# 人力资源规划中英文对照

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*第一篇：人力资源规划中英文对照天津农业学院结课论文报告书题目中小企业人力资源规划 专业班级学生姓名学号指导教师Human resources planning of small and medium enterprises Human r...*

**第一篇：人力资源规划中英文对照**

天津农业学院

结课论文报告书

题目中小企业人力资源规划 专业班级学生姓名学号指导教师

Human resources planning of small and medium enterprises Human resources in corporate governance, not only has the human resources planning and strategic leader in the implementation of corporate strategic planning and overall development objectives of the course also has a vital role in this.At present, an increasing number of SMEs in the development of human resources planning is there are a lot of confusion and helplessness.First of all, let us take a look at the implementation of small and medium-sized effect of human resource planning are not ideal because:1.Human resource planning is not fully familiar with

Human resource planning is the development of strategic planning an important component of the enterprise but also the human resources management of the

foundation and basis.And the management of small and medium-sized and HR are not fully aware of precisely this point, so that the specific process of the formulation and implementation of a lack of sufficient attention, at all levels of department heads and line managers can not effectively cope with.2.The strategic objectives of the company is not clear small and medium-sized general lack of a clear development strategy,particularly in the rapid expansion phase, are often involved in different business areas, including in many emerging industries.These new industries in R & D,marketing, management, and service all aspects of the experience does not mature for reference, especially to open up some new projects, setting a quota of work posts and not as mature as traditional business.Therefore, in human resources management can not have a clear plan, can only go one step further and look forward.3.Changes in the external environment company too fast, not planning Changes in the development of the market very quickly, and with the market despite changes in the industry to make plans, to reach a rate of year-end target of 20%-30%, however.If an IT company is a regional association in one of the major agents.In the beginning of the year, the company\'s Human Resources Department in accordance with the company\'s annual development strategy this year to develop the company\'s human resources planning.But in the new year began less than three months, the Lenovo Group\'s own strategy, the significant changes in organizational structure.So the supply chain as a part of the IT companies need to be adjusted throughout the company\'s human resources planning, in accordance with the

requirements of a new company set up with the establishment, re-enact a series of related training programs.In fact, the external political, economic, legal, technical, cultural and other factors has been a series of dynamic changes, will cause a

corresponding strategic objectives of the enterprise constantly changing, which in turn may lead to subsequent changes in human resource planning.4.Lack of human resources planning and personnel expertiseAt present, although many small and medium-sized set up a Human Resources Department, but the functions of the departments responsible in the exercise, the

prevalence of some problems, mainly reflected in: first, the overall quality is not high, very few professionals, lack of expertise reserves, lack of professional skills;Second, the lack of vocational training system;third, who was born and raised a number of human resources work, do not have good training, no formal influence of large corporations, low vision.Human resources planning is to organize the protection of sustainable

development, the importance of seeking development and growth, particularly in the small and medium enterprises.Most of the current characteristics and the operation of these enterprises are facing the problem of work, we propose the following recommendations:

1.Clear core of human resources

The starting point for human resources planning is to clearly define the

company\'s core competitive advantages, that is, the business environment in the

enterprise, he is the survival value? His resources to maintain a competitive advantage for that? Take in order to maintain its competitive edge to find the real core of human resources.The core of human resources is to determine the survival and development of enterprise key factors, the need for incentives, education and training, design an appropriate career plan, and continuously to ensure that the recruitment of the core group of human resources capacity expansion, quality improvement, and long-term presence in the enterprise.2.Flexibility to develop forward-looking human resources planning

The so-called flexibility of human resource planning, is based on the core

competitiveness of enterprises, re-evaluation and planning of human resources in enterprises, and form a general combination of human resources in order to ensure that the needs of enterprise\'s core competitive advantage of the conditions to meet the demands arising from the external business environment caused by temporary changes in human needs.In particular, in the assessment of the existing stock of human resources and define their core human resources on the basis of preparatory

support the development of manpower planning and training programs accordingly, and its goal is the production or service enterprises are facing capacity expansion of opportunities, as soon as possible, with middle-level officers at the core support staff to enhance the organizations ability to respond.3.The establishment of three-dimensional model of human resource managementThree-dimensional model, is defined as decision-making, human resource

management departments, first-line manager is responsible for the scientific pision of labor and human resources management of the business, and the corresponding collaboration.In general, the decision-making level responsible for strategic planning and human resources to support the Human Resources Department, line manager, human resources work;human resources management department is responsible for job analysis, job evaluation and other infrastructure services, and to assist front-line managers do a good job in the core business and to help decision-making to do a good job of human resources strategic planning;first-line managers responsible for management of human resources in the core business in the key link to hold, and to assist Human Resources Department to do a good job analysis and job evaluation of posts and other infrastructure, as well as to assist decision-making to do a good job of human resources strategic planning.对应中文翻译：

