



GRAZIANO™

Shifting Solutions

SYNCHRONIZERS and POWERSHIFTS



**The widest product offering with worldwide,
best-in-class manufacturing technology**

Powering Innovation To Move Our World

After more than **40 years** of exceptional performance, Graziano™ Shifting Solutions is a globally leading brand of **precision components** for all the major manufacturers of agricultural tractors, construction equipment, trucks, commercial vehicles, and specialized automotive applications.

We have the know-how and manufacturing capability to meet **any customer's specific transmission needs**, including the design and production of synchronizer systems for tractors, crown wheels and pinion sets, single-drive components, and complete powertrains.

Construction 

Agriculture 

 Trucks and Buses

 Utility Vehicles

 Light Vehicles



Global leader in **Synchronizer systems**

We supply shifting solutions to deliver optimal performance through reduced fuel consumption and that can be integrated with other solutions from Dana for both **traditional drivelines and e-drives**.

Dana is a leading global Tier 1 supplier of complete synchronizer systems for off-highway and on-highway applications

Decades of experience in **synchronizer design**, with the expertise to guide customers to the best tailored shifting solution

Over a million synchronizers every year for tractors, construction equipment, passenger cars, and trucks



More than 200 thousand powershifts and welded clutches annually for off-road vehicles

Most agriculture vehicles in production today are equipped with our shifting solutions

Wide customer base in **off-highway** and **commercial-vehicle** markets

Global footprint with manufacturing plants strategically placed around the world to meet the needs of global customers while addressing the specific transmission requirements in local markets

Manufacturing and delivering **Tailor-made systems solutions**

From **research and development to production**, we are the single source to support you through every step.

We start with an **analysis** to collect data and determine performance expectations as we specify stakeholder requirements and target settings.

We then **define system requirements**, including preliminary performance verifications, cost analysis, and concept design definitions.

This process enables us to manufacture and deliver **tailor-made system solutions** supported by a seamless quality-control system



1

**CUSTOMER DATA
and TARGET SETTING**

2

CALCULATION

Synchro performance analysis (time, torque, shifting comfort), installation study, preliminary durability assessment

3

FEA ANALYSIS

Structural static and dynamic, linear/non linear, contacts pattern

4

DESIGN OPTIMIZATION

Simulation software, synchro and bench test models, calibration, prototyping

5

MANUFACTURING

Production capabilities, full product range

6

**DELIVERY AND
AFTERMARKET
SERVICE**

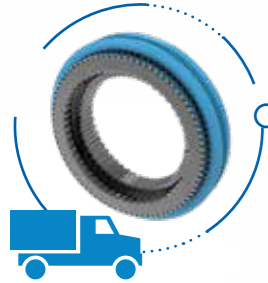
The widest range of Synchronizers and Powershifts For any shifting solutions

We manufacture **synchronizers and powershifts** with diameters from 62 to 184 mm, offering a wide range of shifting solutions **to save customers' development time and cost.**



SC 90 / CSS 90 Synchronizer

Robust and reliable with an optimized design for heavy-duty applications



SC 184 Synchronizer

Modular single- or double-cone designs to accommodate a wide range of applications



SC 62 Synchronizer

Compact single-cone design ideal for compact transmissions

DC 95/100 Synchronizer

Double-cone solution for up to 40% faster synchronization, with higher torque engagement capabilities



TC 102/110/118 Synchronizer

First triple-cone design for the agriculture market. New friction material for heavy-duty applications, plus outstanding torque capability in a compact radial package



Powershift Clutches

State of the art technologies available for clutch housings, including flow forming, grob rolling, and broaching with laser or electron-beam welding

Powershift Units



Product range

Pitch Diameter (mm)	95,00	137,16	144,78	150,00	152,40	159,00	165,00	172,80	175,26	174,00
Module	2,5	2,54	2,54	3,00	2,54	3,00	2,50	2,40	2,54	3,00
Number of teeth theoretical	38	54	57	50	60	53	66	72	69	58

Product range

Single-Cone	62	68	74	82	90	114	114HD	153	168SM	168	184
Double-Cone	71/76		86.5/92		95/100		109/116.		128/135		162/170SM 162/170
Triple-Cone	67/71/76				90/95/100			102/110/118			

Dana is developing new shifting solutions for electrified applications to address surging demand and increased opportunities in the value chain.



Quality and excellence In any phase of production

Our **worldwide research and development teams** work in perfect synergy to share knowledge and expertise.

Our **high standards of quality and reliability** are delivered through our expert technicians and innovative control procedures.

We've made substantial **investments to meet customer demand**, including manufacturing know-how and innovation, vertical integration, and in-house prototyping and testing capabilities.

