

ANNE COUGHLAN AND JULIE HENNESSY

Invisalign: Orthodontics Unwired

Zia Chishti, CEO of Align Technology Inc., looked at his third-quarter 2001 sales figures with yet another sigh. He called his vice president of corporate strategy, Beth Collins, into his office. “Beth, our shareholders aren’t going to like our third-quarter sales results. With our aggressive growth plans, we’re incurring much higher costs than last year, but we’re just not turning sufficient revenues to support our future cost growth.” (See **Exhibit 1** for Align’s financial statements.)

“I know,” Collins replied. “For some reason, orthodontists simply aren’t adopting our system. My team found that out of the approximately 8,000 calls that we get per week requesting basic information, 80 percent are referred to Invisalign-trained orthodontists. Of those, 55 to 60 percent follow up with a call to a referred orthodontist, but only 3 percent end up trying Invisalign.”

“I just don’t understand it,” said Chishti. “This is such an incredible and advanced system for invisibly straightening adult teeth, you would think orthodontists would be eager to expand their patient base. We need to increase those conversion rates, and fast.”

Background

Align Technology Inc. of Santa Clara, California, designed, manufactured, and marketed the Invisalign System, a proprietary method for treating malocclusion, or the misalignment of teeth. The system corrected adult and teen malocclusion using a series of clear, removable “aligners” that gently moved teeth to the desired final position. The aligners were molded in a sophisticated process that utilized three-dimensional computer imaging graphics to forecast teeth movement in sequential stages. Because it did not rely on the use of metal or ceramic brackets and wires, the system significantly reduced the aesthetic and other drawbacks usually associated with corrective orthodontic treatment.

The company was founded in 1997 by Zia Chishti and Kelsey Wirth while they were students at Stanford University’s Graduate School of Business. The idea for the product grew from happenstance. Just prior to business school, Chishti had worn braces while working in investment banking for Morgan Stanley. He felt the experience was awkward, embarrassing, and professionally stunting. When his braces were removed, he wore a clear plastic retainer. Chishti noticed that when he neglected to wear the retainer for several days, his teeth would shift back slightly. Upon reinsertion, the retainer would return his teeth to their final, straightened state, indicating that a single clear plastic retainer was capable of moving teeth.

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Chishti's academic background in computer science gave him the insight that it was possible to design and manufacture an entire series of clear orthodontic devices similar to the retainer he had worn using three-dimensional computer graphics technology. He and Wirth, who had a professional background in environmental consulting and investment banking, started Align Technology in March 1997 to realize this vision. Neither Chishti nor Wirth had previous experience in orthodontics. (See **Exhibit 2** for founder profiles.)

Align's business objective was to establish the Invisalign System as the standard method for treating orthodontic malocclusion. The system was marketed solely for adults and teens with mature dentition.¹ It was distributed only through orthodontists in the United States and Canada, with plans to aggressively market the system in selected international markets.

The firm that led Align Technology's first round of financing was Kleiner, Perkins, Caufield, and Byers of Menlo Park, California, the same venture capital firm that had initially funded Amazon.com, Genentech, and Netscape. General partner Joe Lacob was initially skeptical because the founders were relatively inexperienced, but decided after only 15 minutes of hearing the pitch to invest in the idea. In the three years between August 1997 and August 2000, Align raised more than \$140 million in private capital. On January 26, 2001, Align began trading on the NASDAQ National Market with an initial public offering of 10,000,000 shares of common stock.

The company was headquartered in Santa Clara, California. This location housed the approximately 450 employees who performed the company's preproduction, customer support, software engineering, and administrative functions. Six hundred employees worked in two facilities in Lahore, Pakistan, where much of the computer imaging and simulation manufacturing took place. The production of aligners was outsourced to a factory in Mexico.

Align had trained approximately 6,500 orthodontists, representing 75 percent of all participating U.S. and Canadian orthodontists. The system was treating approximately 35,000 patients by the end of 2001.

Industry Background

Malocclusion is one of the most common clinical conditions, affecting more than 200 million individuals in the United States, or approximately 75 percent of the population. Approximately two million people elect orthodontic treatment annually in the United States, generating industry revenues of approximately \$7 billion. While most individuals seek orthodontic treatment because malocclusion detracts from their appearance, malocclusion is also responsible for dental problems such as tooth decay, tooth loss, gum disease, jaw joint pain, and headaches. However, only a relatively small proportion of people with malocclusion seek treatment because of the compromised aesthetics, discomfort, and other drawbacks associated with conventional orthodontics.