中小企业人力资源规划

在企业的人力资源治理中，人力资源规划不仅具有先导性和战略性，在实施企业总体发展战略规划和目标的过程中也具有举足轻重的作用。当前，越来越多的中小企业人力资源规划的制定更是存在许多困惑和无奈。

首先让我们分析一下中小企业人力资源规划实施效果不尽理想的原因： 1.对人力资源规划的熟悉不全面

人力资源规划是企业发展战略规划的重要组成部分，同时也是企业各项人力资源治理工作的基础和依据。而中小企业的治理者和HR们恰恰没有充分意识到这一点，从而在具体制定和实施过程中缺乏足够的重视，各级部门主管和直线经理也未能有效配合。

2.公司战略目标不明确

中小企业一般缺乏较明确的发展战略，尤其在快速扩张阶段，往往涉足于不同的业务领域，其中不乏许多新兴产业。而这些新兴产业在研发、营销、治理、服务等各个环节没有成熟的经验可以借鉴，尤其是一些新开拓的项目，定岗定编工作不象传统业务那么成熟。因此在人力资源治理方面也不可能有明确的规划，只能是走一步，看一步。

3.企业外部环境变化太快，不易规划 市场发展变化速度很快，而行业尽管随市场变化而作规划，到年终目标达成率也不过20%-30%.事实上，企业外部的政治、经济、法律、技术、文化等一系列因素一直处于动态的变化中，相应地就会引起企业内部的战略目标不断地变化，从而又会导致人力资源规划随之变化。

4.缺乏人力资源规划的专门技术与人才 目前，虽然许多中小企业成立了人力资源部，但在行使部门职能的时候，普遍存在一些问题，主要表现在：第一、整体素质不高，专业人员很少，专业知识储备不足，专业技能不够；第二、缺乏系统的职业培训；第三、许多人力资源工土生土长，没有受过良好的培训，没有经过正规大公司的熏陶，眼界不高。

人力资源规划工作是组织可持续发展的保障，其重要性对于寻求发展壮大的中小企业尤为突出。针对当前大多数中小企业的经营特点和工作当中面临的问题，我们提出以下几点建议：

1.明确企业核心人力资源

人力资源规划的起点是明确界定企业的核心竞争优势，也就是在企业的经营环境中，他的生存价值是什么？他保持竞争优势的资源是什么？籍此才能真正找到保持竞争能力的核心人力资源。核心人力资源是决定企业生存发展能力的关键因素，需要激励机制、教育培训、设计合适的职业生涯计划、不断的招聘才能确保核心人力资源群体量的扩充，质的提高，并能长期的驻留于企业。

2.制定具有前瞻性的弹性人力资源规划 所谓弹性人力资源规划，就是基于企业的核心竞争能力，重新评估并规划企业的人力资源，形成一个一般性的人力资源组合，以便在保证企业核心竞争优势需要的条件下，达到满足因外部经营环境变化导致的临时性人力需求的目标。具体而言，就是在评估现有人力资源存量和界定企业核心人力资源的基础上，制定预备性的支援人力规划，并做出相应的培训计划，其目标是在企业面临生产或服务能力扩张性机遇时，尽可能快地为核心人员配备中层支援人员，以提高组织的反应能力。

3.建立三维立体人力资源治理模式 三维立体模式是指由决策层、人力资源治理部门、一线经理科学地分工负责人力资源治理的各项业务，并进行相应的协作。总的来说，决策层负责人力资源战略规划和支持人力资源部门、一线经理的人力资源工作；人力资源治理部门负责岗位分析、岗位评价等基础业务，并协助一线经理做好核心业务和协助决策层做好人力资源战略规划；一线经理负责在人力资源治理的核心业务中把持关键环节，并协助人力资源部门做好岗位分析和岗位评价等基础工作，以及协助决策层做好人力资源战略规划。

