Shaft Couplings — Jaw, Pin-and-Bush and the Service-Factor Method

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Picking a flexible coupling honestly: what jaw (spider) and pin-and-bush types each forgive, the service-factor method that sizes from motor power and duty rather than shaft diameter alone, elastomer spider hardness, misalignment budgets versus alignment practice, and the wear signs that say the spider — or the alignment — is gone.

Two classics, two characters

Jaw (elastomer spider)	Pin-and-bush
How it transmits	Two cast hubs interleave through an elastomer star in compression	Driving pins through elastomer bushes — e.g. the stocked FCL-140, cast iron with NBR bushes
Strengths	Compact, cheap, damped, fail-tolerant (jaws still drive after spider death — loudly)	Larger sizes economical, bushes replace individually, tolerant of rough duty
Spider/bush choice	Shore hardness trades damping for torque: softer = quieter, harder = stiffer and higher rating	Bush compound by temperature and oil exposure
Typical post	Motor-pump sets, fans, gear units (clamp-hub jaw example)	Medium machinery, crushers, older marine auxiliaries

Size by service factor, bore by shaft

The honest sizing path: nominal torque = 9550 × kW ÷ rpm, multiplied by a service factor for the duty — ~1.0–1.25 for smooth loads (centrifugal pumps, fans), 1.5–2 for reciprocating compressors and frequent starts, higher for reversing/shock duty — then pick the coupling size whose rated torque exceeds it, and only then check both shafts fit the bore range. Sizing by "it fits the shaft" is how under-rated couplings end up on compressors. Keyways to DIN 6885 remain the norm; clamp and taper-bush hubs (see the taper-bush finder) solve worn-shaft and stock-bore realities.

Misalignment budget "` alignment target

Catalogue misalignment figures are survival limits, not goals — every tenth of a millimetre of offset becomes heat in the elastomer and load on both bearings. Align to the machine maker's figure (far tighter), and let the coupling's allowance absorb thermal growth and settling.

Spider autopsy tells the story: evenly polished lugs = normal aging; one-sided wear or powder = misalignment; melted = overload or wrong hardness; torn = shock beyond rating.

Spiders and bushes are consumables — stock one set per machine class; replacement restores the coupling for the cost of an elastomer, and planned swaps at overhaul (alongside compensator inspection) prevent the 2 a.m. variety.

Drivetrain context: motor end sized per the IEC frame chart; belt alternatives in the V-belt finder.

Around 540 jaw-pattern line items plus pin-and-bush sizes are stocked; quote kW, rpm, duty character, both shaft diameters and the old coupling's marking (size is usually cast into the hub) for a 24-hour match — spiders and bushes quoted by coupling size and hardness.

Frequently asked questions
How do I size a coupling for a 7.5 kW 1450 rpm pump?Nominal torque "H 9550 × 7.5 ÷ 1450 "H 49 Nm; a centrifugal pump's service factor ~1.25 gives ~62 Nm design torque — choose the size rated above that, then confirm both shafts sit in its bore range.What does spider hardness (Shore) change?The trade between damping and capacity: softer spiders (lower Shore) absorb more vibration and misalignment but rate lower torque and run warmer; harder spiders carry more torque with less give. Replace like-for-like unless solving a specific problem.Can I replace just the spider in a jaw coupling?Yes — it is the designed consumable, swapped by sliding one hub back (or lifting the spider out radially on open designs). Inspect hub jaws for hammering first; rounded jaws mean the hubs ran metal-to-metal and need renewal.Why does the new spider keep failing in weeks?The coupling is telling you about the machines: misalignment, soft foot, or torque beyond the size's rating (check the service factor against actual duty). Elastomers are the fuse — re-align and re-size before buying spiders in bulk.Jaw coupling or pin-and-bush for a big blower?Both serve; jaw dominates to mid sizes for cost and compactness, pin-and-bush earns its keep on larger frames where individually replaceable bushes and rough-duty tolerance matter. Above both sit tyre and disc types for special cases.

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