The techniques applied by most orthodontists were developed early in the 20th century. In the United States, orthodontists treat malocclusion primarily with metal archwires and brackets,

¹ Individuals with mature dentition have fully erupted second molars and substantially complete jaw growth. This group represents approximately 130 million people in the United States. Typically girls by the age of 13 and boys by the age of 16 years have developed mature dentition.

commonly referred to as braces. Occasionally, in order to improve treatment aesthetics, orthodontists use ceramic, tooth-colored brackets or install brackets only on the inside or lingual surfaces of the patient's teeth. Orthodontists augment braces with elastics, metal bands, headgear, and other devices.

The average treatment takes approximately two years to complete and requires several hours of direct orthodontist involvement, or chair time, over several visits. To initiate treatment, an orthodontist diagnoses a patient's condition and creates an appropriate treatment plan. In a subsequent visit, the orthodontist bonds brackets to the patient's teeth with cement and attaches an archwire to the brackets. By tightening or otherwise adjusting the braces approximately every six weeks, the orthodontist can achieve the desired tooth movement. In the final visit, the orthodontist removes each bracket and residual cement from the patient's teeth. The patient can then be fit for a retainer in order to maintain the final outcome of treatment.

Traditional orthodontic treatment typically costs about \$4,000. Prices for ceramic brackets (with clear bands) are slightly higher. Fees are based on the difficulty of the particular case and on the orthodontist's estimate of chair time and are generally negotiated in advance.

There are many limitations associated with traditional methods of treatment:

- *Aesthetics.* Braces have an unsightly appearance, a propensity to trap food, and the potential to permanently discolor teeth. They are not removable, so they have to be worn while the patient eats or participates in social events.
- *Discomfort.* Braces are sharp and can abrade and irritate the interior surfaces of the mouth. Tightening or adjusting braces result in root and gum soreness and discomfort.
- *Poor Oral Hygiene.* Braces compromise oral hygiene by making it more difficult to brush and floss.
- *Inability to Project Treatment.* Lack of predictability can result in unwanted tooth movements and limit the orthodontist's ability to estimate the duration of treatment. Because most orthodontic treatment is performed on a fixed-price basis, extended treatment duration reduces the orthodontist's profitability.
- *Physical Demands on Orthodontist.* Manipulation of wires and brackets requires a great deal of manual labor. The average chair time with the orthodontist for a two-year treatment with braces is approximately 9–12 hours.
- *Root Resorption.* Sustained high levels of force associated with traditional treatment can result in the shortening of tooth roots, which could have substantial adverse periodontal consequences for the patient.
- *Emergency Repairs or Replacements.* At times, braces need to be repaired or replaced on an emergency basis, causing significant inconvenience to both the patient and the orthodontist.

Product: The Invisalign System

The Invisalign System was a proprietary method for treating malocclusion and consisted of two components: ClinCheck and Aligners.

ClinCheck was an interactive Internet application that allowed orthodontists to diagnose and plan treatment for their patients. After a dental impression² was made and the orthodontist wrote a treatment prescription, a customized, three-dimensional treatment plan that simulated appropriate tooth movement in a series of two-week increments was made. ClinCheck allowed the orthodontist to view this three-dimensional simulation with a high degree of magnification from any angle (**Figure 1** shows an example of the ClinCheck screen an orthodontist saw). Any feedback by the orthodontist was reflected in a modified simulation. Upon the orthodontist's approval of the simulation, the data underlying the simulation were used to manufacture the complete series of aligners.

Figure 1: Example of ClinCheck Computer Screen



Aligners were custom-manufactured, clear, removable dental appliances that were worn in a prescribed series to provide orthodontic treatment. Each aligner covered a patient's teeth and was nearly invisible when worn. Aligners could be worn in pairs, over the upper and lower dental arches, or used in combination with traditional treatments (i.e., aligner on upper dental arch and traditional braces on lower dental arch). Each aligner was typically worn for a two-week period, which corresponded to one stage in the approved ClinCheck treatment simulation. After two weeks of use, the patient discarded that aligner and replaced it with the next one in the series. This process was repeated until the final aligner was used and treatment was complete. The final aligner was often prescribed as a retainer. **Figure 2** shows aligners as they were manufactured (several per tray), and **Figure 3** shows a single aligner.