**第二篇：部分规划用语中英文对照**

部分规划用语中英文对照（持续更新中）2025年12月05日 09:38:51

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Overall Site 总场地

Global position 地理位置

Location Plan 位置图

Site photos 现场照片 Vision 规划远视

Overall master plan 总体规划 Concept plan 概念图

Multi-cultural area-concept plan 多元文化区概念图

Agri-recreational area-concept plan 休闲农业区-概念图 Outdoor sports 户外运动区Land use schedule 用地指标

Land use plan 用地规划图 Circulation 交通流线

Infrastructure 基础设施配套

Infrastructure plan 基础设施配套图

Ecology environment protection 生态环境保护

文档冲亿季，好礼乐相随mini ipad移动硬盘拍立得百度书包

Planning basis 规划根据

Investment return analysis 投入产出分析 Event calendar 项目览表 E x amp l e s 案例Detail plan 大样图

Shadow studies 日照分析图 Building height 建筑高度 Building use 建筑用途

Circulation plan 交通流线图

On ground parking+circulation 地面停车场 + 交通流线 Building levels 建筑标高

Basement parking 地下室停车场 Section lines 剖面图引线 Section 剖面图

Road section 道路剖面图 Phase 1

一期(A)开发 Starting area 起步区 Phasing 分期

Cycling trail 自行车道

继续更新中。今天给出的是《城市规划标准规范集》中的第二部分 保留地 reserved land 步行街pedestrian street 仓储区warehouse district 仓储用地 warehouse 城市city

城市布局 urban layout

城市道路面积率 urban road area ratio 城市道路网 urban road network

城市道路网密度density of urban road network城市道路系统 urban road system 城市对外交通 intercity transportation 城市发展目标goals for urban development 城市发展战略 strategy for urban development城市防洪 urban flood control

城市防洪标准 standard for urban flood control 城市防洪工程urban flood control engineering 城市防空urban air defense 城市防灾 disaster protection

城市防震urban earthquake hazard protection

城市工程管线综合规划 urban engineering pipeline comprehensive planning 城市供电电源power source城市功能分区functional pision 城市供热系统district heating system 城市规划 urban planning

城市规划法则 codes of urban planning 城市规划管理 urban planning administration

城市规划建设管理 urban planning and building administration 城市规模 city size 城市化urbanization

城市化水平urbanization level

城市环境保护 urban environmental protection 城市环境污染 urban environmental pollution 城市环境质量 urban environmental quality

城市环境质量评价 evaluation of the urban environmental quality

**第三篇：中英文对照A**

《美国口语惯用法例句集粹》Ａ

A(Page 1-4)

1.about

1)

2)

3)

4)

5)

6)

7)I\'d like to know what this is all about.我想知道这到底是怎么回事。How about a fish sandwich? 来一块鱼肉三明治怎么样？What about me? 我怎么样？I\'m not about to go in that old house.我是不会进那幢旧房子的！Yes I remember that night.What about it? 是的，我记得那个晚上，那又怎样？What\'s this all about? 这到底是怎么回事？It\'s about time you showed up!差不多是你该露面的时候了。

2.above

1)

2)Above all, I want everything quiet.首要的是：我要一切保持安定。Tom thinks he\'s above hard work.汤姆认为自己没必要努力工作。

3.act

1)

2)

3)

4)

5)

6)Would you please act out what happened? 你能把发生的事演示一下吗？Watch Ricky.He sometimes likes to act up in class.注意里基，他又是喜欢在课堂上捣蛋。That profane comedian needs to clean up his act.那个爱说粗言秽语的喜剧演员应该净化一下自己的言行。We need to get our act together and come to see you.我们需要统一意见后来见你。The newspapers called the earthquake an act of God.报纸上称那次地震为天灾。Masa is a class act.玛莎是位杰出的女性。

4.action

1)

2)

3)

4)We\'re going to bring action against our debtors.我们打算控告我们的债务人。Did you see any action in yesterday\'s ballgame? 昨晚的棒球比赛中你看到有什么有趣的精彩场面吗？Our community is going to take action against the proposed waste dump.我地区要采取行动反对那项垃圾处理场的提案。Jim wants to go where the action is.吉姆想去有刺激性的地方。

5.advantage

1)

2)Our opponents have a height advantage on us.我们的对手在身高上比我们占有优势。Nobody likes to be taken advantage of.没有人喜欢被捉弄（或：被欺骗、利用）

6.after

1)

2)

3)