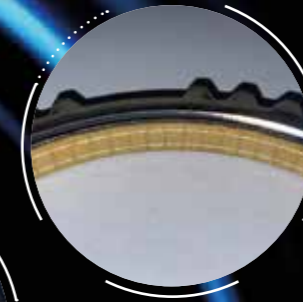
LAB TESTS

Horizontal synchronizer test bench

Vertical synchronizer test bench

Bench and vehicle shiftability tests

Clutch manufacturing technologies



FRICION MATERIALS

Multiple friction linings, including bronze, molybdenum, carbon - woven and powder

High dynamic friction coefficient to minimize synchronization time

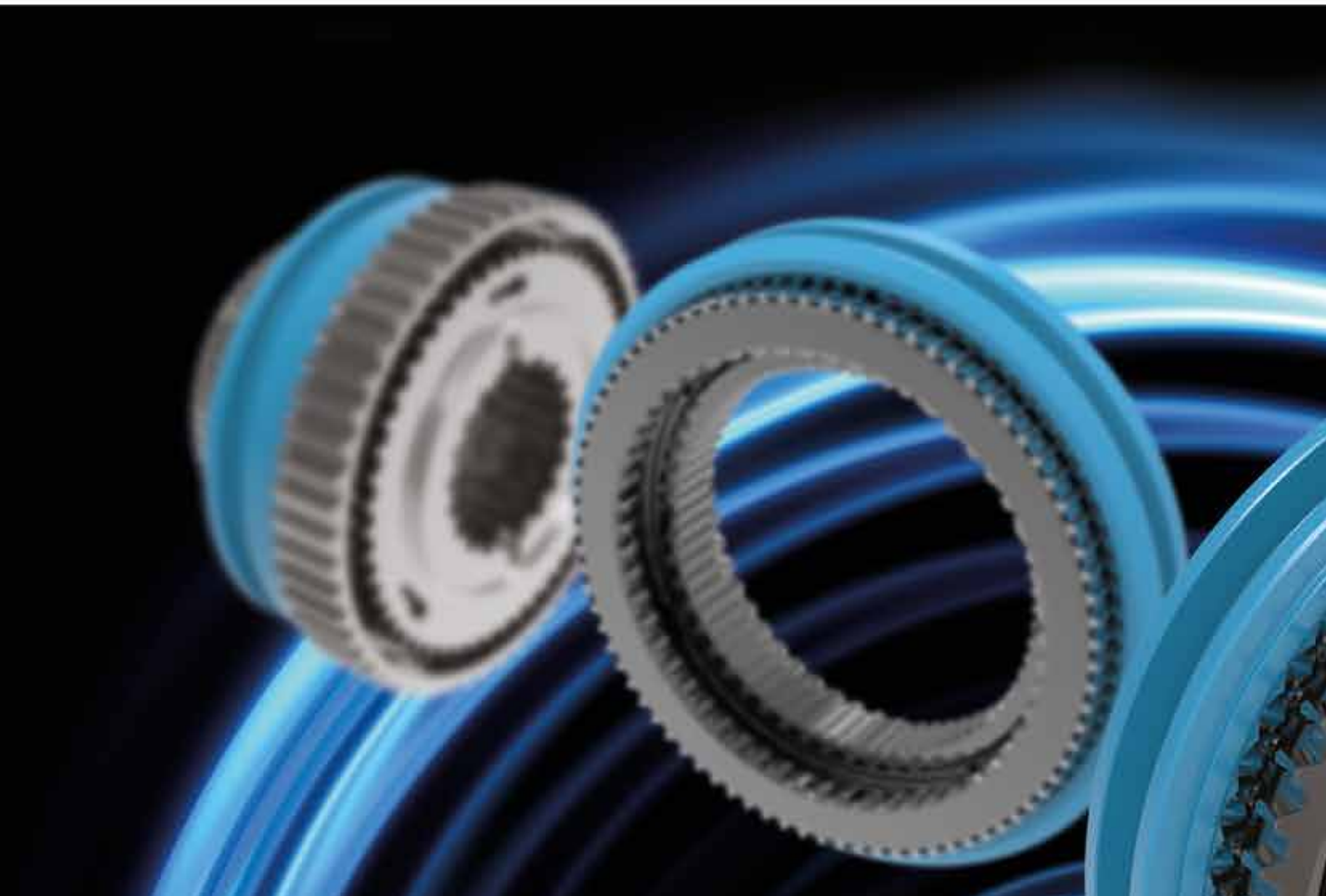
Low static friction coefficient to minimize cone blocking effect

Ability to maintain constant above coefficients during synchronization phase

Resistance to friction for long life

Oil evacuation capability to prevent malfunctions, especially at low ambient temperatures

Optimal compatibility with oils used in synchromesh transmissions



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Application Policy

Capacity ratings, features, and specifications vary depending upon the model and type of service. Application approvals must be obtained from Dana; contact your representative for application approval. We reserve the right to change or modify our product specifications, configurations, or dimensions at any time without notice.



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