Figure 2: Aligners on the Production Line



Figure 3: Sample Aligner



² A dental impression is a negative image of a tooth or dental arch. An impression is produced by placing an elastic compound like alginate in a preformed tray and inserting the tray into the mouth around the teeth until the compound stiffened. The impression is removed from the mouth and filled with plaster to produce an exact positive reproduction of the teeth or dental arch.

The suggested price charged to patients was approximately \$5,500 depending on the severity and length of the case. Many patients did not have dental insurance; those who did were typically covered for approximately \$1,000 for either Invisalign or traditional braces. Align charged orthodontists \$1,900 per case (in contrast, traditional braces typically cost the orthodontist about \$500 wholesale). But given the premium pricing of the system, the profit margin for orthodontists was very similar to that with traditional methods (see **Exhibit 3** for a price/cost comparison of traditional methods versus Invisalign).

The company's 510(k) clearance as Class I device specifications (granted by the U.S. Food and Drug Administration) allowed treatment of all types of malocclusion cases, but Align voluntarily restricted the use of the system to adults and adolescents with mature dentition. Approximately 80 percent of people above the age of 15 who suffered from malocclusion could be treated with Invisalign. It treated cases of tooth crowding, excessive spacing, narrow arches, malocclusion relapse, and anterior intrusion, and was being tested to handle more severe malocclusion cases.

The Invisalign treatment process comprised the following stages:

1. In an initial patient visit, the orthodontist made a judgment as to whether the Invisalign System was an appropriate treatment option. If the patient was appropriate for Invisalign, the orthodontist then prepared treatment data, which consisted of an impression of the relevant dental arches, x-rays of the patient's dentition, photographs of the patient, a wax bite depicting the relationship between the patient's upper and lower dental arches, and the Invisalign System treatment planning form, or prescription. The orthodontist sent the treatment data to the Santa Clara facility.
2. Upon receipt at Santa Clara, Align used the treatment data to construct plaster models of the patient's dentition. The models were then scanned and used to develop a digital, three-dimensional computer model of the patient's current dentition. Along with the treatment prescription, this initial computer model was sent electronically to Align's facilities in Pakistan.
3. In Pakistan, the initial model was transformed into a customized, three-dimensional treatment plan that simulated appropriate tooth movements in two-week increments. This simulation was transmitted back to Santa Clara for approval. Upon passing review, the simulation was delivered to the orthodontist via ClinCheck on the Invisalign Web site. The orthodontist reviewed the simulation (often multiple simulations) and either approved or made adjustments. Typically orthodontists did not make any changes, but if adjustments needed to be made, the orthodontist managed them via ClinCheck and Align prepared an adjusted simulation.
4. Upon simulation approval, a series of molds of the patient's teeth was constructed at the Santa Clara facility. Each mold was a replica of the patient's teeth at each two-week stage of the simulated course of treatment.
5. The molds were sent to an outsourced production vendor in Juarez, Mexico.³ The Aligners were fabricated by pressure, forming polymeric sheets over each mold. The complete series of Aligners was then trimmed, polished, cleaned, packaged, inspected,

³ A few units could be made in the Santa Clara operation, but it was not a large-scale production facility.

and shipped directly to the prescribing orthodontist (see **Exhibit 4** for manufacturing and logistics specifics).

It took approximately three weeks to one month to develop the animated ClinCheck simulation that was transmitted to the orthodontist for approval. Patients generally received aligners approximately six weeks after their initial visit. Align previously shipped aligners to orthodontists in many batches, but switched to shipping all aligners for each case in a single batch in order to optimize logistical efficiency.

The patient switched aligners approximately every two weeks and treatment was generally completed within 6–24 months, depending on the complexity and severity of the case.

The Invisalign product warranty did not provide any assurances regarding the outcome of the treatment using the system. However, if actual treatment results deviated significantly from the ClinCheck simulation, the orthodontist was covered for a single midcourse correction at Align's expense. This required the orthodontist to submit new molds of the patient's dentition. Align then used these molds to create a modified ClinCheck plan for the orthodontist to approve. Upon approval, a successive series of aligners was produced and sent to the orthodontist that would allow the patient to finish treatment. Any additional midcourse corrections could be provided at the orthodontist's expense. Lost or broken aligners could be replaced at the orthodontist's expense, but in most cases patients could simply move on to the next aligner in the series.