4)I think that girl is after you.我想那女孩是在追你。It looks like things are gonna work out after all.看起来事情终会解决的。This soft drink has a nasty aftertaste.这软饮料有种让人难受的余味。I see your point, but don\'t you think it\'s way after the fact.我明白你的意思，但你不觉

得这已是“事后诸葛亮”了吗？

7.again

1)I could go to Japan again and again.我可以一而再、再而三地去日本。（注：意指不会感到

厌倦）

8.age

1)

2)Would you please act your age!请你做事要有一个与自己年龄相称的样子。This is a “coming of age” movie.这是一部成人影片。

9.air

1)

2)

3)

4)

5)

6)

7)

8)

9)I need to go outside and get some air.我需要出去呼吸点新鲜空气。I don\'t know what\'s wrong, but can feel it in the air.虽然我不知道到底是出了什么差错，但我能隐隐约约感觉到。Mike was sad when they took his favorite program off the air.当迈克喜欢的节目被取消时，他感到很伤心。The sale of our house is still up in the air.我们的房子出勤率售一事还没有最后定下来。After winning the championship, I felt I could walk on air.获得冠军后，我飘飘欲仙。Your sister is such an airhead.你姐姐真是来个没有头脑的人。Janet Jackson\'s new song is getting lots of airplay.珍妮〃杰克逊的新歌到处都在不断地播放。That last time I took a plane, I got airsick.上次我乘飞机时晕机了。I hope there\'s no bad air between us.我希望我们之间的关系不要很别扭。

10.all

1)

2)

3)

4)

5)

6)

7)

8)

9)

10)

11)

12)

13)It\'s looks like we won\'t be going after all.看起来最后我们还是不能去。We\'ve all but finished the project.我们已几乎完成了那个项目。All in all I\'d say it\'s been a very productive day.总的来说，我认为这一天过得很充实。Let\'s go all-out and win this game!让我们尽全力来打赢这场比赛。We knew it was all over when we saw the building burst.当我们看见那座建筑突然起火时，我们知道一切全完了。We wish you all the best.我们大家祝福你一切如意。If it\'s all the same to you, I\'d just as soon not go.如果这对你都是一回事的话，我就不想去了。They were running from the police like all get-out.他们以极快的速度逃脱警察的追赶。I didn\'t see them come in at all.我根本高没有发现他们的进来。Let\'s settle this matter once and for all.让我们来把这个问题一次性地彻底解决掉。Mark is an all-around athlete.马克是一个全能运动员。Did you get to play in the all-star game? 你入选全明星队的比赛了吗？He bloke the all-time record in the 100-meter run at his school.他打破了他所在的学校

100米跑的历史最高记录。

11.alley

1)Working on cars isn\'t up my alley.修理汽车不是我拿手的活儿。

12.alone

1)

2)I just wanna be left alone.我只是想一个人呆会儿。Can\'t you just leave well enough alone? 你不能少管一些闲事吗？

13.along

1)

2)You knew all along what was going on.你从一开始就知道所发生的事。Debbie doesn\'t get along with Steve.戴比和史蒂夫相处得不好。

1)

2)

3)

4)

5)Mr.Pak came here searching for the American dream.帕克先生来到这儿寻求他的“美国梦”。Some foreigners become Americanized while living in the U.S.一些外国人在美国居住时被美国化了。Not having any job freedom would be totally unAmerican.没有选择职业的自由是完全违背美国精神传统的。Bill is an all-American quarterback.比尔是全美（橄榄球）明星赛的四分卫队员。I just can\'t go on the American way.我无法适应美国方式。

15.animal

1)

2)Water-skiing really brings out the animal in Tom.滑水运动真正激发出了汤姆的活力与激情。The young actor emits a lot of animal magnetism on the screen.那个年轻演员在荧幕

上充分显示出他的性魅力。

16.answer

1)I called Emi but there was no answer.我给埃米打了电话，但是没人接。

17.apple

1)

2)

3)

4)

5)Have you ever been to the Big Apple? 你去过纽约吗？Do I sense an apple of discord between you two? 你问我有没有感觉出你们两人之间的不和，是吗？Heather is the apple of my eye.希瑟是我的掌上明珠。Rita likes to keep everything in apple-pie order.丽塔喜欢把一切都弄得井井有条。Dennis has always been an apple polisher.丹尼斯一直就是一个马屁精。

18.arm

1)

