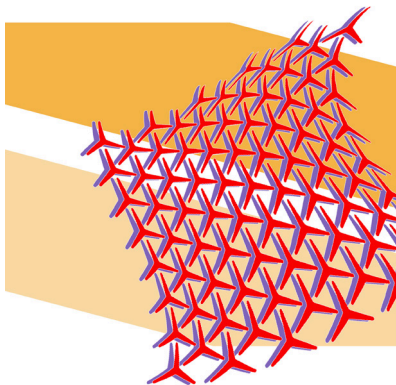


## Reviews

Mara Capone

***Dal piano alla superficie. Strumenti e metodi per costruire forme complesse***

FrancoAngeli  
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**Dal piano alla superficie**  
Strumenti e metodi per costruire forme complesse

FORME DEL DISEGNO  
FrancoAngeli

The book *Dal piano alla superficie. strumenti e metodi per costruire forme complesse* by Mara Capone presents itself as an articulated, in-depth work capable of tracing a coherent trajectory that connects the conception, representation, and transformation of geometric forms. The volume systematically addresses the different levels of complexity inherent to the subject, both from a theoretical and an operational perspective, also making use of the most advanced digital techniques currently available in the field of geometric modelling and parametric design. Its overall goal is to show how an understanding of geometric rules can serve as an essential foundation not only for grasping three-dimensional forms, but also for their conscious generation and practical production.

Within the discussion, Descriptive Geometry plays a primary role: it provides the conceptual basis for investigating three-dimensional shapes, understanding their internal logic, and analysing the processes that generate them from the bidimensionality of flat surfaces. In *Chapter 1*, for example, a significant portion of the text is devoted to classifying surfaces according to their geometric origin –surfaces of revolution, translation surfaces, helicoidal surfaces, ruled surfaces, interpolated surfaces– a categorization that is fundamental for

anyone wishing to approach the generation of forms methodically, including by parametric tools.

A distinctive feature of the volume is the presence of frequent and well-targeted references to the historical origins of the scientific topics discussed. These are not simple digressions, but true interpretative tools through which the author highlights the variety of perspectives that have shaped the debate on geometric representation over time. This is the case, for example, with the introduction of the concept of differential classification of surfaces (*Chapter 2*), introduced by Leonhard Euler; taken up by Gaspard Monge, and later systematized by Carl Friedrich Gauss in 1902. The reference to Gaussian curvature thus becomes an opportunity to underline the close relationship between pure Geometry and Descriptive geometry, showing how a mathematical concept can become an operational tool for distinguishing, understanding, and representing surfaces with specific characteristics, such as developable surfaces. Developable surfaces, characterized by zero Gaussian curvature, receive particular attention in *Chapter 3*, where various methods for their construction and manipulation in virtual environments are illustrated. The discussion introduces a classification of developable

surfaces divided into conic, cylindrical and tangential ones. The latter hold a particularly significant place: they can be generated through geometric locus curves, intersection curves, or graphic lines, and the text carefully addresses each of these methodologies in a distinct and accurate manner.

The book includes numerous elaborations developed through VPL (Visual Programming Language) procedures. The use of visual language makes it possible to clearly express the logical steps that guide form construction, highlighting components, relationships, and control parameters. The choice of VPL also helps readers less experienced in traditional coding to approach complex processes such as parametric generation and subsequent surface transformation. *Chapter 4* illustrates in detail the methods for flattening developable surfaces, implemented through specific scripts applied to particularly significant case studies, such as the developable helicoid. The section opens with a solid theoretical overview enriched by historical references that help clarify the motivations and evolution of the problem. It then shows the construction of the helicoid in a VPL environment and introduces the developable script, an advanced tool capable of addressing the complex problem of unfolding a generic tangential surface –an operation that is not always achievable with the standard functions of some of the most common modeling software.

The volume does not overlook the topic of non-developable surfaces, which cannot be flattened onto a plane without tearing or overlapping. In this regard, techniques for converting digital models into physically producible elements are illustrated. Paneling, for example, makes it possible to build even double-curved surfaces

by discretizing them into rigid, non-deformable panels capable of assembling into multiple configurations. Alongside this is discretization into strips, and the introduction of procedures involving small overlaps through bending or controlled 'breaks', known as kerfing, is also essential. Kerfing, in particular, is described as the practice of making strategic cuts in a flat panel to allow it to adapt to the desired three-dimensional curvature. Particularly interesting is the application of these techniques to the hyperbolic paraboloid, a ruled but non-developable surface that represents a case study rich with practical implications.

From the earliest pages, it is evident that the purpose of the text is not limited to the theoretical dimension: on the contrary, its ultimate goal is to guide the reader toward the constructive phase, through a path that links the knowledge of surfaces to their actual manufacturability. In this sense, the parametric approach offers the designer a wide repertoire of configurations and alternatives, which can be selected and adjusted through the variation of parameters and components. *Chapter 5* deals with techniques devoted to prototyping, aimed at simulating complex configurations obtained through kinetic processes that, starting from a flat surface, lead to three-dimensional forms. These virtual models allow experimentation with the fabrication phase as well, offering the possibility to verify and optimize the design. Particularly striking is the reflection on process reversibility, which in theory would allow one to return from the three-dimensional configuration to the two-dimensional one, highlighting the potential of truly bidirectional design.

The section dedicated to kerfing fully demonstrates the effectiveness of this

technique in the prototyping phase. The text distinguishes cuts executed on only one side of the surface, suitable for developable forms, from cuts on both sides or through-cuts, necessary for non-developable surfaces. These procedures are made possible by the definition of advanced algorithms capable of managing the application of cutting patterns in relation to the geometric properties of the surface.

The volume concludes with a sixth chapter entirely devoted to applications. At this stage, the focus shifts from theory and the many steps of virtual generation to the concrete dimension of material forms, which demonstrate how the properties of different materials can be exploited within logical processes that are both replicable and adaptable to diverse design needs. Examples drawn from the literature highlight the centrality of developable surfaces, followed by prototypes made from various materials, from polypropylene to plywood to aluminium, showing how each one requires specific considerations.

The text also pays particular attention to strategies for obtaining non-developable surfaces starting from flat elements, mainly presenting two cited approaches: discretization through paneling and the transformation of the surface into developable strips. In both cases, an approximated form capable of following the desired curvature is obtained. While panels and strips are generally made from rigid, non-deformable materials, the author notes that deformable or form-taking materials such as membranes or concrete can also be used, offering greater flexibility and sometimes reversible processes.

In conclusion, *Dal piano alla superficie* demonstrates particular care in combining theoretical principles, operational procedures, and design experimentation.

The clear language and the richness of illustrations support not only the understanding of concepts but also the imagination of variations and adaptations useful in different contexts. The work fully belongs to the field of Architectural Geometry, a discipline that makes geometry the foundation of architectural

form, integrating it with computational methods and contemporary production techniques. By focusing on curved surfaces, the text tackles one of the most important themes of Drawing as a discipline, offering readers an approach that is anything but passive: despite the theoretical complexity, the volume

provides concrete and replicable examples, making it a valuable tool both for those interested in theoretical aspects, including learners in design education, and for technical professionals wishing to deepen their understanding of the relationship between geometry, design, and construction.

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