The advantages to consumers were numerous. The product was nearly invisible, more comfortable than traditional methods because of extremely small, incremental tooth movement stages, removable while eating or participating in social activities, and more hygienic than traditional methods because it allowed for unobstructed brushing and flossing of the teeth. Due to systematic forecasting of tooth movements, the treatment time was reduced in some cases. And because lost or broken aligners were typically replaced with the next aligner in the series, there was a reduced incidence of emergency visits.

There were also many advantages to orthodontists. Due to systematic forecasting of tooth movement, treatment time was much more predictable. The system reduced orthodontist labor time to about two to three hours for total treatment, allowing more time for patient diagnosis and interaction. Additionally, minimal training was required because the biomechanical principles that underlay the Invisalign System were consistent with those of traditional orthodontics. Since many people (especially adults) did not seek orthodontic treatment because of aesthetic and comfort problems, the system had the potential to significantly increase the patient base. Additionally, because chair time was reduced, practice throughput could be greatly increased.

However, there were also disadvantages. While orthodontists could charge a premium fee for the system, the cost to orthodontists was significantly higher than that of standard braces because production efficiencies had not yet been optimized. Manufacturing lead times were also relatively long. It took approximately six weeks from the time of prescription to the receipt of the aligners. A major limitation of the system was that its patient base was restricted to adults. Since Invisalign relied on dentition as a constant, children with maturing dentition were not candidates for this treatment. Invisalign's treatment scope was also restricted to minor to moderate malocclusion cases. Additionally, orthodontists were typically highly change-averse and more comfortable with tried-and-true conventional methods. They felt that more research needed to be done to build credibility for Invisalign as a viable treatment option. Finally, a very high level of patient

compliance was required in order to ensure treatment success because the aligners were removable.

Channels of Distribution

There were over 120,000 general-practice dentists and approximately 8,500 orthodontists in the United States in 2001. General dentists received certification (as either Doctor of Dental Surgery, DDS, or Doctor of Dental Medicine, DDM) after completing undergraduate education and upon graduation from a three- to five-year graduate program in general dentistry. Upon graduation from dental school, general dentists were able to perform all oral health procedures. Many general dentists chose not to perform specialty work, such as periodontics, prosthodontics, and orthodontics, because of a lack of specific functional training and the risk of malpractice liability. General dentists who did not practice orthodontics typically referred patients to local orthodontists.

Orthodontists' offices were the primary locations for teeth straightening in the United States. In addition to the education required of general dentists, orthodontists entered a highly competitive educational residency program that generally lasted at least two years after dental school. Orthodontists received certification from the American Board of Orthodontics and many went into private practice. While orthodontists did not receive any special suffix title after completing orthodontic education, only board-certified orthodontists could call themselves orthodontists. Due to federal legal regulations, orthodontists practiced only their specialty and could not accept general practice cases. The average orthodontist in the United States worked approximately three eight-hour days per week and earned nearly \$250,000 per year, with a high-end income of over \$1 million.

Most general dentists earned significantly less, averaging around \$115,000–\$150,000, and worked significantly more hours. It was not uncommon for general dentists to work up to six eight- to ten-hour days per week. General dentists' income was typically derived from treating many patients, each of whom might incur a relatively small bill with the dentist because of less costly procedures and insurance reimbursement caps on routine dental care. Orthodontists, in contrast, typically reaped much higher revenue per patient hour because of the higher fixed-fee nature of their cases.

A patient might be referred to an orthodontist via 1-800-STRAIGHT, the toll-free number of the American Association of Orthodontists, or by other patients. However, in most cases a general dentist referred patients who needed orthodontic work to local orthodontists. Often orthodontists marketed to local general dentists via business cards, information packets, brochures, and/or letters seeking referrals. An orthodontist might try to create a relationship with as many general dentists as possible so that he or she could ensure a consistent flow of patients. The incentive for the orthodontist was most obviously income generation. For the general dentist, the incentive was a working relationship and a reliable place for referral. Due to federal and state legal statutes, general practice dentists and orthodontists could not enter into a formal partnership.

Invisalign distributed exclusively through orthodontist offices. Orders were processed through headquarters and Align supplied inventory directly to orthodontist offices from the factory in Mexico. By the end of 2001 Invisalign had trained approximately 75 percent of all U.S. orthodontists to use its system.