2)

3)

4)You don\'t have to twist my arm to get me to go with you.用不着你强迫我跟你走。My father is a hopeless armchair quarterback.我爸爸是一个没救了的纸上谈兵的人。The suspects are armed and dangerous.嫌疑犯带有武器，十分危险。Every spring the park is filled with lovers walking arm in arm.每到春天公园里到处都是

手挽手散步的恋人。

19.around

1)

2)Coach Johnson has been around for 30 years.约翰逊教练已有三十年的经验了。Someone is on duty here around-the-clock.有人在这里昼夜值班。

20.as

1)

2)

3)

4)

5)

6)It looks as if someone has already been here.看起来在人来过这里了。As for me, I\'m going home.至于我，我准备回家。Marty is acting as if nothing happened.马蒂表现得像什么也没发生过一样。I want this room left as is.我希望这间房子保持原样。The changes will begin taking place as of tomorrow.变动从明天开始实施。Police are baffled as to the whereabouts of the kidnappers.警察局搜寻绑架者的工作受

挫。

1)

2)

3)

4)Our gas bill average about $50 a month.我们每个月的煤气费平均50美元。On the average, I\'d say we eat chicken once a week.我们平均每周吃一次鸡肉。Kent describes himself as just an average Joe.肯特视自己为一名普通的美国人。On the average day, over 100,000 kids bring guns to school in the U.S.在美国平常日

子里，有100,000个孩子带手枪去上学。

22.away

1)

2)

3)

4)

5)What makes you think you\'re gonna get away with this? 是什么使你认为你可以免受处罚？I wish they\'d do away with these complicated tax forms.我希望他们能费除掉这些复杂的税务表格。We\'re planning a weekend getaway for our anniversary.我们正在为庆祝我们的纪念日而安排一次周末的外出活动。Tom wants to run away from home.汤姆想从家里出逃。Dave and Kathy are going to steal away on vacation.戴夫和凯茜计划在假期里偷偷跑出

去。

**第四篇：中英文对照**

医院中英文对照

发热门诊Have Fever主治医师Doctor-in-charge 供应室Supply Room谢绝入内No entering 红灯亮时谢绝入内No entering when red light

彩超、心电图Colorful Cardiogram/ECG住院楼Inpatient Building 透析血磁EndoscopeDept.护士Nueser康复理疗科RehabilitationPhysiotherapyDept.中药计价China medical price account肛肠科Ano-proctology

皮肤、肛肠、男性科、泌尿科候诊Dermatology、Ano-proctology、male Urology Clinic 皮肤科、肛肠科、男性科、泌尿科Dermatology、Ano-proctology、male Urology Dept 中医科Traditional Chinese Medicine五官科ENT Dept.男性科、泌尿科 Male urology Dept.安全出口Exit

预防保健科Medical center for health preventionand care

后勤科、药库Logistic Room、Seore入院登记In-patient Admisson 高压氧治疗Hyperbaric Oxygehation Therapy碎石中心ESWL Center 急救中心Emergency Center挂号收费Registration

中心药房Cenreral Pharmacy内科门诊Internal Medicine Clinic会议室Meeting Room手外科Hand Surgery 产科Obstentrics Dept.骨外科Orthopedics Dept.神经、烧伤外科Neurosurgery.Plaseric surgey Dept.麻醉科Anaesthesiology手术室Operation Room 泌尿、肿瘤外科Urologic.Gumorsurgery Dept.妇科Gynecology Dept.内二科Internal Medicine.Ward 2产房及爱婴中心Delivery Room内一科Internal Medicine.Ward 1洗手间Toilet

普外、胸外科Surgey、Thoracic Surgey Dept.皮肤科Dermatology Dept.中医骨伤科Traditional Mediaine or Thopaedics餐厅Dining Room 配餐室Pantry Room后勤科Logistics Dept.电工室Electrician Room接待室Dermatology Room 内、儿科候诊 Internal medicine.Pediatrics功能检查候诊Function Exam 中医科候诊TCM Clinic放射科候诊Radiology Clinic 妇科门诊Gynecology Dept.产科候诊Obstentrics Clinic 肛肠科候诊Ano-proctology妇科候诊Gynecology Clinic 产科门诊Obstentrics Dept.五官科候诊ENT.Clinic 外科候诊Surgery Clinic输液中心Transfusion Center 皮肤、泌尿科候诊 Dermatology.Male Urology Clinic检验候诊Clinical Laborotories 家属休息Relation Rest Room口腔科门诊Stomatology Clinic 内儿科Internal Medicine.Pediaarics镜检科Endoscope Dept.外科Surgrey Dept.检验中心Laboratory Center 功能检查Function Exam Dept.登记处Registration 预防保健门诊Hygine ＆ Public Health Dept.收费处Cashier 美容科、镜检科门诊 Cosmetology Dept.Endoscope Clinic