Consumers

Invisalign's target market was adults and adolescents with mild to moderate cases of malocclusion. Psychographically, Invisalign targeted adults and adolescents who were sensitive about their appearance for social, personal, and professional reasons. Similar to Chishti's experience with braces as an adult, a survey of the American Academy of Cosmetic Dentistry found that 74 percent of respondents believed that an unattractive smile could hurt a person's chances for career success (see **Exhibit 5** for results of social surveys).

The approximately two million individuals who entered into traditional orthodontic treatment in the United States annually represented less than 1 percent of the population of people with malocclusion. Over 50 percent of those with malocclusion had mature dentition and were therefore candidates for the Invisalign system, which represented a significant opportunity.

There were three major consumer segments for Invisalign. "Health conscious" consumers were serious about straightening their teeth for health reasons and would use either braces or Invisalign. They relied heavily upon orthodontists' recommendations. "Prior users" were consumers who had worn braces in the past but still had crooked teeth as a result of shifting. They were less reliant on orthodontists' recommendations and demanded greater control over the treatment process. "Beauty conscious" consumers would fix their crooked teeth only if their appearance was not affected during the treatment process. They expected a hassle-free experience, although they still valued the advice of orthodontists.

The segments varied in the value they placed on service outputs provided by orthodontists. For the health conscious segment, the demand for expertise and a recommendation was higher than for prior users and the beauty conscious. Prior users and the beauty conscious were more likely to decide to use Invisalign regardless of orthodontists' opinions. The value placed on product availability was another segment differentiator. While the beauty conscious were likely to approach orthodontists who specifically prescribed Invisalign, the health conscious might ask about Invisalign; if it was not recommended by orthodontists, they would go with braces. Additionally, the product selection process for the three segments was different. The health conscious first visited the orthodontist, obtained a recommendation, and made a product choice based on the recommendation. The beauty conscious, on the other hand, saw an Invisalign advertisement and made a preliminary product choice before seeing the orthodontist. The prior user's decision process lay between those two approaches.

Consumer Marketing Communications

The Invisalign System was marketed directly to consumers primarily via national advertising. In September 2000, the company announced a \$40 million national print and television advertising campaign that communicated the benefits of the system, focusing on its aesthetic advantages over traditional systems (see **Exhibit 6** for advertising samples). Four advertising spots ran on major cable networks and during prime-time on major broadcast networks. On the print side, full-page ads appeared in major consumer magazines such as *Vanity Fair*, *GQ*, *Modern Bride*, and *People*. The campaign was launched fourteen months after the initial product launch and after 6,000 patients had already been treated with the system. Between September 2000 and January 2001, the company call center received about 300,000 calls, with a comparable number

of visitors to the Invisalign Web site. Throughout 2001, Align received approximately 8,000 inquiries into its call center per week and had 80 percent brand awareness.

Prospective patients exposed to advertising could find further information from four primary sources: a general-practice dentist, an orthodontist, 1-800-INVISIBLE (the company's toll-free information line), and the company's Web site.

Invisalign's Web site (www.invisalign.com) included product information, success stories, a patient message board, doctor locator, before and after photos, information about the company, relevant clinical studies, and press coverage of the company and its products. Other sources of consumer information included Invisalign brochures in general dentist and orthodontist practices, coverage in national magazines, direct mail, and receptionist recommendations.

Sales, Sales Support Activities, and Compensation

Invisalign's sales force consisted of approximately 30 regional salespeople who were experienced in orthodontic product sales. Approximately 40 technical support staff, together with the marketing department and in-house orthodontic staff, supported the sales team. Sales and sales support staff trained orthodontists and assisted them in building their Invisalign practices. In addition, Align marketed Invisalign to general dentists to create awareness and help refer patients to orthodontists.

The sales and orthodontic teams conducted training primarily in a workshop format. Key topics covered in training included case selection criteria, instructions on filling out the Invisalign prescription form, guidance on pricing, and instructions on interacting with the Web site and ClinCheck software. Because the Invisalign System relied on the same orthodontic principles that underlay traditional treatment, the training material was presented in a manner consistent with orthodontists' training and experience. Workshops were completed within one day and sales representatives were instructed to follow up with orthodontists to ensure that their staff was prepared to handle system cases. Such follow-up might include assisting orthodontists in taking dental impressions, establishing an Internet connection, and familiarizing them with the software. Sales representatives might also provide practice-building assistance, including helping orthodontists market to general dentists and prospective patients via direct mail or other media. Furthermore, the company sold machines to some orthodontists to assist them in preparing the impressions required for submission of Invisalign cases.