收费健康发证Gharge lssue Bill of Health试敏观察室Scratch Espial Room

**第五篇：中英文对照**

共轨技术

随着人们对低油耗、低废气排放、发动机低噪声的需求越来越大，对发动机和燃油喷射系统的要求也越来也高。对柴油发动机燃油喷射系统提出的要求也在不断增加。更高的压力、更快的开关时间，以及根据发动机工况修订的可变的流量速率曲线，已经使得柴油发动机具有良好的经济性、低污染、高动力性，因此柴油发动机甚至进入了豪华高性能轿车领域。达到这些需求的前提是拥有一个可以精确雾化燃油并具有高喷油压力的燃油喷射系统。同时，喷油量必须精确计算，燃油流量速率曲线必须有精确的计算模型，预喷射和二次喷射必须能够完成。一个可以达到以上需求的系统即共轨燃油喷射系统。

共轨系统包括以下几个主要的部分： ①低压部分，包含燃油共轨系统组件。

②高压系统，包含高压泵、油轨、喷油器和高压油管等组件。

电控柴油机系统EDC主要由系统模块，如传感器、电子控制单元和执行机构组成。共轨系统的主要部分即喷油器。它们拥有一个可以快速开关喷嘴的执行阀(电磁阀或压电触发器)，这就允许对每个气缸的喷射进行控制。

所有的喷油器都由一个共同的油轨提供燃油，这就是“共轨”的由来。在共轨燃油喷射系统中，燃油喷射和压力的产生是分开的。喷油压力的产生与发动机转速和喷油量无关。EDC控制每个组件。

(1)压力产生。

燃油喷射和压力的产生是通过蓄能器分离开来。将具有压力的燃油提供给为喷射做好准备的共轨系统的蓄能器。

由发动机驱动的连续运转的高压泵提供所需喷油的压力。无论发动机的转速高低，还是燃油喷射量的多少，油轨中的压力均维持在一定值。由于几乎一致的喷油方式，高压泵的设计可以小的多，而且它的驱动转矩可以比传统燃油喷射系统低，这源于高压泵的负载很小。

高压泵是径向活塞泵，在商用车上有时会使用内嵌式喷油泵。(2)压力控制

所应用的压力控制方法主要取决于系统。

一种控制油轨压力的方式是通过一个压力控制阀对高压侧进行控制。不需喷射的燃油通过压力控制阀流回到低压回路。这种控制回路允许油轨压力对不同工况(如负载变化时)迅速做出反应。

在第一批共轨系统中采用了对高压侧的控制。压力控制阀安装在燃油轨道上更可取，但是在一些应用中，它被直接安装在高压泵中。

另一种控制轨道压力的方式是进口端控制燃油供给。安装在高压泵的法兰上的计量单元保证了泵提供给油轨精确的燃油量，以维持系统所需要的喷油压力。

发生故障时，压力安全阀防止油轨压力超过最大值。

在进口端对燃油供给的控制减少了高压燃油的用量，降低了泵的输入功率。这对燃油消耗起到积极的作用。同时，流回油箱的燃油温度与传统高压侧控制的方法相比得到了降低。

双执行器系统也是一种控制轨道压力的方式，它通过计算单元对压力进行控制，并且通过压力控制阀对高压端进行控制，因此同时具备高压侧控制与进口端燃料供给控制的优势。

(3)燃油喷射

喷油器直接将燃料喷到发动机的燃烧室。它们由与燃油轨道直接相连的短高压油轨提供燃油。发动机的控制单元通过与喷油器结合在一起的控制阀的开闭控制喷油嘴的开关。

喷油器的开启时间和系统油压决定了燃油供给量。在恒压状态下，燃油供给量与电磁阀的开启时间成正比，因此与发动机或油泵的转速(以时间为计量的燃油喷射)无关。

(4)液压辅助动力

与传统燃油喷射系统相比，将压力的产生与燃油的喷射分离开来，有利于燃烧室的充分燃烧。燃油喷射压力在系统中基本可以自主选择。目前最高燃油压力为1600巴，将来会达到1800巴。

共轨系统通过引入预喷射或多次喷射可以进一步减少废气排放，也能明显降低燃烧噪声。通过多次触发高速转换阀的开闭可以在每个喷射周期内实现多达5次的喷射。喷油针阀的开闭动作是液压辅助元件助力的，以保证喷射结束的快速性。

(5)控制和调节

发动机的控制单元通过传感器检测加速踏板的位置以及发动机和车辆的当前工况。采集到的数据包括：

① 曲轴转速和转角； ② 燃油轨道的压力； ③ 进气压力；

④ 进气温度、冷却液温度和燃油温度； ⑤ 进气量； ⑥ 车速等。

电控单元处理输入信号。与燃烧同步，电控单元计算施加给压力控制阀或计算模块、喷油器和其他执行机构(如EGR阀，废气涡轮增压器)的触发信号。

喷油器的开关时间应很短，采用优化的高压开关阀和专业的控制系统即可实现。

根据曲轴和凸轮轴传感器的数据，对照发动机状态(时间控制)，角度/时间系统调节喷油正时。电控柴油机系统(EDC)可以实现对燃油喷射量的精确计算。此外，EDC还拥有额外的功能以进一步提高发动机的响应特性和便利性。

其基本功能包括对柴油燃油喷射正时的精确控制，和在给定压力下对油量的控制。这样，它们就保证了柴油发动机具有能耗低、运行平稳的特点。

其他开环和闭环控制功能用于减少废气排放和燃油消耗，或提供附加的可靠性和便利性，具体例子有：

① 废气在循环控制； ② 增压控制； ③ 巡航控制；

④ 电子防盗控制系统等。(6)控制单元结构。

由于发动机控制单元通常最多有8个喷油器输出口，所以超过八缸的发动机需要两个控制单元。它们通过内置高速CAN网络的“主/从”接口进行连接，因此也拥有较高的微控制器处理能力。一些功能被 分配给某个特定的控制单元(如燃料平衡控制)，其功能根据需求情况(如检测传感器信号)可以动态地分配给一个或多个控制单元。

The Common Rail Calls for lower fuel consumption, reduced exhaust-gas emission, and quiet engines are making greater demands on the engine and fuel-injection system.The demands placed on diesel-engine fuel-injection systems are continuously increasing.Higher pressures, faster switching times, and a variable rate-of-discharge curve modified to the engine operating state have made the diesel engine economical, clean, and powerful.As a result, diesel engines have even entered the realm of luxury-performance sedans.These demands can only be met by a fuel-injection pressure.At the same time the injected fuel quantity must be very precisely metered, and the rate-of-discharge curve must have an exact shape, and pre-injection and secondary injection must be performable.A system that meets these demands is the common-rail fuel-injection system.The main advantage of the common-rail system is its ability to vary injection pressure and timing over a broad scale.This was achieved by separating pressure generation(in the high-pressure pump)from the fuel-injection system(injection).The rail here acts as a pressure accumulator.Principle of the Common Rail The common-rail system consists of the following main component groups: ① The low-pressure stage, comprising the fuel-supply system components;② The high-pressure system, comprising components such as the high-pressure pump, fuel-rail, injector, and high-pressure fuel lines.The electronic diesel control(EDC), consisting of system modules, such as sensors, the electronic control unit, and actuators.The key components of the common-rail system are the injectors.They are fitted with a rapid-action valve(solenoid valve or piezo-triggered actuator)which opens and closes the nozzle.This permits control of the injection process for each cylinder.All the injectors are fed by a common fuel rail, this being the origin of the term “common rail”.In the common-rail fuel-injection system, the function of pressure generation and fuel injection are separate.The injection pressure is generated independent of the engine speed and the injected fuel quantity.The electronic diesel control(EDC)controls each of the components.(1)Pressure Generation.Pressure generation and fuel injection are separated by means of an accumulator volume.Fuel under pressure is supplied to the accumulator volume of the common