Align had developed a system of tiering orthodontists that encouraged its sales force to devote more time to orthodontists most proficient in the use of the Invisalign System. The company used objective criteria, primarily the number of cases initiated with the system, to tier orthodontists. Inquiries from prospective patients through the company's customer call center and Web site were directed to higher-tier orthodontists. Align believed this process would rapidly increase its product penetration within selected orthodontists' offices.

Because general-practice dentists were a key source of referrals to orthodontists, general dentists were targeted through a combination of direct mail, telemarketing, journal advertising, and trade shows. The communication objectives were to produce product awareness and to encourage general dentists to recommend Invisalign to their patients.

Invisalign's sales force was divided regionally and compensated on a 60 percent salary, 15 percent commission, and 25 percent bonus structure. Salaries were competitive with the high end of comparable positions within the industry. Commission was a function of the number of cases submitted and bonuses were based on nonsales objectives, such as number of workshops conducted for general-practice dentists. Both were calculated on a quarterly basis. The compensation structure also included a company car, stock options based on seniority, and full insurance benefits.

Competition

No orthodontic company had yet developed or marketed a comparable system. Additionally, Align was the first company to market a branded orthodontic product directly to consumers. Align held two domestic- and two foreign-issued patents and had 46 domestic and 111 foreign patents pending. One of the U.S.-issued patents had been written to cover any algorithmic method of segmenting orthodontic treatment into a sequence of three or more steps, based on calculated initial and final representation of a patient's dentition. This was viewed as very strong patent protection by company management and the venture capital community.

Align, however, did compete with standard orthodontic (braces) manufacturers for the attention of orthodontists and general-practice dentists. This competition was especially strong for the health conscious consumer segment. Competitive manufacturers of traditional orthodontic appliances included 3M Company, Dynaflex International, Sybron Dental Specialties, and Dentsply International Inc. These companies were very established and had substantially greater financial resources, manufacturing, and marketing experience. Many of their competitive products had been available for years and orthodontists were familiar with their uses and applications.

Mixed Views

Orthodontists had mixed views on the Invisalign System. At first, many of them loved it. Align was essentially providing free, compelling advertising for their practices. Some orthodontists thought the system was amazing and believed that those who did not get on board would be left behind. Others claimed that Invisalign could benefit only a very small number of their patients, many of whom could be treated with a retainer at a far lower cost. Additionally, the orthodontist market was typically resistant to change and many orthodontists questioned the efficacy of this product. After all, it was created by two business school whiz kids who had no background in orthodontics whatsoever. They worried that even though the system might work, a high degree of patient compliance was required and if patients did not adhere to instructions religiously, the product would fail. No orthodontist wanted to have his or her name attached to a failed outcome. Some orthodontists also resented the substitution of Invisalign's computer technology for their manual labor. They viewed Invisalign as trivializing the hard work and specialized education in which they had invested to become orthodontists. Additionally, many orthodontists liked the manual control they had over the treatment process with traditional braces. By contrast, prescribing Invisalign meant involving a team of technicians located very far from the patient and the practice.

General-practice dentists faced a different set of incentives from orthodontists. A general dentist's income was typically earned by treating many patients, each of whom might incur a relatively small bill. Orthodontists, by contrast, typically garnered significantly higher revenue per patient hour. This meant that general dentists were much more motivated by volume than were orthodontists, which led some general dentists to want to learn to treat their patients with Invisalign. On February 22, 2001, a complaint was filed against Align by Jon L. Richter, a general-practice dentist purporting to sue on behalf of himself and all licensed dentists in the United States excluding orthodontists. Richter alleged that the exclusive distribution of the Invisalign System to orthodontists violated U.S. antitrust laws. The lawsuit was in trial at the end of 2001, but Align believed it to be without merit because even though Invisalign was not available to general dentists, there were no formal agreements with orthodontists restricting the distribution of the system.

Strategy Meeting

Chishti tapped his fingers on his desk for a few moments and said, "Beth, I want an analysis of the reasons we can't seem to convert consumer interest into use of our Invisalign System. We simply have to increase conversion rates quickly if we are going to keep our venture capitalists happy. I'd like you to put together a report on the causes of low conversion and the options available to us to increase conversion rates. I'm interested in everything from new sales force incentives to changes in our promotional program to broadening our reach through the general dentistry market. Have your thoughts ready for me by the end of the week."



Exhibit 1: Income Statements, Align Technology Inc. (\$ in thousands, except where noted)

	2000					2001		
	1Q	2Q	3Q	4Q	Total	1Q	2Q	3Q
Revenues	629	1,391	1,439	3,282	6,741	7,689	13,483	12,912
Cost of Goods Sold	2,026	4,207	5,309	8,709	20,251	11,554	13,830	11,265
Gross Profit (Loss)	-1,397	-2,810	-3,870	-5,433	-13,510	-3,865	-347	1,647
Operating Expenses:								
Sales and Marketing	3,438	7,086	9,140	20,781	40,445	16,711	10,945	11,940
General and Administrative	2,156	3,910	6,283	5,642	17,991	6,905	8,059	9,289
Research and Development	1,057	2,013	2,834	3,265	9,169	3,944	3,816	3,444
Litigation Settlement	—	—	—	—	—	—	400	—
Total Operating Expenses	6,651	13,009	18,257	29,688	67,605	27,560	23,220	24,673
Loss from Operations	-8,048	-15,819	-22,127	-35,121	-81,115	-31,425	-23,567	-23,026
Interest and Other Income (Expense), Net	-32	-7,573	288	-316	-7,633	-533	1,273	523
Net Loss	-8,080	-67,542	-21,839	8,713	-88,748	-31,958	-22,294	-22,503
Dividend Related to Beneficial Conversion Feature of Preferred Stock	—	-44,150	—	—	-53,516	-11,191	—	—
Net Loss Available to Common Stockholders	-8,080	-67,542	-21,839	-44,803	-142,264	-43,149	-22,294	-22,503
Net Loss per Share Available to Common Stockholders, Basic and Diluted	-1.55	-12.31	-3.84	-7.94	-25.64	-1.29	-0.50	-0.50
Shares Used in Computing Net Loss per Share Available to Common Stockholders, Basic and Diluted	5,225	5,489	5,682	5,465	5,548	33,574	44,518	45,035

Note: Total advertising spending for fiscal year 2000 was \$20.8 million. Period end: September 30, 2001. Date filed: November 14, 2001.

Exhibit 2: Founder Profiles⁴**ZIA CHISHTI—CO-FOUNDER, CHAIRMAN OF THE BOARD OF DIRECTORS, AND CEO**

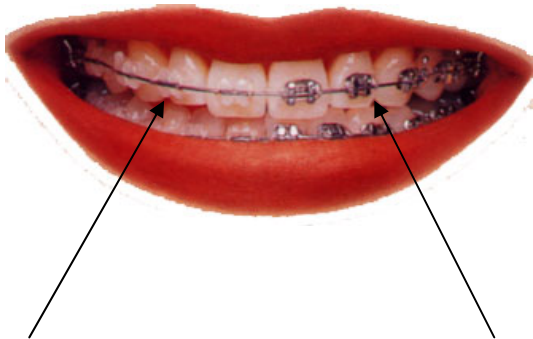
Zia Chishti came to the United States from Pakistan at the age of 15 to attend Columbia University, where he studied economics and computer science. Upon graduation he worked for three years as a financial analyst in the New York and London offices of Morgan Stanley Dean Witter and served as a management consultant for the London office of McKinsey and Company before receiving his MBA from Stanford University's Graduate School of Business. In his position as CEO, 28-year-old Chishti was responsible for the general management of Align Technology, overall corporate strategy, fundraising, and the development and application of the technology process.

KELSEY WIRTH—CO-FOUNDER, PART-TIME CONSULTANT, FORMER PRESIDENT AND DIRECTOR

Kelsey Wirth majored in American history and literature at Harvard University and worked as an environmental consultant for the Environmental Working Group and World Resources Institute in Washington, D.C. In the year prior to attending Stanford University's Graduate School of Business, Wirth worked for BancBoston Robertson Stephens in San Francisco in the firm's investment banking division. Thirty-year-old Wirth recently stepped down from her role as president and director to become part-time consultant for Align in order to pursue environmental consulting interests.

⁴ More executive profiles are available at http://www.invisalign.com/html/Corporate/aboutus_frameset.html.

Exhibit 3: Margins Comparison

Traditional Braces	Invisalign
Cost of braces and wires: \$500	Cost per set of product: \$1,900
Approximate price charged to patients: \$4,000	Suggested price charged to patients: ⁵ \$5,500
Product margin: \$3,500	Product margin: \$3,600
	
Primary market: children	Primary market: adults

⁵ Data approximated from interview with Kelsey Wirth, president and co-founder of Align Technology, Inc., who said Invisalign recommends maintaining same margins as those of traditional braces.