rail ready for injection.A continuously operating high-pressure pump driven by the engine produces the desired injection pressure.Pressure in the fuel rail is maintained irrespective of engine speed or injected fuel quantity.Owing to the almost uniform injection pattern, the high-pressure pump design can be much smaller and its drive-system torque can be lower than conventional fuel-injection systems.This results in a much lower load on the pump drive.The high-pressure pump is a radial-piston pump.On commercial vehicles, an in-line fuel-injection pump is sometimes fitted.(2)Pressure Control The pressure control method applied is largely dependent on the system.One way of controlling rail pressure is to control the high-pressure side by a pressure-control valve.Fuel not required for injection flows back to the low-pressure circuit via the pressure-control valve.This type of control loop allows rail pressure to react rapidly to changes in operating point(e.g.in the event of load changes).Control on the high-pressure side was adopted on the first common-rail systems.The pressure-control valve is mounted preferably on the fuel rail.In some applications, however, it is mounted directly on the high-pressure pump.Another way of controlling rail pressure is to control fuel delivery on the suction side.The metering unit flanged on the high-pressure pump makes sure that the pump delivers exactly the right quantity of fuel rail in order to maintain the injection pressure required by the system.In a fault situation, the pressure-relief valve prevents rail pressure from exceeding a maximum.Fuel-delivery control on the suction side reduces the quantity of fuel under high pressure and lowers the power input of the pump.This has a positive impact on fuel consumption.At the same time, the temperature of the fuel flowing back to the fuel tank is reduced in contrast to the control method on the high-pressure side.The two-actuator system is also a way of controlling rail pressure, which combines pressure control on the suction side via the metering unit and control on the high-pressure side via the pressure-control valve, thus marrying the advantages of high-pressure-side control and suction-side fuel-delivery control.(3)Fuel Injection.The injectors spray fuel directly into the engine’s combustion chambers.They are supplied by short high-pressure fuel lines connected to the fuel rail.The engine control unit controls the switching valve integrated in the injector to open and close

the injector nozzle.The injector opening times and system pressure determine the quantity of fuel delivered.At a constant pressure, the fuel quantity delivered is proportional to the switching time of the solenoid valve.This is, therefore, independent of engine or pump speed(time-based fuel injection).(4)Potential Hydraulic Power.Separating the functions of pressure generation and fuel injection opens up future degrees of freedom in the combustion process compared with conventional fuel-injection systems;the injection pressure at pressure at present is 160 MPa;in future this will rise to 180 MPa.The common-rail system allows a future reduction in exhaust-gas emissions by introducing pre-injection events or multiple injection events and also attenuating combustion noise significantly.Multiple injection events of up to five per injection cycle can be generated by triggering the highly rapid-action switching valve several times.The nozzle-needle closing action is hydraulically assisted to ensure that the end of injection is rapid.(5)Control and Regulation.The engine control unit detects the accelerator-pedal position and the current operating states of the engine and vehicle by means of sensors.The data collected includes:

① Crankshaft speed and angle;② Fuel-rail pressure;③ Charge-air pressure:

④ Intake air, coolant temperature, and fuel temperature: ⑤ Air-mass intake: ⑥ Road speed, etc.The electronic control unit evaluates the input signals.In sync with combustion, it calculates the triggering signals for the pressure-control valve or the metering unit, the injectors, and the other actuators(e.g.the EGR valve, exhaust-gas turbocharger actuators, etc.).The injector switching times, which need to be short, are achievable using the optimized high-pressure switching valves and a special control system.The angle/time system compares injection timing, based on data from the crankshaft and camshaft sensors, with the engine state(time control).The electronic diesel control(EDC)permits a precise metering of the injected fuel quantity.In

addition, EDC offers the potential for additional functions that can improve engine response and convenience.The basic functions involve the precise control of diesel-fuel injection timing and fuel quantity at the reference pressure.In this way, they ensure that the diesel engine has low consumption and smooth running characteristics.Additional open-and close-loop control functions perform the tasks of reducing exhaust-gas emissions and fuel consumption, or providing added safely and convenience.Some examples are:

① Control of exhaust-gas recirculation;② Boost-pressure control;③ Cruise control;

④ Electronic immobilizer, etc.(6)Control Unit Configuration.As the engine control unit normally has a maximum of only eight output stages for the injectors, engines with more than eight cylinders are fitted with two engine control units.They are coupled within the “ master/slave ” network via an internal, high-speed CAN interface.As a result, there is also a high microcontroller processing capacity available.Some functions are permanently allocated to a specific control unit(e.g.fuel-balancing control).Other can be dynamically allocated to one or many of the control units as situation demand(e.g.to detect sensor signals).

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