Exhibit 4: Manufacturing and Logistics Specifics

1. Santa Clara: Upon receipt of treatment data from orthodontist, Align used data to construct plaster models of the patient's dentition. The models were then scanned and used to develop a digital, three-dimensional computer model of the patient's current dentition. Along with the treatment prescription, this initial computer model was sent electronically to Align's facilities in Pakistan.
2. Pakistan: The initial model was transformed into a customized, three-dimensional treatment plan that simulated appropriate tooth movements in two-week increments. This simulation was transmitted back to Santa Clara for approval.
3. Santa Clara: Upon simulation approval, a series of molds of the patient's teeth was constructed at the Santa Clara facility. Each mold was a replica of the patient's teeth at each two-week stage of the simulated course of treatment. The molds were sent to an outsourced production vendor in Juarez, Mexico.
4. Mexico: The aligners were fabricated by pressure, forming polymeric sheets over each mold. The complete series of aligners was then trimmed, polished, cleaned, packaged, inspected, and shipped directly to the prescribing orthodontist.

Exhibit 5: Social Surveys

AMERICAN ACADEMY OF COSMETIC DENTISTRY

- More than 92% of adults agreed that an attractive smile was an important social asset
- Nearly 88% said they always remembered someone with an especially attractive smile
- 85% agreed that an unattractive smile made a person less appealing to the opposite sex
- 74% agreed that an unattractive smile could hurt a person's chances for career success
- Only 50% of people surveyed were satisfied with their own smiles

INVISALIGN SMILE SURVEY⁶

- 94% of those polled said they were likely to notice a person's smile when they met them for the first time. People were less likely to notice someone's eyes, height, or figure
- Over one-third agreed that bad teeth overshadowed the rest of a person's appearance
- An overwhelming majority of adults (85%) considered a person's smile to be very important at initial meeting
- 77% thought that wearing braces as an adult made a person feel self-conscious
- When asked which facial characteristic they would change if they could, one in four adults (25%) said they would change their teeth/smile. Smaller proportions would change their skin (17%) or nose (13%)
- 87% thought one's smile was very important to one's self-esteem
- Over one-third agreed that a person with bad teeth got fewer job promotions
- Three out of four adults (75%) thought an attractive smile was important for succeeding in the workplace
- Almost half agreed (45%) that bad teeth were a sign of poor personal hygiene

⁶ Results are summarized from a study conducted by Harris Interactive on behalf of Align Technology Inc.

Exhibit 6: Advertising

PRINT

ORTHODONTICS UNWIRED.

(Now you can skip this part.)



If the thought of wearing braces is all that's stopping you from getting the smile you've always wanted, here is some very good news.

It's a revolutionary, virtually invisible way to straighten teeth without braces, called Invisalign™.

Invisible, because they straighten your teeth not with the usual wires, but with a series of clear, strong aligners.

Computer Graphics do it

Where, you may ask, has this brilliant idea been all your life? The answer is, waiting for the 3-dimensional computer graphics technology to come of age. Now it has. And we've put it to work.



Then, Invisalign's computers translate these instructions into a sequence of finely calibrated aligners. It may be as few as 12 or as many as 48.

Gradually Your Teeth Move

You'll wear each pair of aligners for about two weeks. You'll take them out only when you're eating (so you don't have to give up any favorite foods) and when you brush your teeth.

You'll sleep wearing them. Kiss wearing them, sip coffee wearing them, whistle a tune wearing them.

As you replace each aligner with the next one, your teeth move. Gradually. Week by week, millimeter by millimeter. Until they reach the final alignment your orthodontist prescribed. Until you find yourself smiling like you've never smiled before!

Invisalign is not intended for children. And it's not appropriate for every adult.

CALL TO FIND OUT IF
INVISALIGN IS RIGHT FOR YOU

**Sample A.
Orthodontist**

Sample Practice
1234 Sample Street
Sampletown, US 12345
(888) 000-0000




invisalign
STRAIGHT TEETH. NO BRACES.

Exhibit 6 (continued)

TELEVISION⁷

Twins: "Hey, I can finally tell you two apart."



DIRECT MAIL

Before/After Pictures

Before



After



⁷ See advertising spots at http://www.invisalign.com/html/PressRoom/media_frameset.html.